Independent review of Crossrail - Governance

Prepared for TfL and DfT

23 January 2019

Glossary

AFCDC	Anticipated Final CRL Direct Cost
AFC	Anticipated Final Cost
ARM	Active Risk Management
BRS	Business Rate Supplement
CBTC	Communications Based Train Control
CCR	Cost Consideration Report
CCSA	Contract Commercial Status Analysis
CCSC	Commercial and Change Sub-Committee
CD	Commercial Director
CEO	Chief Executive Officer
CFO	Chief Finance Officer
CMS	Central Management System
COS	Central Operating Section
COWD	Cost of Works Done
CRL	Crossrail Limited
DfT	Department for Transport
DOO	Driver Only Operation
EIC	Executive and Investment Committee
ELRB	Elizabeth line Readiness Board
ELSSG	Elizabeth line Strategic Steering Group

FD	Finance Director
FLU	Full Length Unit
FRC	Financial Reporting Council
GLA	Greater London Authority
H&S	Health & Safety
HMG	Her Majesty's Government
HMT	Her Majesty's Treasury
IAAP	Integrated Assurance and Approval Plan
IA	Internal Audit
ICE	Institution of Civil Engineers
IM	Infrastructure Manager
IP	Intervention Point
IPA	Infrastructure and Projects Authority
JST	Joint Sponsor Team
KPI	Key Performance Indicator
LUL	London Underground Limited
MD	Managing Director
MCIL	Mayoral Community Infrastructure Levy
MTR	MTR Corporation (Crossrail) Limited
MOHS	Master Operational Handover Schedule
NAO	National Audit Office
NEC	New Engineering Contract

NED	Non-Executive Director
NR	Network Rail
ONW	On Network Works
ODA	Olympic Delivery Authority
OSEP	Operations and Systems Expert Panel
PAC	Public Accounts Committee
PCD	Programme Controls Director
PDA	Project Development Agreement
PDB	Programme Delivery Board
PM	CRL Project Manager
P Rep	Project Representative
QCRA	Quantitative Cost Risk Analysis
QRA	Quantified Risk Assessment
RAP	Remedial Action Plan
RemCo	Remuneration Committee
RfL	Rail for London
RfLI	Rail for London Infrastructure
RLU	Reduced Length Unit
SA	Sponsor Agreement
SACR	Semi Annual Construction Report
SB	Sponsor Board
SC	Staged Completion

SoS	Secretary of State
SQRA	Schedule Quantified Risk Assessment
TCR	Tottenham Court Road Station
TEV	True Expected Value
TfL	Transport for London
TOSD	Tier One Contractor Substantial Demobilisation
tph	Trains per hour
URT	Unresolved trends

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Important notice

This Report has been prepared on the basis set out in the Call-Off Agreement with Transport for London (‘TfL’) and the Department for Transport (‘DfT’) collectively and individually (‘the Client’) dated as commencing 21 September 2018 (the ‘Services Contract’), and should be read in conjunction with the Terms of Reference prepared by TfL.

Nothing in this report constitutes a valuation or legal advice nor an audit of the project.

In accordance with the Terms of Reference, KPMG has been requested by the Sponsors to make recommendations in relation to the governance arrangements of the delivery entity, CRL.

Our recommendations include references to ‘CRL should’ or ‘CRL to’, such terminology is used throughout this document. These recommendations have been provided solely for the benefit of the Client alone, these recommendations have not been prepared for the benefit of any other entity nor for any other person or organisation who may have a role in the implementation of any recommendation.

We have not verified the reliability or accuracy of any information obtained in the course of our work, other than in the limited circumstances set out in the Terms of Reference and except where expressly stated in this Report.

This Report has not been designed to be of benefit to anyone except the Client. In preparing this Draft Report we have not taken into account the interests, needs or circumstances of anyone apart from the Client, even though we may have been aware that others might read this Draft Report. We have prepared this Report for the benefit of the Client alone.

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In particular, and without limiting the general statement above, since we have prepared this Report for the benefit of the Client alone, this Report has not been prepared for the benefit of any other local authority or transportation authority nor for any other person or organisation who might have an interest in the matters discussed in this Draft Report, including for example those who work in the transportation sector or those who provide goods or services to those who operate in the transportation sector.

The contents of this document include matters which are commercially sensitive to TfL, Crossrail Limited (CRL) and potentially other parties and disclosure of this document in its entirety would, or would be likely to, prejudice the commercial interests of TfL, its subsidiary companies and / or other parties.

1 Executive summary

1.1 Introduction

1.1.1 Background

At the end of August 2018 Crossrail Limited (CRL) announced that the opening of Stage 3, the Central Operating Section (COS), of the Crossrail project (the project) would be delayed from December 2018 to Autumn 2019. An Adverse Event Notice, in accordance with clause 22 of the Project Development Agreement (PDA), was issued to Sponsors on 30 August 2018.

Transport for London (TfL), a joint sponsor with the Department for Transport (DfT), appointed KPMG on behalf of both Sponsors in late September 2018 to carry out two independent reviews of the Project.

Prior to the appointment of KPMG and after receipt of the Adverse Event Notice, the Sponsors requested CRL to prepare a Remedial Action Plan (RAP 1). It was issued on 18 September 2018 and was followed by an update (RAP 2) on 2 October 2018. RAP 1 and RAP 2 are jointly referred to as the 'RAP' in this report.

KPMG was asked by Sponsors to review RAP 1 shortly after it was released in September 2018. That review was guided by the separate financial and commercial Terms of Reference provided by the Sponsors to assess the reliability and robustness of the revised schedule and cost put forward by CRL. RAP 2 was issued during the course of our assessment and extended the scope of our review to include RAP 2. For the purposes of this governance report we have had regard to the RAP documents in addressing the Terms of Reference requirements in relation to commercial reporting, oversight, and commercial controls.

CRL was also at the time of our fieldwork updating its Master Operational Handover Schedule (MOHS) that was due to be issued in October 2018. However, at the time of finalising our fieldwork in December 2018 the updated MOHS had not been issued and our fieldwork does not take into consideration any time or cost information other than that contained within the RAP documents except where expressly stated in this report.

1.1.2 Scope of KPMG's work

The scope of our reviews were separately defined in two sets of Terms of Reference:

— Financial and commercial independent review;

— Governance independent review.

This draft report addresses the governance Terms of Reference (which are set out at Appendix 1). Our financial and commercial review is covered in a separate report.

1.1.3 This report

This report has considered the particular governance implications arising from the current stressed[1] status of the Crossrail project, and from the uncertain project cost and completion timelines. The scope of work we were asked to address in our review of governance, is attached as Appendix 1. It is important to note the scope requires that this "*review should focus on current effectiveness and scope for improvement for the remainder of the project while also considering the historical context that has*

[1] "Stressed" in terms of the project having needed on 10 December 2018 to significantly change expectations as to outturn timeline for Stage 3 Opening and as to cost, and the related significant uncertainties and related challenges which remain to be addressed

led to the need for this review". In addressing historical context we were guided to have regard to the preceding 12 months.

Accordingly this report does not seek to review the operation of CRL or its governance in earlier years. We note the many reported achievements of the Crossrail project in its journey and inter alia the Crossrail Learning Legacy it has shared.

An important objective of this report is to help Sponsors to identify the governance and other steps required to be taken at pace to enable CRL to move forward strongly from the current stressed status of the project to help it to achieve its objectives with a particular emphasis on completion time and cost.

The findings and recommendations presented in this report reflect fieldwork which concluded on Friday 7 December 2018. The report has not been updated for new information released after this date save for making reference to TfL's press statement issued on the morning of 10 December 2018.

This report and the recommendations contained within it have been drafted in line with the direction of the Terms of Reference, the focus being on identifying improvements to governance arrangements to address the specific challenges now facing the Crossrail project. Revisions to the governance structure for the Crossrail project have to take into account historical issues but must also in particular, be designed to meet the needs of the remaining programme of work. Governance arrangements should be designed to provide Sponsors and stakeholders with confidence that CRL will complete the project within the newly defined affordability envelope as well as within revised timelines which are still subject to development by CRL and, agreement with Sponsors. CRL will also need to agree with Sponsors that updated frameworks of control and oversight are in place and operating effectively. These same arrangements must also provide CRL as the organisation responsible for the delivery of Crossrail, with the freedoms necessary to address programme delivery issues, manage timely and cost effective delivery to completion, and manage complex integration challenges.

The programme performance issues and the recent announcements of programme cost overruns and delays mean that trust and confidence between Sponsors and CRL has been weakened. Revised governance structures should work alongside action already taken by Sponsors and CRL to enhance CRL management and to help rebuild trust. Transparency and open communication between Sponsors and CRL will be critical in underpinning the structural recommendations both in this report and in our separate report addressing the financial and commercial Terms of Reference.

Action to address the recommendations contained in this report, and in the financial and commercial report, is required as soon as possible so that the revised arrangements are in place and operating to support Sponsors, the CRL Board and CRL Executive team. The project outturn cost which will actually be achieved critically depends on:

- The extent to which appropriate steps are rapidly taken by Sponsors and CRL to address the issues covered in this report, and in the related financial and commercial report, which are the basis for our recommendations provided to Sponsors for consideration; and
- Whether additional significant risks materialise which have a material impact and which have not already been identified by CRL within its RAP 2 document.

1.2 Crossrail programme – history and context

The Crossrail Act 2008 permitted the construction of the Crossrail railway from Maidenhead and Heathrow in the west to Shenfield and Abbey Wood in the east, with new rail tunnels (and stations) under central London as required. The funding deal for the scheme was complex but the basic principle was simple – the cost would be shared between the Government, TfL and the business community.

Crossrail broke ground on 15 May 2009 at Canary Wharf, when the Mayor and the Transport Secretary launched the first pile into the North Dock in Docklands at the site of the new Canary Wharf station.

In 2010, the Government's Comprehensive Spending Review confirmed savings of over £1bn in projected Crossrail costs. This was reported as due chiefly to a revision of the tunnelling strategy[2] and due to "*improved station and engineering solutions and a more efficient construction timetable*"[3]. This meant that Crossrail services would commence through the COS in 2018 rather than 2017, followed by a phased introduction of services across the rest of the route, but it also allowed the funding envelope needed to deliver Crossrail to be reduced to £14.8[4]bn from £15.9bn.

Crossrail tunnelling began in May 2012 and ended in May 2015. As noted above, we have not been asked to review the overall Crossrail project and its many achievements. For context we note from Crossrail's own website[5] that it summarises the project as follows:

"Crossrail is among the most significant infrastructure projects ever undertaken in the UK. From improving journey times across London, to easing congestion and offering better connections, Elizabeth line will change the way people travel around the capital."

It also notes the following general information:

— *"**Crossrail Limited is building the Elizabeth line** - a new railway for London and the South East, running from **Reading and Heathrow** in the west, through 42km of new tunnels under London to **Shenfield and Abbey Wood** in the east.*
— *The **Crossrail project** is currently **Europe's largest infrastructure project**.*
— *The new railway, which will be known as the Elizabeth line when services begin through central London, will be **fully integrated with London's existing transport network** and will be operated by Transport for London.*
— *The Elizabeth line will stretch **more than 60 miles / over 100km** from Reading and Heathrow in the west through central tunnels across to Shenfield and Abbey Wood in the east.*
— *An estimated **200 million annual passengers** will use Crossrail.*
— *The Elizabeth line will serve **41 stations** including **10 new stations** at Paddington, Bond Street, Tottenham Court Road, Farringdon, Liverpool Street, Whitechapel, Canary Wharf, Custom House, Woolwich and Abbey Wood.*
— *Construction of the new railway will **support regeneration across the capital** and add **an estimated £42bn to the economy of the UK**.*
— *Over **130 million working hours** have been completed on the Crossrail project so far."*

We note that CRL management has highlighted to us "*the many years of successful delivery, the completion of the largest ever tunnelling works, station civil works, [and] implementation of much of the highly complex track, including floating track slab works, through the centre of London with very little disruption*".

The project has been subject to reviews and independent scrutiny. One such example was a July 2014 Public Accounts Committee (PAC) report. The PAC July 2014 report noted "*The Crossrail programme is proceeding well and is on course to deliver value for money to the taxpayer. The joint sponsors of the Crossrail programme, the Department for Transport (the Department) and Transport for London, are working well with the delivery organisation, Crossrail Limited, to deliver the programme, which at present is broadly on schedule and being delivered within budget*". This report however cautioned that "*construction is not yet complete, and considerable risks remain in delivering*

[2] http://www.crossrail.co.uk/route/crossrail-from-its-early-beginnings
[3] Crossrail Limited: Programme Overview Report, December 2010
[4] Including NR ONW and Depot costs
[5] Elements of this sub-section are drawn from the contents of the CRL website as at December 2018

the programme by 2019, particularly managing the transition from building the railway to operating it, and delivering the Crossrail trains".

In the same year a National Audit Office (NAO) report noted that "*During the construction phase, the governance arrangements and oversight of the project have ensured tight management of the programme so that delivery to both cost and schedule are well managed*."

The NAO 2014 report also noted a need to consider the future transition from construction to operations. It recommended that "*the Department [DfT] now needs to [f]inalise its plans for the development of governance arrangements as appropriate for the transition from construction to operations, over the next five years. The Department should work with Transport for London, Crossrail Limited and Network Rail to produce a transition plan of similar clarity to the founding programme agreements.*"

During interviews for this report the DfT noted that following the NAO recommendations, action[6] had been taken to consider the future governance arrangements required for the transition from construction to operations.

This report has considered the particular governance implications arising from the departure from "business as usual" to the current stressed status of the Crossrail project, including from the uncertain project cost and completion timelines.

With regard to forecast outturn cost, we note that CRL's recent 6 monthly Semi-Annual Construction Report (SACR) 20[7] report summarises the Anticipated Final CRL Direct Costs (AFCDC) as reported over the last 7 years or so. We note that total Crossrail Project costs (which had an affordability envelope of £14.8bn) comprise in addition to AFCDC, the Network Rail (NR) On Network Works (ONW) costs and Depot costs. In relation to Commercial matters this report addresses AFCDC and not total Crossrail project costs. With regard to governance matters, this report addresses CRL's integration and direct delivery responsibilities and related governance matters.

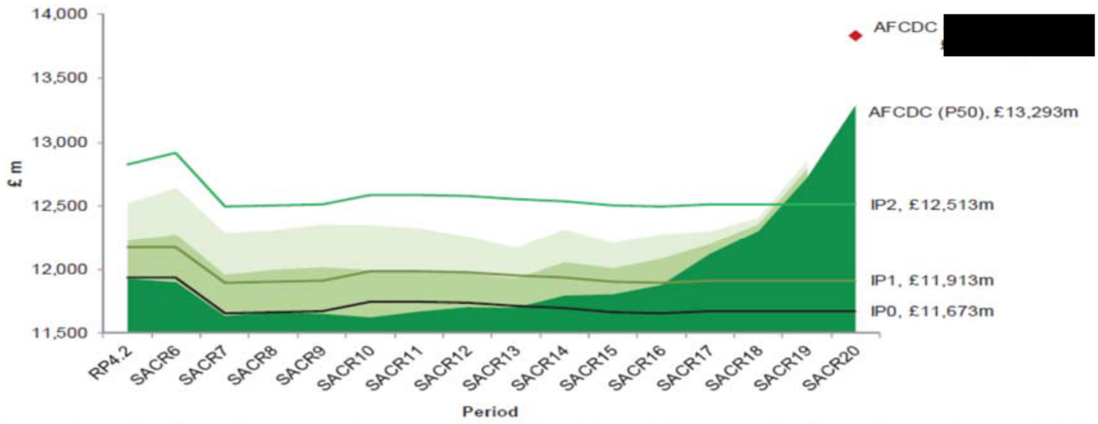
The reported AFCDC over the last 7 years or so, is set out in the graph at Figure 1 culminating in the recent increase in AFCDC referred to under section 1.3. The graph shows the reported AFCDC in each SACR report (these are produced 6 monthly). The dark green area represents what was reported as P50, and the lighter greens, P80 and P95 which have converged as the project has progressed. One can see significant increases in reported P50 AFCDC after SACR 16, and in reported P95 AFCDC after SACR 18, based on the graph.

[6] It was not part of our Terms of Reference to review actions taken in response to the NAO 2014 report and we have not sought to do so.

[7] SACR 20 covers the period from 1 April to 15 September 2018

Figure 1: Crossrail - Change in AFCDC and Intervention Points (IPs) since RP4.2 in May 2011

The graph below shows how the AFCDC and IPs have changed since RP4.2, noting that in SACR20 P80 and P95 were no longer reported:



Notes: The reduction in IPs in SACR7 was driven by a reduction in investment income on the SFA, from £550m (capped at £400m in the calculation of IP0 and IP1) to £119m.
The reduction in AFCDC in SACR7 [redacted] in the Network Rail financing charge.
The increase in IPs in SACR10 was due to £54m additional Sponsor Funding to build an operational station at Woolwich. Since SACR10, forecasts of SONIA rates have declined.
Figure 3.4-1: AFCDC vs. IPs by SACR period

Source: SACR 20

Note: Each SACR covers a 6 month period ending March or September with SACR 20 being the period 1 April to 15 September 2018. The P50 number of £13,293m shown in the above graph (as extracted from SACR 20) was the AFCDC P50 value reported by CRL in its Period 06 Board Report. SACR 20 used the P95 [redacted] value of £13,831m, as agreed with Sponsors as the AFCDC for the purposes of SACR 20. This reflected the latest information available through RAP2.

1.3 Recently announced outturn cost and funding

CRL has recently announced a significant increase in cost to completion and the delayed opening of the Elizabeth line. To complete the project, there remains significant work to be performed, in particular the completion of the stations, train testing, systems integration and transition to operations. At the time we were completing our fieldwork, CRL was developing a revised MOHS and estimated cost to completion.

On 26 October 2018, the Government announced, as an interim measure, that £350 million of short term repayable financing would be made available to the Mayor for the year 2018_19. The purpose was to *"ensure that full momentum is maintained behind Crossrail"*.

On 10 December 2018 TfL issued a press release which stated inter alia:

"*The emerging findings of the KPMG review into Crossrail Ltd's finances indicate the likely capital cost impact of the delay to the project announced in August could be in the region of between £1.6bn and £2bn*[8]*. That includes the £300m already contributed by the Department for Transport (DfT) and TfL in July 2018, leaving an estimated £1.3bn to £1.7bn to complete the project.*

The Mayor of London and the Government have agreed a financial package to cover this. The Greater London Authority (GLA) will borrow up to £1.3bn from the DfT. The GLA will repay this loan from the existing Business Rate Supplement (BRS) and Mayoral Community Infrastructure Levy (MCIL). The GLA will also provide a £100m cash contribution, taking its total contribution to £1.4bn which it will provide as a grant to TfL for the Crossrail project.

[8] This equates to a forecast outturn AFCDC of £14.1bn to £14.5bn respectively, as compared with a budget of £12.5bn.

Because the final costs of the Crossrail project are yet to be confirmed, a contingency arrangement has also been agreed between TfL and the Government. This will be in the form of a loan facility from the DfT of up to £750m, should the higher end of the estimate be realised.

This combined financing deal will replace the need for the £350 million interim financing package offered by the Government in October."

1.4 Governance context

The overarching Crossrail governance structure, being the arrangements established between Sponsors and CRL as the delivery body, largely reflects the design of arrangements which were put in place during the early stages of the project. The Sponsors' roles and responsibilities are defined in the Project Documentation, in particular in the Sponsors Agreement (SA), PDA[9] and specifically as regards TfL as the owner of CRL, in TfL's Shareholders Agreement.

The SA notes that *"[the] SoS and TfL have agreed that the overall management of the Crossrail Project and their relationship as its co-sponsors shall be governed by the terms of this Agreement*" and the agreement provides additional detail regarding the responsibilities of the parties. In April 2011 Review Point 4 was completed, this review point involved the assessment of both Sponsors and CRL by the Major Projects Review Group and considered the projects readiness to move to the next phase (for example tendering for delivery works contracts). The completion of Review Point 4 signalled the point at which CRL met requirements as defined in the PDA for the transition of decision making authority from the Sponsors to CRL. The PDA did not specify additional review points and the governance structure between Sponsors and CRL has not significantly evolved since the completion of Review Point 4.

This report recommends changes to governance to reflect the stressed status of the project, to align the structure with the now changed current and expected project requirements through to completion, and to facilitate Sponsors to achieve / sustain more effective oversight. Given the stage and complexity of the remaining programme, a completely new governance structure is not considered appropriate as it would potentially introduce significant risk to the project.

Changes have already been implemented with regard to CRL leadership. The Chair of the CRL Board has resigned, a replacement is being sought, and there is a new Executive management team in place within CRL. The new Chief Executive Officer (CEO) and Finance Director (FD)[10], are both TfL secondees, appointed at the behest of Sponsors.

1.5 Principles and report assumptions

A set of principles guided the development of the recommendations in this report. The principles are derived from the assessment of the current project status, the current operation of the governance structure and the specific requirements of the forward programme. As such the recommendations in this document should do the following:

— Reflect the stressed status[11] of the project;

— Support the rebuilding of trust between Sponsors, CRL Board and CRL Executive;

— Deal with any identified deficiencies in the current governance arrangements in the context of the situation in which the programme now finds itself;

— Support increased transparency at all levels of the programme;

— Be forward looking, aimed at supporting the project through to completion;

[9] The PDA and SA were agreed in 2008.

[10] We have used FD to refer to the role of Finance Director previously held by Mathew Duncan but note that David Hendry appointed with similar responsibilities holds the title of CFO. We have used the term 'FD' to refer to either the previous FD role or the new CFO role.

[11] "Stressed" in terms of having needed on 10 December 2018 to significantly change expectations as to outturn timeline for Stage 3 Opening and as to cost, and the related significant uncertainties and related challenges which remain to be addressed.

- Be proportionate and practicable. Recommendations must be capable of implementation within timeframes that have a practical and timely effect on the project; and
- Maintain clarity and separation of Sponsor and CRL roles.

The following assumptions informed the recommendations contained in this report:

- Sponsors will agree additional funding facilities sufficient to cover the expected costs of the effective execution of the balance of the programme, together with appropriate mechanisms for bearing risk and holding contingency
- Neither Sponsor has, nor will choose to exercise its “Put” and “Call” rights at this stage
- Sponsors will remain jointly accountable for the overall programme. The joint Sponsor Board (SB) will continue. Sponsors will not assume formal delivery responsibility
- CRL will remain the responsible body for the completion of the project in line with the responsibilities articulated in the PDA, this includes management and integration of the whole programme to deliver an operational railway. The CRL Board will continue, but with potential revisions in composition and autonomy
- Sponsors have confirmed that the CRL Board and Executive team will be given the opportunity and responsibility to address the current issues and deliver the remaining programme

1.6 Our overall approach

Our overall approach to addressing the governance Terms of Reference was to review documentation provided by CRL and TfL, and hold interviews with certain senior Sponsor and CRL staff, as well as with others as appropriate. In was not part of our Terms of Reference to seek information direct from Contractors.

Our overall findings and critical recommendations are summarised at Section 1.7 below followed by our observations and recommendations on moving forwards at Section 1.8. An introduction and additional information on our approach is contained at Sections 2 and 3 respectively. Our detailed findings and the full detail of all our recommendations are set out in the supporting Sections 4 to 8 and in the appendices. For a full understanding of the matters considered the reader should consult the relevant sections and appendices as appropriate.

1.7 Overview of key findings and critical recommendations

1.7.1 General points

Our findings as previously noted, are drawn from a review of documents and information provided which principally relates to the 12 months up to our fieldwork. In this Executive Summary we have set out an overview of key findings together with critical recommendations. After each critical recommendation we have included the recommendation number in brackets so that the reader can consult the detailed recommendation in Sections 4 to 8 where, in many cases, there is significant additional detail as well as further recommendations, sometimes related.

The drafting of a detailed recommendation means that we have concluded a change is required either because Crossrail’s needs have changed given the project is no longer in a “business as usual” state, or because we found evidence / examples that an important control or process was missing or was not designed and / or operating in line with good practice. The inclusion of a finding / recommendation does not therefore mean that the area has not been operating appropriately throughout the entire Crossrail programme, but it does mean that a change / improvement is now, in our view, needed.

1.7.2 Programme sponsorship

There is a need, consistent with our recommendations, to enhance Sponsor oversight of the programme. The recommendations reflect the fact that the project is now stressed and no longer in a “business as usual” state. They have also been informed by good practice and examples from other major government programmes.

Particular areas of focus for Crossrail include maintaining the separation between Sponsors and CRL, whilst increasing Sponsor oversight and controls, rebuilding the trust between Sponsors and CRL and enhancing the behaviours which underpin transparency. This critically needs to be supported by mechanisms which enable enhanced reporting at all levels (by contractors to CRL, within CRL, and by CRL to Sponsors), as well as sufficient assurance of the information provided.

Critical recommendations include:

— Sponsors to encourage and ensure the fostering of an enhanced culture and environment within CRL whereby relevant performance information and risks are encouraged to be openly and promptly shared throughout the organisation so as to best enable informed timely decision-making (4.2);
— Sponsors to foster a culture and environment where CRL is encouraged to share relevant performance information, especially when programme performance and / or expected outturn may not be in line with Sponsor expectations (4.3);
— Sponsors to consider appointing an Independent Member to the SB to support Sponsors in their decision making. (4.7);
— Each Sponsor should consider the appointment of a Voting Member of the SB as an observer at the CRL Board. (4.8).

1.7.3 CRL Board and Board Committees

Trust between Sponsors and the CRL Board has been undermined by reporting that did not sufficiently surface the probable impact of or the magnitude of the emerging performance issues soon enough.

The CRL Board has been through a period of extensive change. A majority of its membership has changed during 2018, including individuals performing the role of Chair and CEO[12].

Our recommendations consider the further skills and experience which would augment the current CRL Board given the nature of the remaining phases of the project, and also address the roles of Committees of the Board.

The CRL Board continued, until relatively recently, to pursue a pre-planned demobilisation of central resources around a December 2018 Stage 3 opening. This included disbanding the CRL Audit Committee in effect in July 2018 and the re-allocation of its responsibilities (further details can be found in Section 5.6).

Sponsors have held some limited rights as regards CRL remuneration, however, Sponsors have not had direct rights of approval over CRL remuneration decisions. Reflecting the current particular challenging status of the project, Sponsors need to have confidence, and to have and be seen to have a more direct role in ensuring, that remuneration decisions taken during the remainder of the programme are demonstrably in the public interest and linked to the timely and cost effective delivery of the programme.

There was a much reduced level of internal audit coverage in 2017_18 and 2018_19, with insufficient coverage in particular in the critical areas of finance and commercial controls.

Demobilisation reduced central risk oversight and central reporting around commercial and financial risks although CRL considers it did not impact risk management and mitigation at a project level as demobilisation was only focussed on central resources.

[12] In the period since March 2018, all three individuals performing the role of Executive Director have changed. There has also been change to CRL NEDs. In March 2018 there were six NEDs, as of December 2018 there were five NEDs. One of the existing NEDs has become the CEO. Three former NEDs reached the end of their terms of office in June 2018, these three individuals were replaced by three new NEDs, appointed in July 2018.

Critical recommendations for consideration in relation to CRL Board and Board Committees include:

— Sponsors to approve a new Chair of the CRL Board taking account of the essential requirements of the role through completion and handover from CRL to TfL for Elizabeth line operation. Sponsors should be clear as to the accountabilities of the role and the Sponsor expectations of the individual performing it, which should include the requirement for CRL to demonstrate strong and appropriate corporate governance (5.1);

— Sponsors should work with CRL to enhance the capabilities and expertise of the CRL Board through the nomination of new Non-Executive Directors (NEDs) with expertise matched to the current and future requirements of the programme (5.2);

— Sponsors and CRL should agree changes to the procedures around and oversight of remuneration of senior CRL staff. Two options for achieving this are presented (5.3);

— CRL to recognise that greater openness and transparency with Sponsors and timely communication of relevant information is required to reflect the changed circumstances of the project and to set out to Sponsors how CRL will cascade enhanced expectations regarding behaviours, transparency, and culture throughout its organisation (5.4);

— CRL to re-establish the CRL Audit Committee and Risk Sub-Committee as a single combined Committee (the Audit and Risk Committee). The remit of the Audit and Risk Committee should be consistent with standard good practice for an organisation such as Crossrail (5.5);

— The breadth, resources and focus of CRL's internal assurance programme should be enhanced so that there is sufficient focus on project delivery and corporate risks, internal financial and commercial controls and on reporting (5.5);

— With regard to the reporting of risk we recommend consideration is given to more frequent reporting to EIC, to introducing reporting to the CRL Audit and Risk Committee once formed[13], to re-assessing the sufficiency of central risk resources and to reinstating risk quantification at project level (5.5).

1.7.4 Programme integration

There are a number of TfL secondees performing executive roles with regard to programme delivery and transition to operations (e.g. Operations Director and the newly appointed CEO and FD). These seconded executive director roles are supporting the integration of CRL programme delivery, TfL provision of rolling stock and TfL as the Infrastructure Manager (IM) (through Rail for London Infrastructure (RfLI)).

There was a general recognition among stakeholders and executives of the need for enhanced integration capabilities and capacity within CRL in support of completion of the remaining programme of works. The completion of the Crossrail project and the commencement of operations involves complex systems integration activity. This includes both complex technical integration (e.g. train and tunnel signalling; and SCADA systems integration) as well as programme and organisational integration activities (e.g. procurement and oversight of sufficient numbers of trained operational staff; availability of key technical capabilities for testing (such as fire safety); and operational process interfaces between RfLI, London Underground Limited (LUL) and MTR Corporation (Crossrail) Limited (MTR)). Sufficient integration capabilities are required so as to ensure CRL is able to understand and successfully integrate the different critical paths of activity.

We are aware that CRL has recently procured an independent report on programme management and technical integration and is taking steps to address the recommendations arising but we have not seen a copy of that report, details of its recommendations, CRL's resulting action plan or details of progress made in implementing agreed actions[14].

There was insufficient clarity around reporting of whole programme performance. To understand whole programme performance requires an assessment of a number of separate critical paths and their inter-dependencies. Not all of these are wholly within CRL direct control. The rolling stock was

[13] The Audit and Risk Committee should be formed as soon as possible.

[14] We have seen a copy of the scope of work but not the resulting independent report which we understand was received by CRL in draft and possibly in final form, during the course of our review.

procured by Rail for London (RfL) although the relevant contract management team is based within CRL, working to the CRL Operations Director who has a dual reporting line to the CRL CEO, and to the LUL Managing Director (MD)[15]. Operational readiness is a function of CRL, TfL and NR managed activities.

Programme assurance has also not consistently covered all elements of the programme, the integration of the programme or operational readiness.

CRL has taken action to update the programme governance arrangements to reflect the changing nature of the programme requirements. For example CRL established the Elizabeth Line Strategic Steering Group (ELSSG) to support integration of the programme elements required for the operation of the Elizabeth line, including handover to the IM and integration of the rolling stock. However, the revised governance arrangements and their operation has not sufficiently reflected the changing balance between construction, systems, integration and operational readiness activities. In consequence they have insufficiently addressed the complexities of the programme, in particular the programme integration challenge.

The changing nature of the programme requirements means that Sponsors and CRL also need to take action to update the arrangements for the termination of the joint sponsorship model. Specifically this needs to take account of the current stressed status of the programme and the handover to the operation of a railway. The current arrangements do not sufficiently address the evolving needs arising from the changing balance between construction, systems, integration and operational readiness activities in the circumstances of the current stressed programme status.

CRL also operates a Programme Delivery Board (PDB). There is overlap between the PDB and ELSSG in terms of representation, responsibilities and reporting. Furthermore interviews noted challenges in the operation of both entities. The ELSSG was identified as having been conceived as a senior strategic decision forum which had ultimately become an informal and detail focused body. The PDB was noted as being comprised of two full day meetings with over 20 participants. Interviewees commented that these forums could be more focused, should emphasise critical issues, and attendance by both CRL personnel and partner organisations should be tailored to ensure that the key remaining delivery, integration and operational issues are addressed.

The planned arrangements for handover by CRL from programme delivery to TfL for operation of the Elizabeth line, are subject to change as a result of the programme schedule slippage. Plans and responsibilities will need to adapt accordingly.

Critical recommendations in relation to programme integration include:

- Sponsors to update current arrangements for the termination of the joint sponsorship model. This is required to reflect the changes to expected completion timelines and potential overlap between programme completion activity and the operation of the Elizabeth line (6.1);
- Sponsors to review and agree the actions which CRL has determined to implement in response to the recommendations set out in the independent report recently procured by CRL to review programme management and technical integration challenges. Sponsors to monitor CRL's progress in implementing resulting agreed actions and CRL's assessment of whether the steps taken are adequately addressing the underlying issues. (6.4);
- CRL to create an effective systems integration leadership / authority with a clear and appropriate remit, together with measureable objectives which are regularly reported against and monitored (6.4);
- CRL to review and take actions as may be necessary to ensure there are appropriate mechanisms under its control for the timely and effective integration of all key supplier and partner contributions to the programme including in particular in relation to NR (6.6);

[15] The CRL Operations Director is a TfL employee and executive director of CRL. The role has reporting lines into both the CRL CEO and LUL MD, this reflects the nature of the role in preparing for the operational running of the railway, the extent of reporting into the LUL MD has varied over time. We note that the previous LUL MD, Mark Wild, was also a CRL NED; Mark Wild has recently been seconded to CRL becoming the CRL CEO and has relinquished the role of LUL MD.

— Sponsors and CRL to update and clarify the arrangements and mechanisms for CRL handover to TfL (RfL, RfLI, LUL) (6.8)

1.7.5 Commercial reporting, oversight, controls and processes

CRL performance monitoring and reporting has not led to timely / adequate[16] advance notice being provided of the need to materially change the Stage 3 opening date and the resulting significant cost impact.

Cost scenarios prepared by CRL at Sponsors' request and tabled at the March 2018 SB, critically did not take account of the potential impact of any material irrecoverable delays in infrastructure works which had a much more substantial cost run rate than the issues addressed in the scenarios[17].

Effective reporting of programme status relies inter alia on:

— Effective contract management, monitoring and oversight by contractors of their supply chains; of contractors and supply chains by CRL; and on

— Effective reporting systems and flows of information up through CRL from project and commercial teams, through to management, on to EIC, and then to the CRL Board and thereafter to Sponsors.

The resultant reporting within and by CRL was neither sufficiently timely nor sufficiently clear as to the impacts and magnitude of the range of probable consequences of the issues within the programme.

CRL management explained to us that its understanding of the project costs and timeline as reported through the project management teams and systems was evolving and changing at pace during the first half of 2018 and that there were many challenges to schedule and milestones and that a variety of actions were being taken to address the challenges identified. It is evident that there were formal discussions taking place between CRL and Sponsors around these matters and we were told that there may also have been informal discussions[18].

Evidence of formal discussions around these matters is apparent from, for example, in the minutes of the June 2018 SB which record that Sponsors asked CRL to provide information for the next checkpoint (in effect the July SB) on: confidence in December delivery, alternative options to December, including a delayed opening or a reduced frequency or partial opening. We note that a document entitled "Stages 2-5 Readiness" dated 25 June 2018 and tabled by CRL at the June SB showed the Stage 3 opening date of 9 December as "Green" with no variance against a 9 December 2018 opening date although a significant number of the preceding Stage 3 milestones and activities were clearly shown as red or amber as shown in Table 1:

[16] "adequacy" when assessed in the context of the length of the Crossrail programme and the magnitude of changes to forecast time and cost outturn recently announced

[17] Scenario A (with 3 different options) assumed no delay to Stage 3 opening but with the potential need to accelerate. Scenario B considered 3 different delay options but in all cases assumed that all infrastructure works would still be finished as planned and that delay would arise during systems or dynamic or software testing or due to the lack of a viable train. Allowance was made for around [redacted] per month costs for maintenance, upkeep and safe operation of the infrastructure in the event of a prolonged train control and/or system operating delay. A [redacted] delay scenario assumed delay due to a serious event that caused wholesale re-programming. We note that Jacobs' Cost Scenario Report of June 2018 reported that at a meeting with the Joint Sponsor Team (JST) in March 2018, CRL had stated that it felt the book-ends of the cost projections lay between Scenario A, Range 2 and Scenario B, Range: [redacted], equating to a £200m to £300m increase in cost above IP2 at P50.

[18] We were not provided with evidence as to the fact of informal discussions and it was outside of our Terms of Reference to investigate whether and if so what informal discussions occurred.

Table 1: Stages 2-5 Readiness Milestone / Activities

Milestone / Activity	Green	Amber	Red
Dynamic Testing	4	1	3
Pre-Trial Running	4	2	3
Combined Elizabeth line trials	1	4	0
Passenger Service	5	0	0
LU and RfLI Stations – Staged Completion for familiarisation and Trial Ops	7	1	0
Infrastructure, Trains and Testing	0	2	4
MTR, NR, LU and RFLI readiness	0	4	1

It is also evident that there was regular reporting each period on forecast cost outturn and timeline inter alia in the CRL Board reports during 2018[19] and in Project Representative (P Rep) reports[20]. We have based our comments and recommendations on what is recorded in the papers and documents that we have reviewed including the formal minutes of meetings.

It is clear from the reporting of CRL and of the P Rep that a large volume of work was being undertaken to mitigate delays, re-sequence works and search for alternative approaches to testing and commissioning to maintain the opening date. A feature of the increasing stretch or optimism, however, was a failure to identify, and / or report on a timely basis, the point at which it became unrealistic to expect all remaining activities to be completed within the diminishing timeframe for planned Stage 3 opening and which should have led to revised expectations as to time and cost outturn being developed and reported.

More generally, we consider there was insufficient information in CRL Board reports (i) around actual and likely performance of individual contracts and related integration activities to enable an accurate and sufficient understanding of their likely outturn and impact on the programme; and (ii) of useful trend and other analysis to enable an adequate understanding of historic performance against plan in the context of assessing forecast cost and time to completion.

Finally we note that since 2017 the CRL risk management process has been split between the site teams who perform qualitative risk assessments (previously they also performed detailed quantitative assessments) and the central management risk team which now performs the quantitative analysis

[19] We note in this regard that the Crossrail Cost Scenario Review report prepared by Jacobs and dated 19 June 201819 stated: *"In early March 2018 CRL presented to JST its document entitled AFCDC Scenarios whereby it proposed two scenarios and developed costs for three options within those scenarios, in order to establish and describe an estimated upper and lower limit of funding requirements (known as the 'book-ends'). During this meeting CRL stated that it felt the book-ends of the cost projections lay between Scenario A, Range 2 and Scenario B, Range 3 month delay, equating to a £200m to £300m increase in cost above IP2 at P50."*

We note the CRL Board Report for period 4 2018_19 [24 June to 21 July 2018] shared with Sponsors addressed *"Are we on time" inter alia as follows:*

"Overall delivery is 94.4% complete vs. planned of 96.3%. 0.6% was achieved in the Period against the plan of 0.7%. Work remains ongoing to evaluate the impact of schedule delays to critical path activities on Stage 3. Alternative scenarios have been identified and communicated, with an executive review planned in Period 5. The drive to complete all physical works and handover each element to the IMs in accordance with the agreed stage completion dates remains resolute."

The same CRL Board Report commented overall: *"Steady but vital progress continues to be made across the project, but in order to mitigate further schedule slippage, each contract is working on detailed plans to demonstrate the steps they are taking towards handing over their sites to the IMs. Despite this, significant overall schedule pressures exist across the programme and work remains ongoing at a project level to identify and evaluate the impact of schedule delays on critical path activities ahead of Stage 3. Alternative scenarios have been developed with Executive, Board and Sponsor reviews planned in August and September to discuss the schedule pressures and proposals for a revised delivery strategy. The drive to complete all physical works and handover of each element to the IMs in accordance with agreed stage completion dates remains resolute as this is key in minimising further cost growth.*

Overall, the project has now reached 94.4% complete. In the Period, the AFCDC remained unchanged at £12,810m (£297m above IP2). In the next few weeks, further defined-cost reviews will be held with key contracts in our ongoing review of emerging costs and additional cost increases in light of schedule pressures. These increases are in the process of validation ahead of being reported next Period."

[20] The role of P Rep is performed by Jacobs. See Appendix 5 for example relevant extracts from P Rep reports during March to August 2018.

across the project. The latter has been reduced to two people as part of the demobilisation plans aligned to a Stage 3 December 2018 opening.

1.7.6 Remainder of the project – CRL reporting

Sponsors should remain accountable for the successful delivery of the whole Crossrail programme, (to a timescale that has yet to be determined and a budget that is heavily dependent on the time to complete the infrastructure works) with CRL in turn held responsible for the successful integration and delivery to an agreed timeline and budget (4.1). It will be critical for the Sponsors to satisfy themselves around the development of the delivery plans with associated estimates of time, cost, risk and assessment of scope adjustments required to open the Elizabeth line as early as practicable (7.2).

Once the plan is agreed the Sponsors and CRL will both need to establish adequate controls, reporting and assurance that the programme is on track or that adequate action is taken at the appropriate time to maintain progress within budget.

Critical recommendations during the initial planning phase include:

- Establish the reserved matters that require CRL to seek Sponsor approval (7.4);
- Agree timescales for the development of the initial programme by the new CRL CEO and then the development of that programme (7.8, 7.12);
- Obtain independent assurance of the CRL programme with a deep dive into the estimates for time and cost and providing scenarios based on various scope and other options (7.8);
- Review the funding envelope and define the process for the timing and release of additional funding against identified risks (7.1).

Critical recommendations after the agreement of the initial programme include:

- Agree the critical milestones that provide the Sponsors with a transparent view of performance (7.5);
- Define the method for obtaining assurance that CRL reporting is sufficient, accurate and transparent (Exec 1[21]);
- Agree the metrics and analysis required from CRL in its performance reporting to allow the Sponsors to make their own assessment of whether the progress being achieved is in line with the plan (7.3 and 7.13);
- Define what Sponsors' wish to receive from CRL in the form of variance analysis and a summary of mitigation actions where performance achieved is behind that planned (7.5).

1.7.7 Sponsor assurance

The P Rep reported many of the key issues and risks to the achievement of the Stage 3 opening date but did not provide an assessment of the potential / likely impact on the opening date.

Jacobs was asked to prepare an independent review of the approach taken by CRL in the development of scenarios on the costs to completion and reported thereon in June 2018. However, Jacobs did not set out in its report to Sponsors that an additional scenario in which CRL materially failed to recover its delays to infrastructure works should have been considered and priced. Had CRL and / or R Rep considered such a scenario then such a scenario would have identified a more substantial increase in the AFCDC.

The P Rep did not adequately challenge CRL in its assumptions that it could recover their delays to maintain the Stage 3 opening date including as to the achievement of contractor Tier One Contractor Substantial Demobilisation (TOSD) dates and an assumed resulting substantial reduction in the programme cost run rate.

Critical recommendations for Sponsors include:

- Confirming the requirements to be placed on the P Rep to provide whole programme assurance. P Rep should set out the approach it intends to follow to provide this assurance for the remainder

[21] Recommendations included only in the Executive Summary are set out in Section 1.8.3

of the programme. Sponsors should then review, iterate as necessary, and agree an approach with P Rep which Sponsors consider to be appropriate and sufficient (8.1);

— Consider obtaining regular, independent advice which enables Sponsors to judge whether P Rep's current remit and outputs are providing sufficient assurance to Sponsors across the full range of programme challenges or whether additional steps are required to assess and consider the information being received in relation to the programme (Exec 1).

1.8 Moving forwards

1.8.1 Addressing the issues

We have set out above and through this report, and in our other report on financial and commercial matters, a number of recommendations for consideration to address the issues identified.

We have noted that the issues we have highlighted need to be addressed at pace if Sponsors and CRL are to give themselves a good chance of managing the completion of the programme within the cost envelope announced on 10 December 2018.

There will still be significant challenges to be faced in completing the infrastructure works, the routeway, systems, signalling and systems integration and dynamic testing and then in commissioning.

Addressing the issues highlighted in this report and in the separate financial and commercial report will mean that the Sponsors and the project will be better placed to identify challenges in a timely way, will have the right expertise on hand, will have better visibility of performance and emerging commercial issues and will be able to deal with challenges promptly. Improvements to reporting and programme sponsorship etc will not in themselves make the difficulties of completing the project go away, but they will facilitate early visibility of issues and identification of the right actions and interventions, enable transparency and provide an environment in which the complexities of completing this project successfully have a much enhanced chance of being overcome more smoothly.

1.8.2 Early visibility of emerging critical issues and recommendations

An early outline for consideration by Sponsors of issues and our critical recommendations emerging from completing the fieldwork in addressing both Terms of Reference, was shared with Sponsors at the 15 November 2018 SB. At Sponsors' request we then supported Sponsors in sharing the critical recommendations relevant to CRL with members of the CRL Executive on 22 November 2018. This was so as to provide a basis for CRL's early consideration of the identified issues and to allow CRL to accelerate actions in response, given our strong recommendation to Sponsors that both Sponsors and CRL taking the right actions at pace to address the issues identified was critical to constraining project outturn costs. The issues discussed with members of the CRL Executive on 22 November 2018 which were relevant to this report were as set out below.

— Developing a robust updated MOHS
— Developing a robust updated cost estimate
— Improving CRL reporting including enhancing metrics, setting milestones for reporting against and establishing early warning reporting
— Resourcing – identifying and addressing central resource gaps
— Enhancing certain management controls and re-setting financial controls
— Defining, assessing and approving commercial strategy
— Driving contractor performance
— Reinforcing culture and cascading enhanced expectations around openness in reporting throughout the project and avoiding optimism bias

— Addressing the identified issues from our reviews and the related practical day to day management steps recommended to oversee timely implementation
— Strengthening integration governance
— Enhancing systems integration leadership and capability
— Mechanisms necessary for integration of supplier and partner contributions
— Strengthening the three lines of defence including broadening internal assurance coverage of commercial and financial matters;
— Establishing the Audit and Risk Committee

1.8.3 Remainder of the project – CRL reporting, addressing our recommendations and related Sponsor assurance

Sponsors will face significant challenges, going forwards, in assessing CRL reporting and related Sponsor Assurance, and in implementing our recommendations. In particular key challenges will include Sponsors' need to assess:

— Whether the pace of change in the nature, quality, and extent of, CRL reporting is providing sufficient transparency and a realistic assessment of progress and forecast outturn as to time and cost; and
— The extent to which the recommendations in this report and the related financial and commercial report have been implemented and whether the manner and pace of their implementation by Sponsors and CRL is sufficiently addressing the underlying issues they were designed to address. This will be particularly challenging given the relatively short amount of time within which some of these matters need to be implemented. This together with the pace of the programme may therefore necessitate, with Sponsor agreement, the application of judgement in some instances as to the sensible degree of pragmatism which should be applied when determining the design of what should be implemented.

We have therefore recommended that Sponsors:

— Seek independent advice on these matters (Exec 1);
— Create an action plan and ensure CRL creates their own action plan using a similar overall design, to be agreed with Sponsors (Exec 2); and
— Develop an approach to the oversight and monitoring of the implementation of the consolidated action plans (Exec 2).

Table 2: Executive Summary Recommendations

	EXECUTIVE SUMMARY RECOMMENDATIONS
Exec 1	Sponsors to define the method for obtaining assurance that CRL reporting is sufficient, accurate and transparent. Sponsors to consider obtaining regular and independent advice which enables them: — To judge whether P Rep's current remit and outputs are providing sufficient assurance to Sponsors across the full range of programme challenges or whether additional steps are required to assess and consider the information being received in relation to the programme; — To assess whether the pace of change in the nature, quality, and extent of, CRL reporting around programme progress, forecast cost outturn and key risks is likely to provide sufficient transparency of programme status, likely outturn, and key risks net of mitigating actions being taken. In particular whether the metrics being reported are sufficiently reliable and tailored to the differing needs of construction, systems and integration etc. activities to provide sufficient visibility of current and expected performance and outturn; — To assess periodically and more deeply (for example at pre-defined stages) if project status and likely cost and time outturn broadly aligns with that being reported; To assess whether the shape and pace of addressing the issues highlighted by / implementing the recommendations in this independent report on the review of governance arrangements and in the related report on financial and commercial matters, is progressing as it ought and whether the actual steps being taken are sufficiently addressing the underlying issues.
Exec 2	Sponsors to draw up an action plan comprising the recommendations for Sponsors set out in this and the related financial and commercial report. Agree and record within the action plan, the actions to be taken, prioritisation, timelines, and responsible individuals. Define the extent of progress which Sponsors wish to see achieved from their own and CRL actions, by pre-set milestone dates in each of the critical priority areas, such as in the case of CRL, creation of a sufficient schedule, enhancing CRL reporting etc. Define the means by which assessment will be made of the progress in implementing Sponsor and CRL actions and of the extent to which each underlying objective has been achieved. Define how these matters will be independently assured, and to whom and how frequently the implementation progress and results of the independent assurance will be reported. Agree with CRL an appropriate set of arrangements including initial agreement between Sponsors and CRL of the actions proposed to be taken by CRL and by when, arrangements for period visibility of a copy of the CRL action plan updated for progress in closing agreed actions and the results of CRL's own regular monitoring, assessment and independent assurance of the implementation and impact of the actions. The initial agreement between Sponsors and CRL of actions to be taken will need careful consideration by Sponsors of: — The prioritisation sequence proposed by CRL — The timeline proposed for implementation — How satisfactory completion of an action is proposed by CRL to be established — Where CRL concludes that the approach to addressing an issue needs to be varied from that outlined in a recommendation so as to enable more rapid addressing of the underlying issue, then Sponsors will need to satisfy themselves that the changed approach will be sufficient to address the underlying issue highlighted Define how, how often and by whom, the rolled up action plan (Sponsors' and CRL actions plans combined) will be reviewed and the means by which resulting required actions will be communicated and in turn followed up.

2 Introduction

2.1 Background

At the end of August 2018 CRL announced to the Sponsors that the opening of Stage 3[22], COS, of the Crossrail project would be delayed. An Adverse Event Notice, in accordance with clause 22 of the PDA, was issued on 30 August 2018. At the SB meeting on 3 September 2018 CRL presented a revised Stage 3 opening schedule and the associated preliminary cost implications. The revised schedule and cost forecast are known as the Checkpoint 2 (CP2) position.

Following the issue of the Adverse Event Notice, Sponsors asked CRL to prepare a Remedial Action Plan (RAP 1) for the SB meeting on 20 September 2018. RAP 1 was issued on 18 September 2018 and addressed:

— A revised MOHS to reflect the delayed completion of the stations, routeway and systemwide contracts;

— Cost and commercial implications;

— Business plan and management structure;

— Revised Handover process.

RAP 1 referenced the first of two independent schedule review reports commissioned by the Sponsors. This was the “Crossrail MOHS Schedule Peer Review” prepared by Ian Rannachan dated September 2018.

RAP 1 concluded inter alia:

“For SACR 20 (Period 6 2018/19), CRL will be reporting the CP2 risk allowances at P50 level within its AFCDC in line with its reporting responsibilities under the PDA. The SACR 20 AFCDC is therefore expected to be £13,279m, an increase of £469m from the reported P4 2018/19 figures upon which the CP2 cost forecast is based.

CRL suggest that it would be prudent for Sponsors to secure funds at the P95 level of £523m above the current available funding.

In addition, if Sponsors wish to take into account the independent Schedule Assurance Review they commissioned, CRL advise that there would be a further increase of £125m at P95 level above the £523m requirement of the CP2 P95 forecast.

The CP2 costs and risks are based on two specific schedule scenarios. Sponsors may wish to consider an additional general contingency in the event that further delays occur beyond the scenarios considered or some of the assumptions underpinning the forecast are not achieved.”

TfL, a joint sponsor with the DfT, appointed KPMG on behalf of both Sponsors in late September 2018 to carry out two independent reviews of the Project; financial and commercial, and governance.

CRL issued an update to the RAP (RAP 2) on 2 October 2018, during the course of KPMG’s work. RAP 2 referenced both independent schedule review reports (the second being the *“Crossrail Schedule Assurance Review”* by John Boss dated 17 September 2018).

RAP 2 concluded inter alia:

“CRL have reviewed the time, cost and risk allowances [redacted]” [redacted] to advise sponsors of time, cost and risk allowances in accordance with the direction given at the 20 September 2018 Sponsor Board. The [redacted] the independent Schedule Assurance Reviews commissioned by Sponsors.

In addition [redacted], a quantified risk analysis (the Additional QRA [Quantified Risk Assessment]) has been undertaken for risks associated with the assumptions and clarifications

[22] Stage 3 is the Central Operating Section between Paddington and Abbey Wood

contained in the Remedial Action Plan which include finding, for example, a SIL4 issue in dynamic testing.

The [redacted] indicates a further delay in the Stage 3 opening. This is due to an assumed increase of [redacted] in the period needed for dynamic testing along with an increase in the duration of Trial Operations from 12 to [redacted] weeks. The [redacted] also result in an outturn cost (excluding the Additional QRA) at P95 level of £13,677m. This is an increase above IP2 of £1,165m indicating that £865m is required further to the £300m of additional funding already committed.

Sponsors may also wish to make an allowance for the Additional QRA at P95 of £154m."

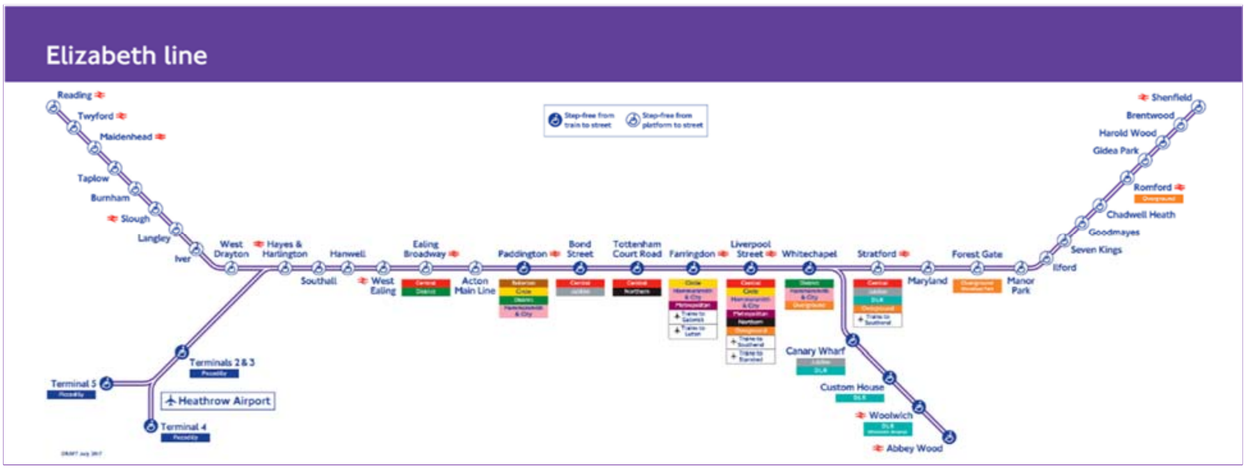
CRL's RAP 1 cost estimate is calculated as an addition to the CRL forecast of Anticipated Final Crossrail Direct Cost (AFCDC) at Period 4 2018_19 (P04), including risk allowances described as being at P50, P80 and P95 values. The RAP 1 costs are based on schedule scenarios (described in RAP 1) which includes Stage 3 opening in [redacted] whereas the AFCDC reported at P04 2018_19 assumed Stage 3 opening in [redacted] The RAP 2 cost estimate is calculated as an addition to the RAP 1 cost estimate and makes allowance for further delays (including to Stage 3 opening through the addition of [redacted] for dynamic testing and a further [redacted] for trial operations) beyond the programme dates assumed in RAP 1 and shown as [redacted]. The RAP 2 additions are shown as point estimate increases above the RAP 1 estimate to account for prolongation beyond the dates shown in RAP 1. RAP 2 also includes P50, P80 and P95 values for additional risks identified by CRL but not included in their base cost estimate.

2.2 The Crossrail scheme

2.2.1 Crossrail layout

The layout of the Crossrail scheme (Elizabeth line) is shown in Figure 2.

Figure 2: Layout of the Crossrail scheme



2.2.2 Stages of the Crossrail scheme

The stages of Crossrail are as follows[23]:

Stage 1** – **opened June 2017

Introduction of Reduced Length Unit (RLU) fleet

The first phase of TfL Rail services started running between Liverpool Street and Shenfield ahead of the opening of the Elizabeth line. These services were previously operated as part of the Greater Anglia franchise.

[23] Includes information extracted from CRL Board Report Period 08 2018_19 and P Rep reports Period 01 2017_18 and Period 08 2018_19

Stage 2 Phase 1 – opened May 2018

This comprises:

— 2 trains per hour (tph) Class 345 RLU with AWS / TPWS Paddington to Hayes and Harlington (excluding Hanwell)
— 2 tph Class 360 Connect style service Paddington to Heathrow Central Terminal Area, including Hanwell
— 2tph Class 360 Inter terminal transfer service between Heathrow Central Terminal Area to Terminal 4
— Platform extensions and Driver Only Operation CCTV

Stage 2 Phase 2

Phase 2 of Stage 2 comprises 4 tph Paddington to Heathrow T4, using 9-car class 345 with ETCS.

Stage 3 – Central Operating Section

Launch of the Elizabeth line, which will initially operate as three services:

— Paddington (Elizabeth line station) to Abbey Wood via central London
— Paddington (mainline station) to Heathrow (Terminals 2 & 3 and 4)
— Liverpool Street (mainline station) to Shenfield

Known as the new Central Operating Section, Stage 3 consists of running a class 345 FLU service with Communications Based Train Control (CBTC) on CRL-built & NR-built infrastructure under the safety management systems of RFLI, MTRC and LUL.

Stage 4

Direct services will operate between Paddington – Shenfield and Paddington – Abbey Wood. Services from Paddington to Heathrow will continue to start and terminate at the mainline station

Stage 5

Reading and Heathrow to Abbey Wood (including Stage 5A involving Crossrail trains running between Paddington and Reading)

This report is concerned with the programme to completion and cost of Stage 3, the COS. We requested from CRL the current costs, schedule and underlying assumptions relating to the completion of Stages 4 and 5 and were informed that such information was not complete but CRL expected the cost to be relatively low [redacted] in the context of the overall AFCDC. We understand that the costs due to Stages 4 and 5 are largely related to completion and commissioning of signalling and communications works. At present, the timeline to completion appears unclear and there remains a risk that the opening of Stages 4 and 5 could be delayed, adversely affecting train operations, but the direct CRL cost of such a delay would be relatively low. The key Stage 4 and 5 activities and inter-dependencies should be scheduled out and the related costs estimated respectively.

2.3 Current status of the Project

At the time of RAP1, which was built up by making adjustments to Period 4 2018_19 reported AFCDC, there were 13 significant contracts in progress. Their expected cost outturn and relationship to the expected programme cost outturn by reference to both RAP 1 and RAP 2 positions, is summarised in Table 3 below.

Table 3: Status of Crossrail Project

	Forecast outturn cost
	£m
13 principal live contracts[1]	4,105
Other contracts and indirect costs[1]	8,659
Risk[1]	46
Total Anticipated Final CRL Direct Cost (AFCDC) at P4 2018_19 (P50)	12,810
RAP 1 point estimate increase	268
RAP 1 P95 risk	257
RAP 2 increase for [redacted]	342
RAP 2 additional QRA (P95)	154
Total at approximately P95 confidence level	**13,831**
Cost of Work Done at P6 2018_19	12,564
Cost to Go[24]	**1,267**

Source: [1]CRL Board Report P04 2018_19 Page 15

2.4 Scope of KPMG's work

KPMG was asked to carry out the review of RAP 1 in October 2018, shortly after it was released in September 2018. Our review was guided by the Terms of References provided by the Sponsors to focus on assessing the reliability and robustness of the revised schedule and cost put forwards by CRL for the Stage 3 opening (see below). During the course of our review of RAP 1, CRL issued its RAP 2 on 18 October 2018 which led to the scope of our review being extended to include RAP 2. CRL was also at the time updating MOHS that was first due to be issued later in October 2018, then in November and then in early December.

The Sponsors asked KPMG to complete our work on the RAP (RAP 1 and then RAP 2) documents without consideration of the potential content of the updated MOHS. The Sponsors indicated that they would want KPMG to review the updated MOHS once it was formally issued to consider the impact of the updated MOHS on the alternative indicative cost scenarios that KPMG had produced from the review of the RAP documents. At the time of finalising our fieldwork in December 2018 the updated MOHS had not been issued and our reports do not take into consideration any time or cost information except where expressly stated in this report.

The scope of our work was defined in two sets of Terms of Reference documents summarised below:

- Financial and commercial independent review to consider if CRL's financial modelling and forecasts reflect the true financial position of CRL, together with a review of commercial and contract management and governance to consider:
  - Whether appropriate and effective controls are in place;
  - Inputs to financial models, including risks and uncertainty, together with assumptions made;
  - Commercial reporting and oversight arrangements.
- Governance review to address governance arrangements for oversight by DfT and TfL and to consider matters such as:
  - The composition and performance of the CRL Board, its project control and reporting arrangements;

[24] Cost to Go relates to costs of work to be performed after Period 06 2018_19.

- The appropriateness of and the need for strengthening controls and reporting processes.

2.5 This document

This document addresses governance Terms of Reference summarised above and included in full in Appendix 1. Our financial and commercial review is covered in a separate report.

Section 3 provides a brief outline of the structure of this report and alignment with the Terms of Reference.

Minor apparent discrepancies may appear in some of the tables of this document as a result of rounding and limiting significant figures for simplicity.

2.6 Other important matters

2.6.1 Schedule

Throughout our review, and prior to the 5 December 2018 CRL Board meeting, we were advised that CRL was working on an updated draft MOHS (CRL's performance monitoring schedule) which was expected to be available from 5 December 2018. We understood that the draft MOHS would need further revision thereafter, as CRL would have had insufficient time to complete its ongoing review of work to be completed at TCR station and had not started similar reviews on the other major contracts.

In this report we have recommended the creation of a bottom up logic driven schedule at a sufficient level to enable effective management of the programme. In our view this should, at a minimum, be sufficient to enable effective monitoring of:

— Outturn cost, by enabling the measurement and reporting of progress against the key factors which drive cost outturn (principally the timely realisation of Tier One Substantial Demobilisation (TOSD) on the main contracts); and

— Time, by enabling measurement of progress against key activities on the critical path which have the greatest uncertainty and risk attached to them in terms of impact on the overall timeline (principally systems / integration and dynamic testing).

The revised draft MOHS was not issued or shared with Sponsors as expected on 5 December 2018. In the absence of a MOHS, CRL will need to develop a plan to manage the programme that needs to be agreed with Sponsors which sets out the approach to delivering the opening of Stage 3.

While our recommendation set out in this report is for a detailed bottom-up logic linked schedule to be produced to manage the programme for completion, we understand that the situation has changed from when our fieldwork was completed. Though the recommended principle still applies, we realise this can be achieved in a different way, such as the preparation of a similar schedule but at a higher level. Whatever CRL prepares, we recognise that developing an 'appropriate' logic driven programme will need to balance the time required to develop it versus the time left in the programme, but that what is developed needs to deliver a suitable and effective way of managing controls and of monitoring performance within the constraints of the current position CRL find themselves in.

The forecast opening date for Stage 3 resulting from the revised MOHS when it is prepared, is in our view better expressed, at present, as a range of dates given the significant uncertainties which remain to be addressed. As uncertainty is reduced it should be possible to narrow the range.

Appropriate metrics to measure progress and performance against key activities and milestones on the path to Stage 3 opening need to be developed, and reported against each period, and the overall approach discussed and agreed with Sponsors. The level of granularity in the MOHS / Schedule will need to be determined to suit the availability of data and resources to develop it, and what is needed to manage effectively the programme and to enable effective measurement and reporting of progress. In the context of the resources to develop the MOHS / Schedule, we note the significantly reduced level of central project controls staff now remaining within CRL. This will delay CRL's ability to develop a new bottom-up integrated logic driven programme as will the lack of some of the critical data needed.

We are strongly of the view that an enhanced suite of reporting metrics needs to be designed and developed focussed on the key activities to be completed within milestones. The metrics selected need to have careful regard to the identification of sub-activities and measurement of progress for the most challenging of the key activities so that levels of difficulty are properly distinguished in assessing cost and time of work done and work to go. The enhanced metrics need to address the separate key factors which critically drive “cost” and “time”, as referred to above.

Progress needs to be regularly and reliably measured using those metrics, and transparently reported. This should provide sufficient visibility or progress and enable, when appropriate, informed revision to forecast cost and time outturn. Such an approach should significantly help to restore trust and confidence in the overall programme outturn.

3 Approach to the review

3.1 Overall approach

Our approach was to review documentation provided by CRL and TfL, and hold interviews with Sponsors, CRL Directors, senior CRL staff and the P Rep. Our review was at comparatively high level without deep-dive investigations in view of the comparatively short timescale available. The findings and recommendations presented in this report reflect fieldwork which started at the end of September 2018 and concluded on Friday 7 December 2018. This report has not been updated for information released after that date, save to refer to the press statement released by TfL on 10 December 2018.

From the information gathered we have formed views of key programme and company governance arrangements. We also gained information on key internal processes and controls used for top level management of the project.

The report provides Sponsors and CRL with recommendations, these are outlined in the Executive Summary (Section 1). The structure of Sections 4 – 8 follows a broadly similar flow, each section provides a summary of findings, recommendations, before providing supporting context and detailed findings.

A review meeting was held with the SB on 15 October 2018, at which we discussed our emerging thoughts in relation to the governance and assurance arrangements as well as our emerging thinking from our work in addressing the separate financial and commercial Terms of Reference.

A further review meeting was held with the SB on 24 October 2018 at which we discussed our emerging findings. Our views were informed by having gathered more detailed information.

An early outline for consideration by Sponsors, of our critical recommendations emerging from completing the fieldwork in addressing both Terms of Reference, was shared with Sponsors at the 15 November 2018 SB. At Sponsors' request we then supported Sponsors in sharing the critical recommendations relevant to CRL with members of the CRL Executive on 22 November 2018. This was so as to provide a basis for CRL's early consideration of the identified issues and for CRL's accelerated actions in response, given our strong recommendation to Sponsors that both Sponsors and CRL taking the right actions at pace to address the issues identified was critical to constraining project outturn costs. More information as included at Section 1.8.2.

3.2 Mapping Terms of Reference requirements to report sections

Table 4: Governance Terms of Reference and report structure

Governance scope	Report Section	Common Scope items with the Financial and Commercial review
Making recommendations on any changes to the control or governance environment from the reviews	1. Executive Summary	Yes
Consideration of the role and effectiveness of Sponsor representation on the CRL Board;	4. Programme Sponsorship	
Consideration of the composition of the Sponsor Board and the mechanisms for reporting to it and reporting by it;	4. Programme Sponsorship	

Governance scope	Report Section	Common Scope items with the Financial and Commercial review
Considering the oversight by the project's Sponsors and to what extent this could be strengthened for the remainder of the project with reference to other large and complex public sector projects;	4. Programme Sponsorship	
Considering the role, composition and governance of the CRL Board and steps that could be taken to provide greater oversight to Sponsors for the remainder of the Project;	5. CRL Board	
Considering the role and performance of the committees of the CRL Board, including its Audit Committee (recently subsumed into the CRL Board);	5. CRL Board	Yes
Considering going forwards options for who is most appropriate to make decisions on the remuneration of CRL Board members and senior executives and whether Sponsors should be more closely involved;	5. CRL Board	
Considering the governance of all elements of the Crossrail programme including the integration of the rolling stock and operational readiness	6. Programme Integration	
Considering the performance of the CRL Board, in particular its approach to performance monitoring and reporting to TfL as parent company and Sponsors and to what extent this could be strengthened with reference to other organisations with major delivery responsibilities;	7. Reporting and controls	
Assessing whether appropriate and effective governance controls are in place;	7. Reporting and controls	
Assessing whether appropriate risk management processes and reporting are in place;	7. Reporting and controls	
Assessing whether appropriate and effective commercial controls and contract management processes are in place;	7. Reporting and controls	Yes
Reviewing whether commercial reporting/tracking and oversight arrangements should be strengthened to ensure that effective reporting to the Crossrail Board and Sponsors takes place for the remainder of the Project;	7. Reporting and controls	Partial
Considering the current role and effectiveness of the Project Representative team to provide independent assurance and oversight of Crossrail Limited on behalf of Crossrail's Joint Sponsors;	8. Sponsor Assurance	

4 Programme sponsorship

This section outlines recommendations related to programme sponsorship. These recommendations are followed by a summary of the current situation and commentary on examples of sponsorship from other major public sector infrastructure programmes and good practice guidance.

This section seeks to address three areas in the Terms of Reference:

— Consideration of the role and effectiveness of Sponsor representation on the CRL Board;
— Consideration of the composition of the Sponsor Board and the mechanisms for reporting to it[25] and reporting by it;
— Considering the oversight by the project's Sponsors and to what extent this could be strengthened for the remainder of the project with reference to other large and complex public sector projects.

4.1 Summary of findings

A short summary of the key findings arising from the review of programme sponsorship are outlined below. The detail is set out in Sections 4.3 – 4.5.

— There is a need, consistent with our recommendations, to enhance Sponsor oversight of the programme. The recommendations reflect the fact that the project is now stressed and no longer in a "business as usual" state. They have also been informed by good practice and examples from other major government programmes. Particular areas of focus for Crossrail include maintaining the separation between Sponsors and CRL, whilst increasing Sponsor oversight and controls rebuilding the trust between Sponsors and CRL and enhancing the behaviours which underpins transparency. This critically needs to be supported by mechanisms which enable sufficient reporting at all levels (by contractors to CRL, within CRL, and by CRL to Sponsors), by enhanced reporting and the assurance of information provided.
— There was a consensus between Sponsors and CRL to increase the number of Sponsor nominated NEDs on the CRL Board in July 2018. The addition of Sponsor nominated NEDs was in part intended to provide for greater transparency between Sponsors and CRL. This is through a combination of informal interaction between Sponsors and Sponsor nominated NEDs and the overlap between CRL and TfL Board NEDs.
— There are a variety of mechanisms for the escalation of issues and reporting of programme performance to stakeholders. Examples of this include SB escalation of issues to the TfL Commissioner and DfT Permanent Secretary, Mayoral briefings on operational readiness and CRL updates to the TfL Board, these were typically provided by the CRL Chair supported as required by the CRL Executive[26]. The principal mechanism is through the members of the SB providing updates directly to stakeholders and appropriate colleagues regarding programme performance. All reporting and communication by Sponsors is heavily reliant upon the timely and transparent reporting of all relevant information to the SB by CRL, as well upon the timely provision of relevant and appropriate Sponsor assurance inputs by P Rep and insights from JST.
— There has been a time-lag in the formal provision of sufficiently clear and transparent information to the SB, and SB members have not had direct visibility of the issues which are considered by the CRL Board. Reporting provided to Sponsors did not sufficiently surface the probable impact of or the magnitude of the emerging programme performance issues soon enough.
— The SB membership provides DfT and TfL with oversight of the Crossrail project. The SB members are senior members of TfL and DfT for example the TfL Chief Finance Officer (CFO) and DfT Director General Rail Group, who in addition to the Crossrail SB are members of various TfL and DfT boards (e.g. TfL Board and Rail Board respectively) where they are in a position to

[25] See Section 7 for the results of our review of reporting to the Sponsor Board

[26] Periodic written updates have been shared with the TfL Board. These papers provided updates as to the progress of the Crossrail project and Elizabeth line readiness. Prior to the release of these TfL Board papers, CRL, TfL and the JST were provided with visibility of their content.

communicate Crossrail programme performance. The SB, however, does not incorporate specific expertise relevant to the construction close-out, railway systems and network integration, as such this presents some limits on the ability of the SB to interpret and challenge information presented to it and places greater reliance on the advice given by P Rep.

4.2 Recommendations

Sponsors perform critical functions overseeing CRL's delivery performance, holding CRL to account and being ultimately accountable for the funding and realisation of benefits. To enhance Sponsors ability to discharge this role, the following recommendations in Table 5 are proposed, these reflect the recommendations in the Executive Summary.

Table 5 : Programme sponsorship recommendations

Programme sponsorship recommendations *Sponsors to retain overall accountability for the whole programme. Sponsors to be supported in this through enhanced transparency of assured, timely and sufficient performance information. Sponsors to encourage a culture of openness to allow this increased transparency, particularly where outturn may not be aligned with Sponsor expectations. Sponsors to consider appropriate ways of obtaining expert contribution on specific issues.*		
Owner	**Ref**	**Recommendations for consideration by Sponsors**
Sponsors	4.1	Sponsors retain overall accountability for the whole programme with CRL in turn responsible for successful integration and delivery to an agreed timeline and budget.
	4.2	Sponsors to encourage and ensure the fostering of an enhanced culture and environment within CRL whereby relevant performance information and risks are encouraged to be openly and promptly shared throughout the organisation so as to best enable informed timely decision-making.
	4.3	Sponsors to foster a culture and environment where CRL is encouraged to share relevant performance information, especially when programme performance and / or expected outturn may not be in line with Sponsor expectations.
	4.4	Sponsors to formalise expectations of the CRL Board in terms of transparency and timeliness of reported performance. Sponsors to consider requesting that copies of Audit and Risk Committee reports prepared for the CRL Board / Executive are also provided to Sponsors (see recommendation 5.5).
	4.5	Subject to the terms of the December Crossrail funding settlement, Sponsors may need to consider representation by HMT (or a delegate) at the SB.
	4.6	At the request of Sponsors, the CEO of NR (or an empowered delegate) to be invited to the SB. The invitation would be for NR representation in its capacity as a key programme delivery partner.
	4.7	Sponsors to consider the potential benefits of appointing an Independent Member to the SB to support Sponsors in their decision making. The Independent Member to be selected so as to enhance skills needed relevant to the current and near-term stages of the programme and to provide an independent perspective. Should Sponsors determine not to appoint an Independent Member to the SB, Sponsors should consider alternative ways in which expert contribution could be obtained on specific issues."
	4.8	Sponsor observers: — Each Sponsor should consider the appointment of a Voting Member of the SB as an observer at the CRL Board (with mechanisms / guidance to help manage potential conflicts of interest); — Sponsors should consider whether the Head of the JST should attend the CRL Board as an observer;

Owner	Ref	Recommendations for consideration by Sponsors
Programme sponsorship recommendations *Sponsors to retain overall accountability for the whole programme. Sponsors to be supported in this through enhanced transparency of assured, timely and sufficient performance information. Sponsors to encourage a culture of openness to allow this increased transparency, particularly where outturn may not be aligned with Sponsor expectations. Sponsors to consider appropriate ways of obtaining expert contribution on specific issues.*		
		— Should Sponsors decide to appoint observers then Sponsors, the CRL Chair and CRL CEO should agree arrangements for the operation of the CRL Board that support effective integration of Sponsor and JST observers. Any Sponsor observers at the CRL Board should not have decision making rights, their presence is to support improved transparency of information relating to performance, risks and other relevant issues. Should Sponsors decide not to appoint observers then Sponsors, the CRL Chair and CRL CEO should agree arrangements which as nearly as possible deliver equivalent transparency.
	4.9	Should the recommendation be accepted to have separate Executive and Investment Committees, each Sponsor should review whether also to have observer status at the Investment Committee (see recommendation 5.6).
	4.10	To facilitate more timely escalation of issues, information and items requiring decision making, the period between CRL Board and SB meetings should be kept to a minimum number of working days (for example around 5).
	4.11	A number of letters were written by Sponsors to CRL properly reflecting concerns and questions which surfaced at SB meetings and in line with agreed SB actions. Although SB minutes record the actions that letters were to be sent and that subsequently they had been sent, the minutes in recording the action as closed do not always clearly record the responses received from CRL and how the responses had been followed up although SB minutes do include plenty of detail around the continuing themes under discussion. We recommend the closing of SB actions to be addressed with CRL should be linked to clearly recording whether and how the issue has been addressed by CRL to Sponsors' satisfaction.

4.3 Current situation: The role of the programme Sponsors

The joint Sponsorship arrangements are set out in the SA, a document agreed between the Sponsors in November 2008. This document, in conjunction with the PDA and certain other Project Documents, provides the basis for the operation of the Sponsor role and the relationship of Sponsors with each other and with CRL.

The SA provided for a clear delineation between the role of the Sponsors and CRL as the delivery entity. The SA also provides the detail behind the governance arrangements between Sponsors and CRL, in this regard the SA is supplemented by provisions in the PDA. Sponsors and CRL has maintained that separation of roles and the supporting governance arrangements since November 2008. The recent announcements of programme cost overruns and delays have led to consideration as to whether the Sponsor arrangements continue to be appropriate for the current and future requirements of the programme.

The SA established the SB, a joint DfT and TfL board to oversee the Crossrail programme (see Section 4.4 for more details of the composition and structure of the SB). DfT and TfL formed the joint sponsor arrangements reflecting their joint interests in the programme. The SA defines specific matters reserved to the SB, moreover, it provides the forum for DfT and TfL to jointly review programme performance and make joint decisions. The SB receives programme performance reporting from CRL and assurance reporting from P Rep (for details see Sections 7 and 8).

Sponsors are currently working with HMT to agree a revised funding settlement for Crossrail. The nature of the final funding settlement may suggest that the Sponsors need to consider an HMT role in future Sponsorship arrangements.

4.4 Composition and structure of the Sponsor Board

The Voting Members of the SB include two DfT and two TfL representatives. For DfT the representatives are the Director General Rail Group and Director Major Projects; for TfL the representatives are the TfL CFO and LUL Director of Strategy and Service Development.

The Sponsors are supported by the JST which provides the regular interface between the Sponsors and CRL. The JST has other responsibilities including management of P Rep, reviewing management information and issues escalated by CRL to Sponsors.

Sponsors nominate a number of the CRL NEDs, and there is regular interaction between Sponsors, the JST and Sponsor nominated CRL NEDs. Sponsor nominated CRL NEDs do not attend the SB. Sponsors have recently (July 2018) increased the number of Sponsor nominated NEDs (see Section 5 for more information on CRL Board composition). The decision to increase the number of Sponsor nominated NEDs was consensual between Sponsors and CRL. This has provided Sponsor organisations with additional ability to gain insight into CRL activity. For example the number of DfT and TfL nominated NEDs has increased to two each (as at 7 December 2018), and furthermore the new TfL appointees are also members of the TfL Board, which supports increasing transparency from CRL through to the TfL Board. Interviews with Sponsors and Sponsor NEDs identified the need to address a cultural optimism bias and to encourage the open sharing of bad news between CRL and Sponsors. These interviews also highlighted that there should be full transparency between CRL and Sponsors, this potentially being achieved by the presence of additional Sponsors representatives (not Board members) at the CRL Board.

The SB typically meets monthly, meetings are generally divided into two parts, a Sponsor only meeting and a meeting with CRL Executives. We reviewed the frequency of CRL Board and subsequent SB meetings over a 10 month period between October 2017 and July 2018, this identified that on average ~10 working days passed between a CRL Board and SB meeting (see Figure 3). To facilitate the timely resolution of issues and to support transparency between CRL and Sponsors, we recommend a reduced gap between CRL Board and SB meetings should be something Sponsors consider.

Figure 3: Sponsor Board meeting frequency

4.5 Reporting to and from the Sponsor Board

Additional detail on reporting is included in Section 7.

4.5.1 Sponsor reporting

Interviews and information provided did not identify specific formalised reporting from the SB to either DfT or TfL governance forums. However, there is evidence of a variety of mechanisms which have been used to communicate programme performance to stakeholders by Sponsors. One such mechanism has been through the presence of senior members of both organisations at the SB which has provided a means for communicating programme performance for example DfT representatives communicating Crossrail related content at forum such as DfT's Rail Board and TfL through the establishment of the Elizabeth Line Readiness Board (ELRB), this forum included stakeholders from across TfL with an interest and role in the transition of Crossrail as a programme to Elizabeth line operation. A review of SB minutes also identified instances where escalation of programme performance issues from the SB to the TfL Commissioner and DfT Permanent Secretary had been deemed appropriate (e.g. September 2017 SB).

In terms of regular reporting to stakeholders, we observed that this included a mixture of Sponsor and CRL communications, these included:

— DfT monthly programme updates;
— Monthly updates to the GLA;
— Periodic updates to the TfL Board and its Committees from Sponsors and CRL[27]; and
— Regular reporting to the Mayor of London regarding operational readiness. This was noted in the 30 January 2018 TfL Board papers. These reports are a product of inputs from CRL, the JST, LUL, and TfL Corporate Affairs; prior to being shared with the Mayor's office, these are approved by the TfL Commissioner Mike Brown.[28]

4.5.2 Reporting to Sponsors

To provide effective oversight, and where necessary make interventions and decisions, Sponsors rely on the timely provision of complete, accurate and assured information from CRL, both formal reports (for example the SACR) and informal updates. Interviews highlighted that the current practice of requiring CRL Board approval for the release of certain project information to Sponsors was considered inefficient and potentially compromised transparency between CRL and Sponsors.

Sponsors also rely on programme performance information providing clear insight into programme performance, and for the information to have been subject to independent challenge by P Rep. Whilst there is often extensive information made available to Sponsors this has not always provided Sponsors with sufficient insight into the accurate state of programme performance and trends. Moreover, programme performance information should provide Sponsors with visibility across all elements of the programme, both those areas directly project managed by CRL, and those areas where CRL is integrating inputs from others (e.g. NR ONW deliverable, TfL commissioned rolling stock). NR has in the past been invited to attend both the CRL Board and SB, although this does not appear to have occurred recently, Sponsors may consider re-establishing the principle of inviting NR representation to both bodies (see this section and Section 5).

Interviews identified that it has been regular practice for representatives of the Sponsors to meet with Sponsor nominated NEDs ahead of SB meetings and on an ad hoc basis as may otherwise be considered necessary. Feedback identified that at the present time these meetings are providing Sponsors with insight which is supporting the SB to challenge CRL during SB meetings, and providing Sponsors with an additional channel to communicate their concerns regarding the programme to both the CRL Board and Executive.

4.6 Examples of good practice

Table 6 summarises insights into Sponsorship arrangements from other complex government programmes. These highlight some key principles, and underscore the criticality of sufficient, timely, reliable and assured information for Sponsors to discharge their role

[27] Over the past 12 months the CRL Chairman has attended the TfL Board and the CRL Operations Director has also been in attendance. The Operations Director is a TfL employee an executive director of CRL. His role has reporting lines into both the CRL CEO and the LUL MD

[28] The weekly reports have been published by TfL and are available at https://tfl.gov.uk/corporate/publications-and-reports/crossrail-project-updates#on-this-page-2

Table 6: Examples of good practice programme sponsorship

Programme	Summary	Comments
Governance good practice	The Infrastructure Projects Authority (IPA) provides principles for good governance, these include: — A clear statement of the objectives and parameters for delivery between the Sponsor(s) and the execution team including arrangements for remedy in the event of difficulty. — The project being sufficiently autonomous with a single controlling mind. — A clear system of delegation and determined process for timely decisions that fall outside the limits of delegation. — A determined process for controlling change. — A determined process for reporting and other communications between the Sponsor(s) and execution team. — A collaborative culture and working relationship between Sponsor(s) and execution team. — Board members have sufficient understanding of the project context to make reasonable timely decisions (or seek advice to help them). — A defined system for assurance at all levels.	The principles first developed by Infrastructure UK, the forerunner to the Infrastructure and Projects Authority are recognised as UK good practice guidance for governance of infrastructure projects and, as such, these provide a basis for the development and testing Governance arrangements. The IPA principles provide a basis for testing the current governance structure and informing potential changes. Based on the review of the Crossrail project, there are a number of areas where current governance may not be considered to be operating in line with good practice. These include: — Reporting which represents a clear and transparent arrangement between the Sponsors and CRL as deliverer (see Section 7). — The effectiveness of the collaborative, working relationship between Sponsors and CRL as reflected in the lack of confidence expressed to us by Sponsors in CRL's ability to accurately and transparently communicate the programme status. — A system of assurance which clearly demonstrates 3 lines of defence. Furthermore confidence in Sponsors independent assurance provided by P Rep (see Section 8).
London Olympics 2012	The London 2012 Olympic and Paralympic Games is perceived as an example of a successfully delivered complex programme. It involved a range of government bodies and public and private sector delivery partners. The Olympic Delivery Authority (ODA) was responsible to the Olympic Board for delivering the venues and infrastructure for the Games, this was delivered on time and within budget. The ODA reduced its anticipated final cost from £6,856 million to £6,714 million, £1,385 million less than the £8,099 million which had been potentially available to it under the March 2007 Public Sector Funding Package.	Reviews and learnings taken from the Olympics highlighted some features with particular relevance for Crossrail: — ODA operated effective programme management including the rigorous application of a suite of 'good practice' controls within a strict monthly cycle of performance reporting which was key in providing senior management with objective information with which to manage the programme and drive its successful delivery. — Executive management used this information to provide stakeholders (including Sponsors) with accurate, detailed reporting contributing to successful decision making. — The criticality of a robust and realistic baseline. — The need to evolve governance arrangements through the course of the programme.
Confidential programme	The programme is a major energy infrastructure project involving both UK government and private sector parties.	— An open and transparent culture, led by Sponsors and embraced by the delivery entity is supporting cooperative

Programme	Summary	Comments
	The programme is highly complex and novel, it is running behind schedule. Transparency between Sponsors and the delivery entity has meant that programme delays whilst challenging, are being addressed in a cooperative way, and Sponsors have been provided with the information they need to support them through difficult decisions.	relationships in a challenging project delivery environment. — Sponsors are kept informed through a consistent set of key programme metrics, the presentation of progress based on both mitigated and unmitigated risks, and period based trend reporting against the baseline. — A combined team of technical and financial experts provides independent assurance on behalf of Sponsors. The team is not embedded in the programme, but provides periodic assurance taking an 'outside-in' perspective.

Source: The London 2012 Olympic Games and Paralympic Games: post-Games review by National Audit Office, Infrastructure and Projects Authority.

5 CRL Board

The questions within the Terms of Reference raised and which are dealt with in this section are:

— Considering the role, composition and governance of the CRL Board and steps that could be taken to provide greater oversight to Sponsors for the remainder of the Project;
— Considering the role and performance of the committees of the CRL Board, including its Audit Committee (recently subsumed into the CRL Board);
— Considering going forwards options for who is most appropriate to make decisions on the remuneration of CRL Board members and senior executives and whether Sponsors should be more closely involved.

We have first set out below a summary of findings, followed by recommendations, followed by detailed sections addressing each of the respective areas of CRL Board Structure; Audit Committee and Internal Audit; External Audit; Risk Sub-Committee and Remuneration.

5.1 Summary of findings

A summary of the key findings arising from the review of the CRL Board are outlined below. These are intentionally high-level, the detail is set out in Sections 5.3 – 5.9.

— CRL is expected to continue as the delivery entity for the Crossrail project and retain its responsibility for whole programme integration activity (see Section 6 for additional details regarding programme integration).
— Trust between Sponsors and the CRL Board has been undermined by reporting which did not sufficiently surface the probable impact of or the magnitude of the emerging programme performance issues soon enough (see Section 7). The review identified opportunities for enhanced transparency between CRL Board and Sponsors (see Sections 4 and 7 for additional details). This is considered as a requirement to support improved Sponsor oversight.
— The CRL Board has been through a period of extensive change. A majority of its membership has changed during 2018, including the individuals performing the role of Chair and CEO.
— There are skills and experience which would augment the current CRL Board, in particular in the areas of Commercial, Construction, Construction close-out, Railway systems and Network integration.
— The CRL Board continued, until relatively recently, to pursue a pre-planned demobilisation of central resources around a December 2018 Stage 3 opening. This included disbanding the CRL Audit Committee in effect in July 2018 and the re-allocation of its responsibilities (further details can be found in Section 5.6).
— There was a much reduced level of internal audit coverage in 2017_18 and 2018_19, with insufficient coverage in particular in the critical areas of finance and commercial controls.
— Demobilisation reduced central risk oversight and central reporting around commercial and financial risks although CRL considers it did not impact risk management and mitigation at a project level as demobilisation was only focussed on central resources.
— The arrangements for an integrated EIC mean that the majority of investment decisions have not required the involvement of CRL NEDs.
— Sponsors have held some, limited, rights as regards CRL remuneration (for example TfL approval of the Remuneration Framework), however, Sponsors have not had direct rights of approval over remuneration decisions. The exercise of decisions related to remuneration has been performed by the CRL RemCo. The last RemCo meeting was held on 8 November 2018, the two prior to this on 26 October 2018 and 24 May 2018. In the period between the 24 May and 26 October RemCo meetings all except one member (Sir Terry Morgan) of the RemCo left the CRL Board having reached the end of their terms of office as Directors of CRL. Since 8 November 2018, Sir Terry Morgan has resigned from the CRL Board.

— The CRL Remuneration Framework has not been updated since 2010. As such in a number of areas, the Framework is not aligned with current good practice as represented by the FRC Corporate Code 2018. Reflecting the current particular challenging status of the programme, Sponsors need to have confidence, and to have and be seen to have a more direct role in ensuring, that remuneration decisions taken during the remainder of the programme are demonstrably in the public interest and linked to the timely and cost effective delivery of the programme.

5.2 Recommendations

The CRL Board performs a critical role in both challenging and supporting CRL Executive management. The recommendations here propose ways the CRL Board may be enhanced to reflect the requirements of the programme. The recommendations in Table 7 are proposed. These reflect the recommendations in the Executive Summary.

Table 7: CRL Board and Board Committees Recommendations

CRL Board recommendations for consideration ***Sponsors to approve a new Chair and nominate new Sponsor NEDs with the expertise required to match the needs of the remainder of the programme and so that they enhance the overall capability of the CRL Board. Sponsors and CRL to agree changes to the procedures around and oversight of remuneration of senior CRL staff. CRL to review the current Board sub committee structure, including (re)-establishing the Audit and Risk Committees as a single combined Committee and creating a separate Investment Committee reporting to the CRL Board, distinct from the Executive Committee. The breadth and focus of the internal audit programme and resources to be enhanced.***		
Owner	**Ref**	**Recommendations for consideration by Sponsors**
Sponsors	5.1	Sponsors to approve a new Chair of the CRL Board. Sponsors should consider the essential requirements of the role of Chair through to the completion of programme, and during the period of transition from CRL to TfL for Elizabeth line operation. Sponsors should be clear as to the accountabilities of the role and the Sponsor expectations of the individual performing it. This should include the requirement for CRL to demonstrate strong and appropriate corporate governance. The Chair should support and empower a strong Company Secretary. We would also expect the Chair of the new Audit and Risk Committee (see recommendation 5.5) to play an important role, working with the CRL Chair and Company Secretary, in driving corporate governance standards.
	5.2	Sponsors should work with CRL to enhance the capabilities and expertise of the CRL Board through the nomination of new NEDs with expertise matched to the current and future requirements of the programme. Sponsors should work with the CRL Board to identify and agree candidates with additional expertise in Commercial, Construction, Construction close-out, Railway systems and Network integration. Sponsors and the CRL Chair should give consideration to implications of adding new NED's to the CRL Board in terms of its size, efficiency and effectiveness.
	5.3	Remuneration: Sponsors and CRL should agree changes to the procedures around and oversight of remuneration of senior CRL staff. A decision between two alternative options for strengthening remuneration procedures and Sponsor oversight should be made: A. The CRL Board retains remuneration responsibility, exercised through the CRL RemCo. However an increased number of decisions are reserved for Sponsor approval; or B. The CRL RemCo is disbanded. TfL RemCo assumes responsibility for CRL remuneration decisions which would otherwise have fallen to CRL RemCo. In both options the definition of those whose remuneration falls under RemCo governance to include: — CRL Chair; — All members of the CRL Executive; and — CRL staff whose remuneration is above the thresholds set out in HMT's "*Guidance for approval of senior pay*".

CRL Board recommendations for consideration ***Sponsors to approve a new Chair and nominate new Sponsor NEDs with the expertise required to match the needs of the remainder of the programme and so that they enhance the overall capability of the CRL Board. Sponsors and CRL to agree changes to the procedures around and oversight of remuneration of senior CRL staff. CRL to review the current Board sub committee structure, including (re)-establishing the Audit and Risk Committees as a single combined Committee and creating a separate Investment Committee reporting to the CRL Board, distinct from the Executive Committee. The breadth and focus of the internal audit programme and resources to be enhanced.***		
Owner	**Ref**	**Recommendations for consideration by Sponsors**
		Furthermore, the Remuneration Framework applied to CRL senior staff should reflect current good practice and align with the FRC Corporate Governance Code 2018.
CRL	5.4	CRL to recognise that greater openness and transparency with Sponsors and timely communication of relevant information is required to reflect the changed circumstances of the project. CRL to set out to Sponsors how CRL will cascade enhanced expectations regarding behaviours, transparency, and culture throughout their organisation and maintain this over the rest of the programme so as to support transparent and timely reporting of successes and challenges, avoid optimism bias, and also so as to sustain a strong and positive morale amongst their staff in the face of the current challenges. Regular updates to be provided demonstrating how CRL has satisfied themselves that the appropriate culture is being sustained.
	5.5	The bullets below set out detailed recommendations relating to the re-establishment of the Audit Committee and Risk Sub-Committees as a single combined Committee and recommendations relating to Internal Assurance. — CRL to establish as soon as possible a CRL Audit and Risk Committee reporting to the CRL Board. The remit of the Audit and Risk Committee should be consistent with standard good practice for an organisation such as Crossrail (e.g. addressing internal controls, financial and commercial controls, project and risk reporting, as well as external audit and internal financial, commercial, technical and health and safety assurance etc.). The frequency of meetings of the Audit and Risk Committee should be considered urgently and be sufficient so as to allow for appropriate attention on risk reporting matters. — The Annual Internal Audit Report should be presented to the CRL Audit and Risk Committee. The Annual Audit Plan should be approved by, and Audit Plan Updates should be provided no less frequently than quarterly to, the CRL Audit and Risk Committee. — The breadth and focus of the internal assurance programme should be broadened so that whilst maintaining the focus on critical technical and health and safety matters there is also sufficient focus on Programme delivery and corporate risks, internal financial and commercial controls and on CRL reporting, reflecting all of this in a renewed Integrated Assurance and Approval Plan (IAAP). — The breadth and nature of resources required and available to deliver the broadened internal assurance programme should be assessed and gaps appropriately addressed. — The Audit and Risk Committee to sponsor implementation of a dedicated corporate risk management procedure with the development of a separate corporate risk register. A CRL risk lead to be appointed who will be in charge of both the project risk and corporate risk management processes. With regard to the central reporting of risk we recommend: — Consideration is given to reviewing the sufficiency of the current eight weekly cycle of reporting to EIC and whether this should be shorter. — Risk matters should be reported to the CRL Audit and Risk Committee once re-formed. — CRL's Head of Programme Risk to report to both the EIC and Audit and Risk Committee. — The sufficiency of the resources addressing risk reporting should be reviewed in light of the impact of the implemented demobilisation actions (in line with planned Stage 3 opening in December 2018) and consideration should be given to reinstating risk quantification at project level.
	5.6	Executive and Investment Committee:

CRL Board recommendations for consideration		
Sponsors to approve a new Chair and nominate new Sponsor NEDs with the expertise required to match the needs of the remainder of the programme and so that they enhance the overall capability of the CRL Board. Sponsors and CRL to agree changes to the procedures around and oversight of remuneration of senior CRL staff. CRL to review the current Board sub committee structure, including (re)-establishing the Audit and Risk Committees as a single combined Committee and creating a separate Investment Committee reporting to the CRL Board, distinct from the Executive Committee. The breadth and focus of the internal audit programme and resources to be enhanced.		
Owner	**Ref**	**Recommendations for consideration by Sponsors**
		CRL to separate the Investment Committee from the Executive Committee. The Investment Committee should report to the CRL Board, it should also have a NED majority, and CRL should consider a requirement for this to be a NED Chaired Committee. The current CRL delegation framework (the "*Scheme of Authorities*") will require amendment.
	5.7	Health and Safety Committee: The CRL Board to review the decision to disband the Health and Safety Committee[29] and consider whether it should be re-established given the status of the programme and revised forecast timelines and whether this would contribute to the maintenance of CRL's successful focus on health and safety matters.
	5.8	Nominations Committee: In the event that Sponsors and CRL decide to retain the CRL RemCo, CRL to formalise consolidation of the RemCo and Nominations Committees.
	5.9	Once the CRL Board composition and Committee structure has been confirmed and is in operation, the CRL Board should as soon as possible commission an independent board effectiveness review to assess Board performance and to identify further areas for improvement. The scope and conclusions from the review should be shared with the Sponsors together with details of any steps proposed to be taken by the CRL Board in response to any recommendations which emerge.

5.3 CRL Board structure

In line with the assumptions for this report, CRL is expected to continue as the lead for programme delivery and programme integration for the remainder of the Crossrail project. The findings presented in this section have been based upon this assumption.

5.3.1 Current role of the CRL Board

The CRL Board is CRL's ultimate governing body. It takes high-level decisions and is responsible for ensuring that CRL's organisation, processes and resources are appropriate to deliver the Crossrail project. The Project Documents define those areas reserved for Sponsor decision making and provide guidelines which set out the arrangements for the operation of the CRL Board.

The CRL Board performs a range of functions, these include:

- Setting out the corporate framework within which CRL Executives deliver the project;
- Providing a balance of challenge and support to CRL Executives; and
- Being a key interface with the Sponsors.

[29] Recommendation 5.7 is in the context that we have been asked to consider the role of Committees of the Board which included the Health and Safety Committee which we note was recently disbanded. We have not attempted to assess the historical additive impact of that Committee on the Health and Safety record of the Programme nor to distinguish its impact from that of the many other measures in place.

We note SACR 20 states "*The focus on effective health and safety performance has been maintained and improved, with some of the best HSPI scores ever achieved on the programme during this SACR period. Crossrail and its contractors continue to promote effective management engagement with personnel at all levels and on all sites.*"

5.3.2 Current status of the CRL Board

The CRL Board composition and structure has changed significantly over the past nine months. This is both a result of planned changes intended to reflect a project which was expected to be moving toward completion in December 2018, and also of the consequences of the emerging programme delays and cost increases.

The CRL Board is currently[30] comprised of a majority of NEDs (five) as well as three executive directors; the CEO, the FD and the Programme Director. Currently there is a vacancy to be filled for the role of Chairman which we understand is a non-Executive role. NED appointments are either through Sponsor nominees or Board nominated Directors. At present there are four Sponsor nominated NEDs and one independent Board nominated NED. The Sponsor Agreement (SA) sets out requirements for at least four independent NEDs and up to two Sponsor nominated NEDs. We understand the current balance of Sponsor nominees and independent NEDs reflects TfL and DfT action taken in response to programme performance issues. The CRL Board has established subordinate bodies "Board Committees", one of which is the EIC compromising executives only.

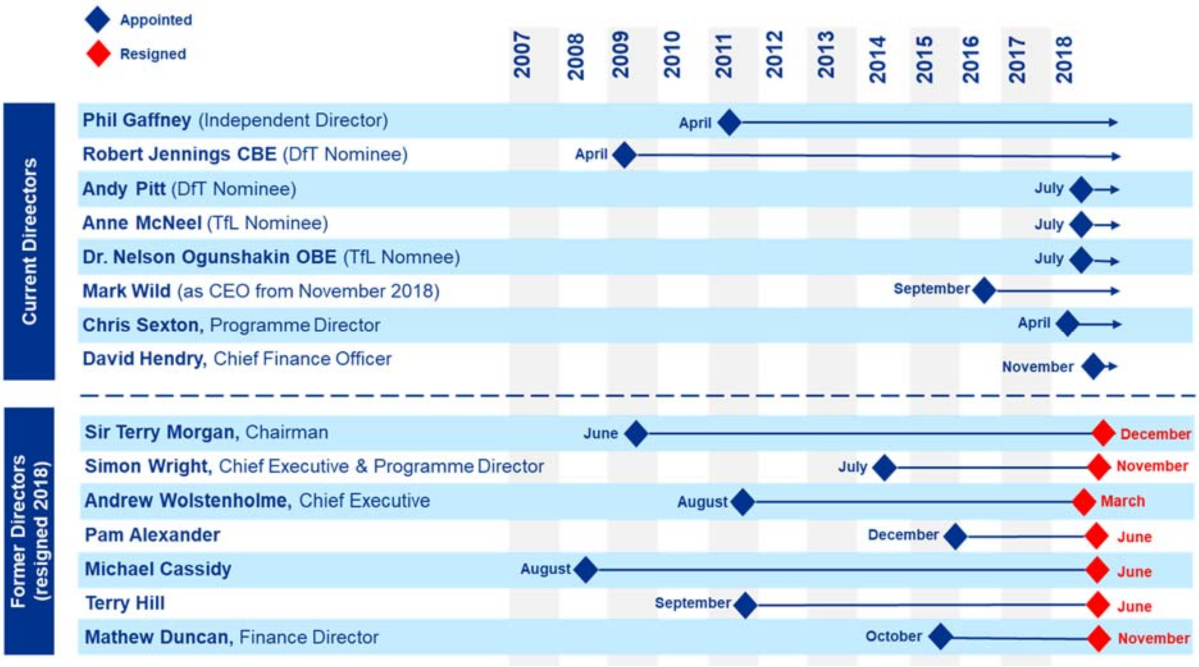
Figure 4 provides a snapshot of the current Board composition, and also the changes to Board personnel since March 2018. Further changes are underway including Mark Wild moving from his NED role to that of CEO in November 2018, and the identification of a replacement for Sir Terry Morgan who resigned as Chair on 5 December 2018.

Interviews with stakeholders including Sponsors, CRL Board Directors (including newly appointed Sponsor NEDs) and CRL executives have indicated some specific gaps in Board capability. These capability gaps[31] reflect the current status of the programme and the experience and skills necessary to ensure effective decision making and appropriate Board challenge. The areas identified are Commercial construction, Construction close-out (previously provided by Terry Hill) and Railway systems and Network integration. Interviews also cited a number of additional areas for improvement, these included the need for improvements to the transparency of Board reporting (see Section 7) and re-consideration of CRL's demobilisation plans given the critical stage of the programme and the associated risk of loss of skills and experience over the same period. We note the importance of CRL efficiently managing its organisation and staffing, as such a demobilisation strategy and plan which clearly reflects the need to handover to TfL whilst retaining sufficient resources and appropriate structures to complete the programme is important. We consider that the demobilisation plans require review in order to ensure alignment between key resources and the needs of the programme given that central demobilisation of key resources has continued against an assumption of Stage 3 opening in December 2018.

[30] As at 7 December 2018

[31] 'gaps' in this context is used to refer to insufficient capability or experience as opposed to a complete lack of these skills

Figure 4: CRL Board of Directors timeline



Source: Companies House; CRL website

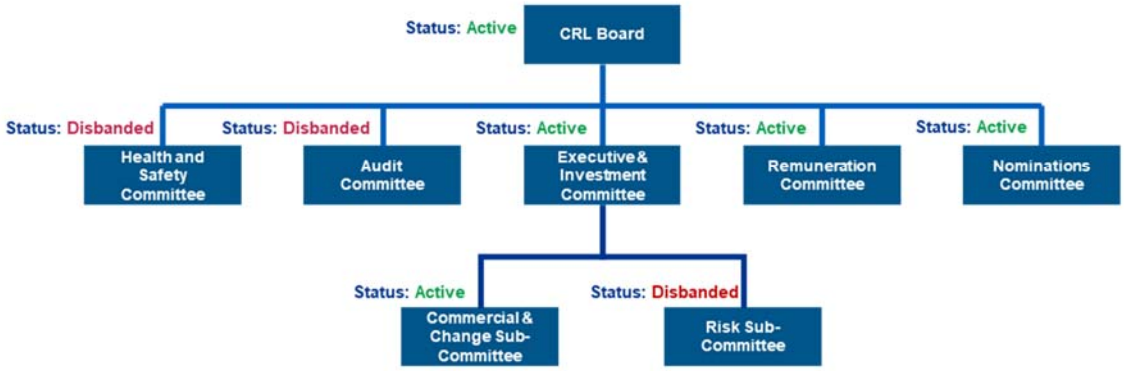
Figure 5 shows CRL corporate governance structure and status, as of November 2018. Table 8 provides additional detail on each of the Board Committees and sub-Committees. In December 2017, the EIC considered proposals relating to changes to governance and reporting through Crossrail close-out and transition to TfL. The proposals had assumed programme completion in line with the original timeline. There is evidence that some aspects of the proposals presented have been implemented, however, since these actions were taken, CRL has advised Sponsors that the planned Programme timelines would not be achieved and there would be further cost increases beyond the IP2 threshold (the programme's P95 cost estimate, and the point at which the TfL contingency fund was exhausted). Proposals presented to EIC which have been adopted include the CRL Board:

— Disbanding the Health & Safety Committee, its functions now being incorporated into the CRL Board;

— Disbanding the Audit Committee and the re-allocation of its responsibilities (further details can be found at Section 5.6);

— Merging the Nominations and Remuneration Committees. This does not appear to have been formalised but in practice has occurred.

Figure 5: CRL corporate governance status



Source: Terms of Reference for Board Committees, Board Committee Meeting Minutes and KPMG interview programme.

Table 8 summarises the role of each of the CRL Board Committees and sub-Committees. Commentary on each Committee and sub-Committee has been included, these include the recommendations which are summarised in Section 5.2 and supporting considerations which have arisen from a review of documentation and feedback obtained during interviews. As part of this review we did not assess the impact of disbanding various committees. However, we note that for the Audit Committee and Risk Sub-Committees the timing of their disbanding was not appropriate. As regards the disbanding of the Health and Safety Committee, we recommend that in light of the current status of the programme that the CRL Board review the decision taken to disband this committee.

Table 8: CRL Board Committees and sub-Committees summary

Committee and status	Summary	Comments and recommendations
Executive & Investment Committee (EIC) **(Active)**	CRL operates a combined EIC. This is an Executive only Committee which meets weekly. The EIC is the highest level executive decision making forum. Responsibility for most investment, commitment and contractual approvals has been delegated to the Commercial and Change Sub-Committee (CCSC) chaired by the FD. The EIC retains visibility of certain decisions, in particular those decisions requiring Board approval.	**Consider the separation of Executive and Investment Committee into separate Committees and incorporation of NEDs on the new Investment Committee** There remain some critical commercial decisions to be made and approved including in relation to potential supplemental agreements with certain contractors. NED expertise in constructively challenging Executives should support more effective decision making for these remaining decisions. Should the EIC be separated, CRL should review the role and functions of the Executive Committee and the CCSC. Changes to the current delegation structure would necessitate revisions to the current *Scheme of Authorities.*
Commercial and Change sub-Committee (CCSC) **(Active)**	The CCSC is a sub-committee of the EIC. The CCSC meets fortnightly. The CCSC is CRL's principal body for financial decision making. The Terms of Reference state "*The Sub-committee is the main decision-making body for financial, contractual and commercial matters in connection with delivery of the Crossrail Programme.*"	**The change control process should be revised[32] for more significant changes to allow time for Sponsor review to understand what is changing and why it is changing.** **Should CRL establish separate Executive and Investment Committees, CRL to further**

[32] Changes should be required to be notified to Sponsors within a finite time period of say 7 days.

Committee and status	Summary	Comments and recommendations
	The CCSC is chaired by the FD, and other members include the Commercial Director (CD), Operations Director, Programme Controls Director (PCD), Technical Director, Delivery Director, Company Secretary and Chief of Staff. The authority of the CCSC is set out in the *Crossrail Scheme of Authorities*. Within the prescribed limits the authority reserved to the CCSC includes: — Release of Programme contingency — Pre-Tender Budget Authority — Investment Authority — Category procurement plans — Package procurement plans — Approval of the tender list — Authority to commit to contract award — Settlement of contractual claims and disputes — Settlement of third party claims	**consider the changes which may be required to the CCSC.** The CCSC reports and makes recommendations to the EIC. The summary sets out areas delegated to the CCSC as defined in the *Scheme of Authorities*. The *Scheme of Authorities* has been amended twice since September 2017 (see Section 7). These changes reduced the authorities delegated to the CCSC and required additional oversight by the EIC and Board. Should CRL establish separate Executive and Investment committees, CRL will need to consider the role of the CCSC, its responsibility, authority delegated to it and its reporting lines. In terms of the operation of the CCSC we note: — It has authority to release programme contingency to delivery contingency and contract budgets up to a limit of £25m — It is responsible for ensuring contracts and agreements are procured and managed in a manner consistent with CRL's financial constraints and commercial objectives — The Chair is the FD, Deputy Chair is the CD — There is some risk of self-review in that the CD leads the commercial negotiations with the key contractors and is a key member of this sub-committee providing governance and approval on behalf of CRL without any reference back to the Sponsors. We recommend going forwards in light of the challenged position of the Programme that a change control process should be implemented that allows time for Sponsor review to understand what is changing and why it is changing. The criteria for escalating change for review by the Sponsors should be agreed between the Sponsors and CRL. This is addressed in more detail in Section 7.
Health and Safety (H&S) Committee (Disbanded)	The last meeting of the Health and Safety Committee was on 19 July 2018. The full CRL Board now deals with health and safety issues directly. We note SACR 20 states "*The focus on effective health and safety performance has been maintained and improved, with some of the best HSPI scores ever achieved on the programme during this SACR period. Crossrail and its contractors continue to promote effective management engagement with personnel at all levels and on all sites.*" Our recommendation is in the context that we have been asked to consider the role of Committees of the Board which included the Health and Safety Committee which we note	**CRL Board to review its decision to disband the Health and Safety Committee** The Board decision to disband the Health and Safety Committee was in line with a plan considered by the EIC in December 2017. In light of the extension to the programme and therefore the remaining work required to complete the programme, the CRL Board should consider whether re-establishing the Health and Safety Committee would contribute to the maintenance of CRL's focus on health and safety matters.

Committee and status	Summary	Comments and recommendations
	was recently disbanded. We have not attempted to assess the historical additive impact of this Committee on the Health and Safety record of the Programme nor to distinguish its impact from that of the many other measures in place.	
Audit Committee (Disbanded)	The Audit Committee was disbanded in 2018. A decision was taken at the last meeting of the CRL Audit Committee in June 2018 to send proposals to the CRL Board covering the re-allocation of the CRL Audit Committee's responsibilities. The CRL Board subsequently (19 July 2018) agreed a re-allocation of the CRL Audit Committee's responsibilities. Further detail is included at Section 5.6.	**Re-establish the Audit Committee and Risk Sub-Committee as a single Committee** The Board decision to disband the Audit Committee and re-allocate its responsibilities was in line with a plan considered by the EIC in December 2017. The CRL Audit Committee should be re-formed as part of an integrated Audit and Risk Committee with a broader remit appropriate to the balance of risks and uncertainties remaining to be addressed and the volume of programme activity remaining to be completed and in need of assurance. *See details in Section 5.6 for further information on the Audit Committee*
Risk Sub-Committee (Disbanded)	The last meeting of the Risk Sub-Committee was on 12 January 2018 and agreed that risk registers and any summary reports should be reviewed at the EIC meeting from March 2018 at eight weekly intervals.	**Re-establish the Audit Committee and Risk Sub-Committee as a single Committee** The Risk Sub-Committee should be incorporated as part of a re-established Audit and Risk Committee. *See details in Section 5.8 for further information on the Risk Committee*
Remuneration Committee (Active)	The RemCo has recently (26 October 2018) updated its Terms of Reference, which coincided with the first meeting of the RemCo since May 2018. In the intervening period former members of the RemCo reached the end of their terms as CRL Directors, and membership of the RemCo has been amended accordingly. Minutes from the RemCo indicated this body met 5 times between November 2017 and May 2018, but did not meet again until October 2018.	*See details in Section 5.9 for further information on the RemCo.*
Nominations Committee (Active)	The last meeting of the Nominations Committee was 12 October 2017. This was a joint meeting of the Nominations Committee and RemCo. The Terms of Reference for the Nominations Committee were last amended in Jan 2016, these have not been updated to reflect the changes to the CRL Board.	**Consolidation of RemCo and Nominations Committee where Sponsors select to retain the CRL RemCo** The Nominations Committee is already operating informally as a joint Committee, twinned with the RemCo. Should Sponsors determine that CRL retain its remuneration responsibilities and therefore a RemCo, the CRL Board should consider formally merging the RemCo and Nominations Committees This would require an update to the Terms of Reference. The recent NED appointments being Sponsor nominees has meant a limited role for the Nominations Committee.

Source: Terms of Reference for Board Committees, Board Committee Meeting Minutes and KPMG interview programme.

5.4 Internal Audit

The draft 2018_19 integrated internal audit plan was presented to the CRL Audit Committee on 12 March 2018. This showed that 518 days were planned to be expended of which 182 were focussed on reviews described as financial / corporate functions. This compares with the planned 1,669 days in 2017_18. The reason for this substantial reduction in the number of planned days was given as "*reflecting the changing risk profile for Crossrail and the railway moving into operational mode during the year*". However, with the prolongation of the CRL programme, the number, nature and focus of audits in the plan should be reconsidered, and therefore in turn should the resource requirement.

We reviewed the subjects which the 2018_19 internal audits were planned to address in relation to corporate and financial functions and we requested further information on two which we considered particularly interesting in the context of our scope of work. These were the "Management and close out of commercial contracts" and a proposed internal audit of the demobilisation and transfer of staff to TfL. The scope of these internal audits is set out in Figures 6 and 7:

Figure 6: Scope of proposed internal audit of Management and Close out of commercial contracts

18 xxx	Management and close out of commercial contracts	To review the management and close out of commercial contracts, including the financial calculations made by the Crossrail Finance Team. The purpose will be to include having sufficient information to defend subsequent claims for compensation from contractors.	30

Source: CRL 2017_18 Internal Audit Plan

Figure 7: Scope of proposed internal audit of Demobilisation and Transfer for Staff to TfL

17 529	Demobilisation and transfer of staff to TfL c/f from 2017/18	A review of the demobilisation process, including readiness and effectiveness of the transfer of any staff from Crossrail to TfL. Review to include any transition plan and 'hold points' should the project be behind schedule.	20

Source: CRL 2017_18 Internal Audit Plan

At the time that we made our enquiries (November 2018) we were advised that neither of these audits had at that stage been completed and that the whole of the 2018_19 internal audit plan had been put on hold.

We note that in past years, auditor resource had been split between TfL Internal Audit and auditors employed directly by the Crossrail Health and Safety and Environment teams. All internal audits for 2018_19 were to be resourced by the TfL Risk and Assurance Directorate.

Review of internal audit plans for CRL since financial year 2016_17 indicate a large number of internal audits although very few finance focused audits had been completed during that time by CRL's Internal Audit (IA) function. We did not find evidence of any cyclical reviews being performed of key financial controls and believe this should be considered.

We obtained a copy of the 2017_18 internal audit plan which for each planned audit included a brief high level scope summary. We reviewed the list for internal audits which addressed risk within their scope. There were, as expected, a significant number in relation to Health and Safety, and also in relation to Environmental matters and Ethical Sourcing but relatively few in the commercial and financial area. The numbers of such audits were as follows:

Table 9: Summary of number of proposed internal audits in 2017_18 addressing risk

Summary of number of proposed internal audits in 2017_18 addressing risk	
Internal Audit	**Number**
Health & Safety Matters	10
Environmental Matters	13
Ethical Sourcing	7
Commercial / Financial / Other	2

Source: 2017_18 CRL Internal Audit Plan

Two Commercial / Financial planned audits were:

Figure 8: Scope of proposed internal audits in 2017_18 of commercial / financial matters:

17 508	Master Operational Handover Schedule (MOHS)	A review of the arrangements for monitoring progress against the MOHS. To include a review of the process by which the data to support Board reporting on Safety Critical Paths is generated and collated. Also the Schedule Quantified Risk Assessment (SQRA). The review to include a representative sample of contractor reporting.	IA	14104 Crossrail and supply chain performance	20

17 512	Risk Management and ARM	A review of the role of ARM in the final year of the Crossrail Programme. To include a review of the risk management process to ensure that Crossrail is capturing and monitoring the stage risks appropriately.	IA	14104 Crossrail and supply chain performance	25

Source: CRL 2017_18 Internal Audit Plan (undated) as provided by CRL

We note that in a schedule provided to us containing details of issued internal audit reports, the “Risk Management and ARM [Active Risk Management]” internal audit was not listed.

We would have expected a higher proportion of internal audits addressing areas of commercial and financial risk.

We reviewed a summary provided by CRL of issued internal audits in relation to 2017_18 and identified the following which were relevant to reporting on project progress and on time and cost outturn. We note that the findings were summarised as “Well Controlled – No issues raised”. We recommend that the scope of and breadth of future reviews of such areas should be reconsidered carefully as should the sufficiency of appropriately skilled resource being deployed in the execution of such key reviews. This should enhance the probability of identifying issues of concern.

Table 10: Scope and results of 2017_18 CRL commercial / financial internal audits

17-500 Semi-Annual Construction Report (SACR) reporting process Issued 14/12/2017	A review of the SACR process to ensure that the underlying data is sound. This is to include a review of the Work Breakdown Structure reporting and PRISM. Three contracts will be selected as examples - Whitechapel, Bond Street and the Systemwide main works (C610). No issued were raised during this audit (combined with 17-508).	Well Controlled No issues raised
17-508 Master Operational Handover Schedule (MOHS) Issued 14/12/2017	A review of the arrangements for monitoring progress against the MOHS. To include a review of the process by which the data to support Board reporting on Safety Critical Paths is generated and collated. Also the Schedule Quantified Risk Assessment (SQRA). The review to include a representative sample of contractor reporting. No issued were raised during this audit (combined with 17-500).	Well Controlled No issues raised

Source: Extracted from “Audit Reports issued in 2017_18 (undated) provided by CRL”

We note that the internal audit report 17-500 (recorded as combined with 17-508) recorded its scope as being:

“The audit focused on the control environment in relation to the following key risk areas:

- *Resources and governance over reporting cost and schedule within Crossrail;*
- *Compliance with internal procedures for example change control and risk management including their inclusion in regular reports;*
- *Assurance provision over the accuracy and timeliness of data for reporting;*
- *Robustness of progress monitoring of cost and time;*
- *Robustness of programme reporting at different levels of Crossrail; and*
- *Communication and stakeholder management.*

During the audit, a sample of projects currently being undertaken were reviewed in relation to the above scope items to ascertain if controls are being consistently applied at project level. IA [Internal Audit] attended a selection of management meetings to review how reports are utilised by management to support the SACR and MOHS.”

It is not entirely clear to us from the above or from the remainder of the report exactly how the scope was addressed.

We are surprised at the conclusion that “*processes and controls in in place for effective management and reporting of the Crossrail programme budget and schedule are well controlled*”. We consider that the approach used and the skillsets and experience of resources deployed in the internal audit of commercial management and critical related progress monitoring and reporting processes should be reviewed and enhanced.

We note the following comments in the findings section of the report:

“*The use of Crystal as the single source of data ensures that there is data transparency and traceability. The strict timetable used for the reporting cycle ensures that data is timely and the data assurance process ensures accuracy and completeness.*

There is appropriate focus on underperforming contractors and the pressures on cost and time in the board report. The current contingency budget is insufficient to cover the P50 risk exposure by £128m and SACR 18 reports a decrease in confidence in meeting the Stage 3 opening from 77% to 71%.

It is essential that sufficient resource is retained both [by] CRL and contractors to ensure that the railway is able to open as planned. There is an audit in the 2018/19 plan that will cover this. We would recommend that the scope is expanded to include a review of contractor resource."

We would make the following observations on the above findings:

- We note the 'data assurance process' is described as ensuring accuracy and completeness but it is unclear to us how this was checked, nor what if any steps were taken to review key aspects of the base data underpinning the schedule for costs and time to go;
- It is not clear whether and if so, how, internal audit was satisfied as to the basis of calculation of the 71% confidence of achieving Stage 3 opening. We note that the subsequent report by P Rep a few months later commented that underpinning assumptions to this calculation were out of date and that they thought the probability was significantly lower (at that time). We also note that SB 87A minutes recorded that JST reported "The Stage 3 confidence of 71% has limited accuracy given the exclusion of the three most at risk stations and 19 assumptions on 'red' items."
- The internal audit correctly highlighted issues around potential shortfalls in resource although this was one of many issues which needed to be addressed. We note the reference to there being an audit in the 2018_19 internal audit plan which will cover this, however we could only see the proposed internal audits in Figures 6 and 7 above which might have touched on this area, but neither of which were carried out.

We did not see any internal audits addressing the accuracy of the commercial or financial data which was used as the basis for the preparation of the CRL Board Reports, during 2017_18 or 2018_19 although elements of the data used in those reports would have been common to the data which should have been considered in the execution of the above internal audits numbered 17-500 / 17-508.

We also did not see any completed internal audits testing the alignment between the planned pace of demobilisation and the effectiveness of the control environment versus programme tasks still to be managed and performed. This is relevant given our concern that the head office demobilisation continued in line with plans drawn up against a Stage 3 Opening of December 2018 leading to a reduction in resources in certain key areas beyond that required to preserve a sufficient operation of key processes. We understand this is being addressed.

5.5 Assurance across the CRL business

The interactions between CRL's existing lines of defence are not as clearly defined as they should be, in terms of who is being provided with what assurance, to what degree, when, how and by whom.

There is also insufficient clarity that all key areas of risk are being properly addressed through a mixture of business as usual processes and checks and internal assurance.

5.6 Audit Committee

The CRL Audit Committee met for the last time in June 2018 and was in effect disbanded in July 2018. Discussion at the CRL Audit Committee at their final meeting on 11 June 2018 led to the finalisation of a proposal approved by the EIC on 11 July 2018 and which was subsequently approved at the CRL Board on 19 July 2018. This included details of proposed future governance arrangements related to Audit Committee matters. These are set out below.

With regard to future arrangements for the oversight of internal assurance we note that the minutes of the 11 June 2018 CRL Audit Committee record that: "*The Committee agreed that there must be a clear distinction between those audits that fall within the TfL remit (i.e. relating to the Elizabeth line) and those relating to CRL (i.e. those relating to delivery of Crossrail). The former should be considered and approved by the TfL Audit and Assurance, and the latter by the CRL Board. The members considered that only a small number of audits would need to be considered by the CRL Board, but agreed that an appropriate process needed to be put in place by CRL to monitor the progress of such audits.*

The meeting further discussed the distinction between the governance delivered by the TfL Audit and Assurance Committee and that provided by the CRL Board. The members considered that it was important that the interface between the two be properly managed to ensure that the appropriate matters were debated in the correct forum. The meeting accepted that in all probability only a small percentage of the governance matters presently considered by the Audit Committee would fall upon the CRL Board to review."

The 19 July 2018 CRL Board approved the proposals contained in a paper titled *"Future Audit Committee Arrangements"*. It was proposed that arrangements going forwards for managing the matters previously looked after by the CRL Audit Committee in relation to internal audits, would be as shown in Figure 9.

We note it was intended that there would still be meetings between the Head of Internal Audit and the CRL Programme Director on a quarterly basis. We have been advised that such a meeting has taken place at least twice.

Figure 9: Proposed Internal Audit arrangements for remainder of 2018_19

Proposed Arrangements for remainder of financial year 2018/19

Current Arrangements	**Proposed Arrangements**
Annual Internal Audit Annual Report (i) Presented by the TfL Director of Risk and Assurance to the CRL Audit Committee at the same meeting as the Annual Report & Accounts.	Annual Internal Audit Annual Report (i) Presented by the TfL Head of Internal Audit to the CRL Board at the same meeting as the Annual Report & Accounts (June 2019).
Approval of Annual Audit Plan (i) Reviewed by TfL Director of Risk and Assurance (ii) Reviewed by CRL ExCom. (iii) Approved by CRL Audit Committee	Approval of Audits for 2019/20 in March 2019 (i) Reviewed by TfL Director of Risk and Assurance (ii) Reviewed by CRL ExCom (iii) Those relating to the delivery of Crossrail, Approved by the CRL Board (iv) Those relating to the Elizabeth line, approved by the TfL Audit and Assurance Committee as part of the TfL Integrated Audit Plan.
Audit Plan Update Presented 3 times per year by the Crossrail Head of Internal Audit to CRL Audit Committee giving formal updates on: (i) Progress on audit plan (ii) Closure of audit findings (iii) Fraud Risk Assurance Group (iv) Crossrail Integrated Assurance Group (v) Auditor Resource	Audit Plan Update Those relating to the Elizabeth line to be presented 4 times per year (September 2018, December 2018, March 2019 and June 2019) to the TfL Audit and Assurance Committee. This will continue to provide formal updates on: (i) Progress on audit plan (ii) Closure of audit findings Those relating to the delivery of Crossrail to be referred to the CRL Board on a quarterly basis.

Source: CRL Board paper 19/19: "Future Audit Committee Arrangements", tabled at the CRL Board 19 July 2018

We recommend that a CRL Audit and Risk Committee be formed. In addition, the Annual Internal Audit Report should be presented to the CRL Audit and Risk Committee, the Annual Audit Plan should be approved by the Committee, and Audit Plan Updates should be provided no less frequently than quarterly to, the CRL Audit and Risk Committee. We have also recommended that the internal audit programme should be broadened so that whilst maintaining the focus on critical technical and health and safety matters there is also sufficient focus on programme delivery and corporate risks, internal financial and commercial controls and on CRL reporting. We would expect oversight of these areas to fall within the remit of the new CRL Audit and Risk Committee.

5.7 External Audit

It was not part of our scope of work to consider or comment on the statutory audit of CRL and we have not done so.

We were, however, asked to speak with the audit partner from external statutory auditors, EY and to consider any observations he provided which were relevant to our scope of work. We were also asked to have regard in our report to the contents of an extract from a paper tabled to the Audit Committee by EY, dated 8 June 2018 in relation to EY's observations on outturn costs.

During our discussions with the EY audit partner we were told that the issue of expected outturn costs for the programme was only relevant to their audit in so far as considering whether outturn costs were likely to exceed committed funding, in which case it was relevant to going concern considerations. We note that the EY audit partner advised that the statutory accounts for CRL for the year ended 31 March 2018 had not as yet been signed although he expected to sign them shortly.

To contextualise the EY paper dated 8 June 2018 in terms of timing:

- SACR 19 issued in June 2018 referred to an expected P50 AFCDC cost outturn of £12,723m which was said to be £211m over IP2 (that figure (£211m) is referred to in the EY paper below); and

- A paper prepared by TfL and dated 20 July 2018 for the Deputy Mayor of Transport and Mayor's Chief of Staff, referred to "*CRL and Sponsor view following further scenario testing*" as £211m to £315m, and "*Jacobs independent assessment - worst case*" £400m, and referred to "*Sponsors had agreed to co-fund overrun up to £300m*".

- On 31 August 2018, CRL served an Adverse Event Notice of a delay in Stage 3 opening and tabled at the Sponsor Board on 3 September 2018 two alternate calculations of a revised AFCDC which were £767m to £823m (P50 to P95) or £728m above IP2.

We note the EY paper which was tabled to the CRL Audit Committee and dated 8 June 2018, stated:

"CRL Management anticipate the risks to materialise at the 50% level and forecast the total final costs to exceed Intervention Point 2 (IP2) by c.£211m.

We have;

— *Performed a sensitivity analysis on future cost outturn by identifying different scenarios and forming our own independent view of total capital spend compared to existing funding agreements.*

— *Assessed the impact of our findings on the going concern of CRL."*

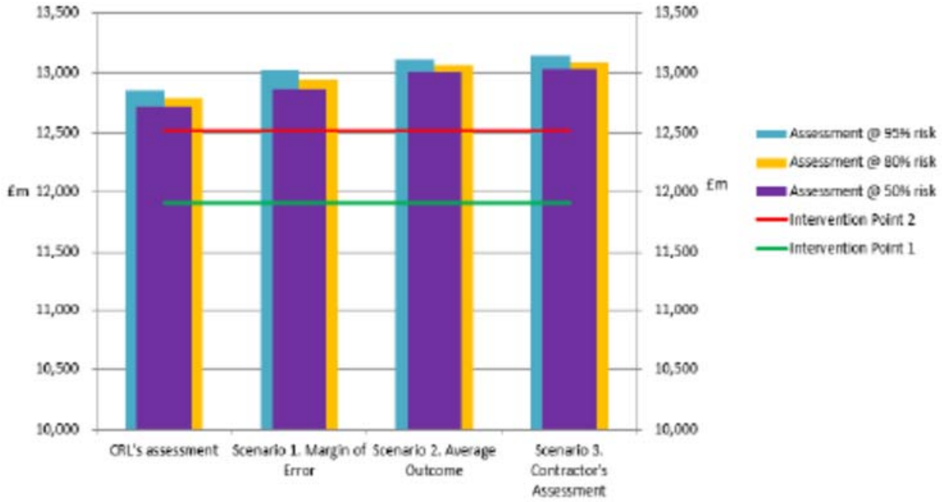
A separate handout tabled by EY stated:

"Set out in the graph below in Scenario 1 is the current forecast positon for Crossrail. The remaining three scenarios utilise different assumptions with respect to target and forecast cost outcomes. In addition, to avoid an element of double counting, we have adjusted the CRL risk assessment. Please refer to the table below the graph for the assumptions used.

In all of the scenarios presented, the forecast costs at a 50% risk assessment are in excess of intervention point 2. The expected breach of Intervention point 2 ranges from £356.4m under EY's Margin of Error assessment at 50% risk (scenario 1), to £632.0m using the Contractor's view of target price and cost at 95% Risk (scenario 3).

Based on the analysis performed we consider that it is highly likely that the total Crossrail spend will breach intervention point 2."

Figure 10: Anticipated Final Crossrail Direct Cost – EY sensitivity analysis



	CRL's Assessment	Scenario 1	Scenario 3	Scenario 4
Target price	CRL	CRL with a 19.2% margin of error applied	Median of CRL and Contractor	Contractor
Anticipated Final Cost (AFC)*	CRL	CRL with a 19.2% margin of error applied	Median of CRL and Contractor	Contractor
Other	None	None	None	None
Risk adjustment	None	None	15% reduction on CRL	15% reduction on CRL

*The AFC includes the impact of pain/gain adjustments where applicable.

**The predicted AFC within the graph does not include the Contractor's updated AFC for C610 as a result of the revised programme in order to meet the most recent MOHS dates.

Source: End of extract from EY Paper of 8 June 2018.

We note that this paper in essence explains it applies a 19.2% margin of error to the CRL numbers, and sets out the Contractor position and the median, the latter two scenarios with some adjustment to CRL's position on risk. The EY Audit Partner told us the source of the 19.2% was based on a comparison between actual and expected spend rates.

We note the Minutes of the CRL Audit Committee of 8 June 2018 comment as follows on the above:

"[The EY Audit Partner] then handed round a separate sheet setting out EY's 'Future Outlook'. The members debated the sensitivity analysis of the Anticipated Final Crossrail Direct Costs and in particular 'Scenario 3' which was based upon the Contractors' Assessments. [The EY Audit Partner] accepted that this was somewhat more pessimistic than Crossrail's assessment. The Committee considered that 'Scenario 3' was an unduly pessimistic prediction…

The Committee noted the EY Audit Results Report."

5.8 Risk Sub-Committee

We note the central risk team and the Risk Sub-Committee were demobilised in early 2018. The Head of Programme Risk had until this point provided reports to and attended the Audit Committee and Risk Sub-Committee[33]. The final meeting of the Risk Sub-Committee was 12 January 2018 at which the plan for demobilisation of risk was reviewed and the following decisions taken:

"Quantitative Cost Risk Analysis (QCRA):

[33] The Head of Programme Risk reported to the PCD (Richard Palczynski) who attended the Risk Sub-Committee. The PCD reported to the Finance Director (Mathew Duncan) who attended the Audit Committee.

- *In accordance with the 2017/18 Business Plan, the final quarterly QRA was scheduled for March 2018 as part of the SACR19 process;*
- *Post March 2018, risk reporting would be reviewed periodically and would only focus on the AFCDC (P50); and*
- *Sponsors were to be formally informed that there was no benefit in continuing to conduct QRA's beyond March 2018*

The Sub-Committee agreed that:

- *There was no justification for incurring the costs and resources that would be required to conduct another QRA beyond SACR 19; and*
- *Nikki Gash, Richard Palczynski and Lucy Findlay should prepare a letter notifying Sponsors that beyond March 2018, the QRA modelling exercise would no longer be carried out and only the P50 would be reported. Risk management would continue within the various sectors.*

Active Risk Manager (ARM)

The meeting agreed the following actions:

- *Shut down of the ARM software was planned for 1 May 2018;*
- *Closed risks would be archived while active risks would be exported to Microsoft Excel and managed by individuals within the various sectors;*
- *Central collation and monitoring of the management of these risks was key; and*
- *Strategic, Programme and Business risks would be the main areas of focus, with a view to streamline these risks between now and May 2018.*

The sub-committee agreed that:

- *ARM should be shut down on 1 May 2018;*
- *The format for collating, monitoring and managing active risks using Microsoft Excel and SharePoint should be defined; and*
- *The individuals within each directorate responsible for managing these risks should be identified, as well as the person who would be responsible for central monitoring and control of the reporting system.*

Risk Data and Reporting

- *The ARM Metrics Report (usually produced for the Risk Sub-Committee and the Audit Committee) would no longer be produced after the shut down of ARM on 1 May 2018 (the final report would be produced in April 2018);*
- *The cost and risk sections of the Board Report would be simplified and reduced beyond SACR19; and*
- *The management and closure of the Strategic and Programme Risk Registers would be managed by the Head of Change, with the intention that the register would no longer be incorporated into the Board Report from Period 1, 2018/19.*

Closure of the Risk Sub-Committee

- *The Risk Sub-Committee would cease to meet after its meeting on 12 January 2018;*
- *Risk registers and any summary reports should be reviewed at the ExCom[34] meetings from March 2018, at eight weekly intervals (as opposed to the current governance proposal for the reports to be reviewed at ExCom from September 2018);"*

We note that the CRL Board of 19 July 2018 approved new arrangements in relation to Risk Management reporting. The extract in Figure 11 from a paper regarding "Future Audit Committee Arrangements" prepared for the CRL Board compared the then current arrangements with the proposals which were approved.

[34] The reference to ExCom in the Risk Committee report is a reference to the Executive and Investment Committee referred to as EIC elsewhere in this report.

Figure 11: Extract from CRL Board Paper regarding Future Audit Committee Arrangements 19 July 2018

Proposed Arrangements for remainder of financial year 2018/19

Current Arrangements	Proposed Arrangements
Risk Management Report (i) Risk matters presented to ExCom on an 8 weekly cycle. (ii) Presented to CRL Audit Committee 3 times per year.	Risk Management Report (i) Risk matters presented to ExCom on an 8 weekly cycle. (ii) Risk matters referred to the CRL Board as necessary.

Source: CRL Board Paper 19 July 2018

We recommend:

— Consideration is given to reviewing the sufficiency of an 8 weekly cycle of reporting to EIC and whether this should be shorter

— Risk Matters should resume being reported to the reformed and integrated CRL Audit and Risk Committee

— The sufficiency of the resources addressing risk reporting should be reviewed in light of the impact of the planned demobilisation actions (in line with Stage 3 opening in December 2018)

5.9 Remuneration Committee

Reflecting the current challenging status of the Crossrail project, there is a need to review and amend the approach to remuneration and in particular introduce a greater degree of Sponsor control and influence over future remuneration decisions. This so as to enable Sponsors to, and to be seen to be taking an active role in, establishing increased confidence that for the remainder of the programme remuneration decisions are demonstrably in the public interest and linked to the timely and cost effective delivery of the programme.

The approach to, and management of the remuneration of senior members of CRL should reflect both good practice and the sensitivity raised by a project with significant commitment of public money. The CRL Remuneration Framework dates to 2010 and the membership of the RemCo has changed in its entirety since June 2018. This report sets out two alternative approaches to remuneration for the remainder of the programme. In considering both options, we recommend Sponsors consider amending the scope of those covered by the remuneration policy, and that in future approval of the remuneration of the following roles is no longer delegated to the CRL RemCo:

— The CRL Chair;

— CRL Executives (members of CRL Executive and Investment Committee (EIC)); and

— CRL staff whose remuneration is above the thresholds set out in HMT's "*Guidance for approval of senior pay*" (remuneration packages at £150,000 or above, and performance ('bonus') arrangements of more than £17,500).

It should be noted that previously the CRL RemCo were required to consult with TfL[35] on the remuneration of the Non-Executive Chair and the CEO.

[35] The SA defines the approach for determining remuneration packages for executive directors, the Chair and CEO: *"11.11 The remuneration and benefits package of the executive directors of CRL and (i) the Executive Chair or (ii) if appointed, the Non-Executive Chair and Chief Executive Officer of CRL shall be determined by the CRL Remuneration Committee in accordance with the Remuneration Framework and in consultation with TfL regarding the remuneration and benefits package of the Non-Executive Chair (if appointed) and with TfL and the Non-Executive Chair regarding the remuneration and benefits package of the Chief Executive Officer (if appointed)."*

In each option presented here, Sponsors and CRL leadership need to consider the flexibility required in order to ensure appropriate recruitment and retention of staff who may be important to support the safe, timely and efficient delivery of the remaining work.

5.9.1 Options for Sponsors to exercise greater influence over CRL remuneration decisions

Two options for greater sponsor influence over CRL remuneration decisions are outlined below. There are additional recommendations which should be considered by Sponsors and CRL irrespective of which option is pursued, these were identified following a review of the FRC Corporate Governance Code 2018.

5.9.1.1 Option A: Strengthen CRL's Remuneration Framework, the RemCo, and provide Sponsors with direct influence over key remuneration decisions

The CRL RemCo is retained and that its operation is amended as follows:

— CRL retain a RemCo with responsibility for remuneration policy

— The CRL RemCo proposes remuneration packages for the roles identified in Section 5.9. Approval would first be sought from the CRL Board and then the SB before any commitments are entered into with the individuals fulfilling these roles.

— The CRL RemCo retains responsibility for other remuneration decisions, but Sponsors can intervene into remuneration packages for other CRL staff where they consider that the package is inappropriate. Guidelines for this would need to be developed.

5.9.1.2 Option B: The CRL RemCo is disbanded, TfL RemCo assumes responsibility for CRL remuneration

Sponsors may opt to disband the CRL RemCo with its functions replaced by the TfL RemCo. This would provide TfL with direct control over CRL remuneration. The option presents Sponsors with a way of demonstrably obtaining greater control over key remuneration decisions.

There are a number of practical considerations which will need to be taken into account by Sponsors and CRL should this option be adopted:

Remuneration Policy:

Consideration of whether the TfL Remuneration Policy would be suitable for CRL and allows CRL to recruit personnel with the right skills and experience to support the completion of the programme. It may be that there is a need to adapt a version of the TfL Remuneration Policy to reflect the specific details of the Crossrail project and CRL's programme delivery role. Alternatively, the TfL RemCo may be able to oversee the implementation of an updated CRL Remuneration Framework;

TfL and CRL interaction: There would need to be close alignment between the TfL RemCo and CRL Board on topics such as CRL objectives, KPIs; CRL's human resource requirements considered necessary to complete the Programme in as timely and cost efficient manner as possible; and the related time-criticality of some appointments. The TfL RemCo would need to take account of the time limited nature of the Crossrail project and of CRL as an incorporated entity.

5.9.2 Additional considerations

The Remuneration Framework for CRL was agreed in August 2010 by the CRL Board and endorsed by Sponsors. The current Terms of Reference for CRL RemCo were adopted on 26 October 2018. This followed the re-constitution of the RemCo after the departure from the CRL Board of all former RemCo members.

Should Sponsors decide that the CRL Board retain its remuneration responsibilities, the CRL Board should conduct a detailed review of its approach to remuneration and align with the FRC Corporate Governance Code 2018 (FRC Code). Our review noted that the 26 October 2018 RemCo Terms of Reference identified that RemCo should be taking account of best practice, including the FRC Code. The table below summarises considerations based on an outline review of CRL's current approach to remuneration against some key provisions of the FRC Code.

Should Sponsors determine that the TfL RemCo assume oversight of CRL remuneration arrangements, TfL should review how the considerations outlined below might apply in this context.

Table 11 : FRC Remuneration and CRL comparison

Item No.	FRC Corporate Governance 2018 Remuneration Provisions	Commentary
1. RemCo constitution	The code provides guidelines for the composition of the RemCo, including guidance on the characteristics and requirements of the individual performing the role of Chair.	**CRL has recently appointed a new set of NEDs to the RemCo to replace former NEDs who left the CRL Board during 2018.** CRL indicated there may be further revisions to the RemCo composition and Terms of Reference. The revised RemCo should align closely with the FRC code provisions.
2. Extent of authority	The FRC Code identifies that the RemCo should have delegated responsibility for determining the policy for executive director remuneration and setting remuneration for the chair, executive directors and senior management.	**In considering both options, we recommend Sponsors consider extension of the existing remuneration policy to include:** — The CRL Chair, — CRL Executives (members of CRL EIC); and — CRL staff whose remuneration is above the thresholds set out in HMT's *"Guidance for approval of senior pay"* (remuneration packages at £150,000 or above, and performance ('bonus') arrangements of more than £17,500). Considering the nature of CRL as a wholly owned subsidiary of TfL and its public funding, this report recommends that a RemCo should continue to set remuneration for the roles identified, but that Sponsors should consider having direct approval of packages proposed reflecting the stressed nature of the programme (as reflected in Section 5.9).
3. Remuneration Policy	The FRC Code states that remuneration schemes and policies should enable the use of discretion to override formulaic outcomes. Furthermore, the same provision states that provisions should be included to enable the company to recover and/or withhold sums or share awards and specify the circumstances in which it would be appropriate to do so. The FRC Code also sets out clear details regarding remuneration policy and practice, including for example the principle of proportionality and risk (including reputational).	**CRL to update its Remuneration Framework. The revised Framework should adopt current good practice and align with the FRC Code.** The CRL Remunerations Framework dates back to 2010. The current Framework has not been reviewed for applicability to the status of the programme, not for alignment with good practice. For example the current Framework includes some provisions to permit RemCo discretion, but no provisions for recovery or withholding of sums awarded. The Framework should be updated, taking account of aspects such as appropriate performance targets and incentive structures.
4.Transparency	The FRC Code sets out the principles for the disclosure of information relating to remuneration and the operation of the RemCo.	**CRL to provide increased transparency as part of its annual reporting of both remuneration policy and its operation.**

Item No.	FRC Corporate Governance 2018 Remuneration Provisions	Commentary
		The CRL Annual Report does not include any information relating to the CRL Remuneration policy or the workings of the RemCo. The TfL Annual Report provides details of Crossrail remuneration packages for Crossrail employees earning a base salary of £150,000 or more.

Source: Terms of Reference for CRL Board Committees, CRL Ltd and TfL Annual Reports, Sponsors Agreement, FRC UK Corporate Governance Code 2018.

6 Programme integration

This section outlines recommendations related to Crossrail programme integration. These recommendations are followed by a summary of the current situation.

A single element of the Terms of Reference is addressed in this section: Considering the governance of all elements of the Crossrail programme including the integration of the rolling stock and operational readiness

6.1 Summary of findings

A short summary of the key findings are outlined below. The detail is set out in Section 6.3.

— The planned arrangements for handover by CRL from programme delivery to TfL for operation of the Elizabeth line are subject to change as a result of the programme schedule slippage. Plans and responsibilities will need to adapt accordingly.

— An amended programme schedule which is still being confirmed and revised funding settlement mean that provisions originally established for the termination of the joint sponsorship model are no longer aligned with the current status of the programme.

— TfL's preparations for operation of the Elizabeth line included the formation of the ELRB; a senior TfL body to align TfL interested parties. However, its relationship to the formal Crossrail programme governance structures is unclear.

— CRL established the ELSSG to support integration of the programme elements required for the operation of the Elizabeth line, including handover to the IM and integration of the rolling stock. CRL also operates a PDB. There is some overlap between these bodies in terms of representation, responsibilities and reporting. Furthermore interviews noted challenges in the operation of both entities. The ELSSG was identified as having been conceived as a senior strategic decision forum but that it had become an informal and detail focused body. The PDB was noted as being comprised of two large (20+ attendees) long meetings. Interviewees commented that these forums could be more focused, they should emphasise critical issues, and attendance by both CRL personnel and partner organisation should be tailored to ensure that the key remaining delivery, integration and operational issues are addressed.

— There are a number of TfL secondees performing executive roles with regard to programme delivery and transition to operations (e.g. Operations Director and the newly appointed CEO and FD). These seconded executive roles are supporting the integration of CRL programme delivery, TfL provision of rolling stock and TfL as the infrastructure manager (as RfLI). This underlines the need to clearly define the strategy and plan for the interface arrangements which describe the handover between CRL and TfL responsibilities.

— There was a general recognition among stakeholders and executives of the need for enhanced integration capabilities and capacity within CRL in support of completion of the remaining programme of works. The completion of the Crossrail project and the commencement of operations involves complex systems integration activity. This includes both complex technical integration (e.g. train and tunnel signalling; and SCADA systems integration) as well as programme and organisational integration activities (e.g. procurement and oversight of sufficient numbers of trained operational staff; availability of key technical capabilities for testing (such as fire safety); and operational process interfaces between RfLI, London Underground Limited (LUL) and MTR Corporation (Crossrail) Limited (MTR)). Sufficient integration capabilities are required so as to ensure CRL is able to understand and successfully integrate the different critical paths of activity.

— We are aware that CRL has recently procured an independent report on programme management and technical integration and is taking steps to address the recommendations arising but we have not seen a copy of that report, details of its recommendations, CRL's resulting action plan or details of progress made in implementing agreed actions[36].

- There was insufficient clarity around whole programme performance. To understand whole programme performance requires an assessment of a number of separate critical paths and their inter-dependencies. Not all of these were wholly within CRL direct control. The rolling stock was procured and contract managed by RfL although the relevant contract management team is based within CRL, working to the CRL Operations Director who has a dual reporting line to the CRL CEO, and to the LUL MD[37]. Operational readiness is a function of CRL, TfL and NR managed activities.
- Programme assurance has not consistently covered all elements of the programme, the integration of the programme or operational readiness.

6.2 Recommendations

The recommendations in Table 12 are proposed. These reflect the recommendations in the Executive Summary.

Table 12: Programme integration recommendations

<table>
<tr><th colspan="3">Programme integration recommendations
Sponsors to update current arrangements for the termination of the joint sponsorship model to reflect changes to the programme completion schedule and a new funding settlement. Sponsors to review and agree the actions which CRL has determined to implement in response to the recommendations set out in the independent report recently procured by CRL to review programme management and technical integration challenges. CRL to strengthen its integration capability for the completion of the programme of works for which it is responsible and to review options for simplifying and clarifying the programme delivery governance structure. Sponsors and CRL to jointly consider any necessary revisions to arrangements for handover from CRL to TfL.</th></tr>
<tr><th>Owner</th><th>Ref</th><th>Recommendations for consideration by Sponsors</th></tr>
<tr><td rowspan="2">**Sponsors**</td><td>6.1</td><td>Sponsors to update current arrangements for the termination of the joint sponsorship model. The current arrangements, as defined in the SA envisage termination of the agreement and of the joint sponsorship model on the "*operations commencement date*". Should timelines for programme completion extend and overlap with operation of the Elizabeth line, as is considered possible, Sponsors will need to reconsider the optimal moment for termination of the joint sponsorship model.</td></tr>
<tr><td>6.2</td><td>TfL should be clear as to the role and remit of the ELRB. The SB and CRL Board should be informed of any material outcomes from ELRB which influence the responsibility or action required of CRL.</td></tr>
<tr><td>**CRL**</td><td>6.3</td><td>CRL to strengthen integration governance arrangements by clarifying the responsibilities of programme level groups, there are currently ~40 such groups in operation.
Specific areas for CRL action include:
— Clarifying the roles of those groups providing day to day strategic direction to the programme delivery teams. The two principal groups are the ELSSG and PDB. CRL should clarify responsibilities, authority, reporting, relationship and interfaces of these groups with the EIC and CRL Board.
— Reviewing the efficiency of the programme delivery and integration governance structure, whether it is operating effectively in support of programme delivery, supporting transparency and whether operational improvements may arise from simplifying and reducing the current number of programme governance groups.</td></tr>
</table>

[36] We have seen a copy of the scope of work but not the resulting independent report which we understand was received by CRL in draft and possibly in final form, during the course of our review.

[37] The CRL Operations Director is a TfL employee and executive director of CRL. The role has reporting lines into both the CRL CEO and LUL MD, this reflects the nature of the role in preparing for the operational running of the railway, the extent of reporting into the LUL MD has varied over time. We note that the previous LUL MD, Mark Wild, was also a CRL NED; Mark Wild has recently been seconded to CRL becoming the CRL CEO and has relinquished the role of LUL MD.

Programme integration recommendations ***Sponsors to update current arrangements for the termination of the joint sponsorship model to reflect changes to the programme completion schedule and a new funding settlement. Sponsors to review and agree the actions which CRL has determined to implement in response to the recommendations set out in the independent report recently procured by CRL to review programme management and technical integration challenges. CRL to strengthen its integration capability for the completion of the programme of works for which it is responsible and to review options for simplifying and clarifying the programme delivery governance structure. Sponsors and CRL to jointly consider any necessary revisions to arrangements for handover from CRL to TfL.***		
Owner	**Ref**	**Recommendations for consideration by Sponsors**
	6.4	CRL to create an effective systems integration leadership / authority with a clear and appropriate remit, together with measureable objectives which are regularly reported against and monitored by the Executive. — We understand CRL has commissioned a third party to recommend changes which would strengthen CRL's programme management and technical integration. — CRL should provide Sponsors with details as to how the strengthened systems integration leadership provides CRL with effective control across the programme and any areas of residual weakness leading to programme risk. CRL to ensure the systems integration team has sufficient capabilities, experience and numbers. — Sponsors to review and agree the actions which CRL has determined to implement in response to the recommendations set out the independent report recently procured by CRL to review programme management and technical integration challenges. Sponsors to monitor CRL's progress in implementing resulting agreed actions and CRL's assessment of whether the steps taken are adequately addressing the underlying issues.
	6.5	CRL to create a new panel of independent experts with a remit across the whole programme to provide regular challenge to decision making at the CRL Board and Executive.
	6.6	CRL to review and take actions as may be necessary to ensure there are appropriate mechanisms under its control for the timely and effective integration of all key supplier and partner contributions to the programme. Specifically with regard to NR: — The CRL Board should improve its whole programme visibility by inviting a delegated representative of the NR CEO to attend the formal meetings as appropriate. — CRL should invite a senior NR representative covering NR's Anglia, Western, South East Routes, and System Operator to the CRL EIC, or appropriate other Board to support NR operational integration. — To complement the additional NR representation at Crossrail governance meetings, CRL to review and determine whether there are additional improvements required in terms of the timeliness and quality of NR reported performance. Critically this should consider the extent to which NR is providing sufficient input, reporting and information regarding operational matters so as to reflect the requirements for operational integration between Crossrail and each of the NR Routes with which there will be an operational interface (i.e. Anglia, Western, South East).
	6.7	With the increasing number of TfL secondees fulfilling senior CRL roles and joint teams established for operational handover activity, it is important that CRL and TfL set out a clear strategy for the interface arrangements which describe the handover between CRL and TfL responsibilities. The strategy and interface arrangements should be supported by a plan and clear governance arrangements for handover which are reflective of the new programme plan and timelines, these should clearly define the responsibilities between CRL and TfL before, during and after handover. Critically these plans will need to evolve, through formal change control, so as to remain aligned with the programme requirements.
Both	6.8	Sponsors and CRL to consider updating and clarifying the arrangements and mechanisms for CRL handover to TfL (RfL, RfLI, LUL).

Programme integration recommendations		
Sponsors to update current arrangements for the termination of the joint sponsorship model to reflect changes to the programme completion schedule and a new funding settlement. Sponsors to review and agree the actions which CRL has determined to implement in response to the recommendations set out in the independent report recently procured by CRL to review programme management and technical integration challenges. CRL to strengthen its integration capability for the completion of the programme of works for which it is responsible and to review options for simplifying and clarifying the programme delivery governance structure. Sponsors and CRL to jointly consider any necessary revisions to arrangements for handover from CRL to TfL.		
Owner	**Ref**	**Recommendations for consideration by Sponsors**
		The delays to the programme schedule are having an impact on original plans for trial running and trial operations. This is leading to greater overlap between CRL and TfL responsibilities than envisaged by the Project Documents. In light of the delays to the programme, the ongoing uncertainty as to the final delivery date and consideration which is now being given to partial opening of some services, it is critical that handover plans are updated to reflect the new circumstances. Mechanisms and arrangements should be clarified taking these changes into account. CRL and TfL should keep these arrangements under review and through a formal change control procedure evolve these as required to meet further potential changes to the programme. Sponsors and CRL should regularly review these arrangements and where appropriate take action to address potential risks to handover.

6.3 Current situation and supporting findings

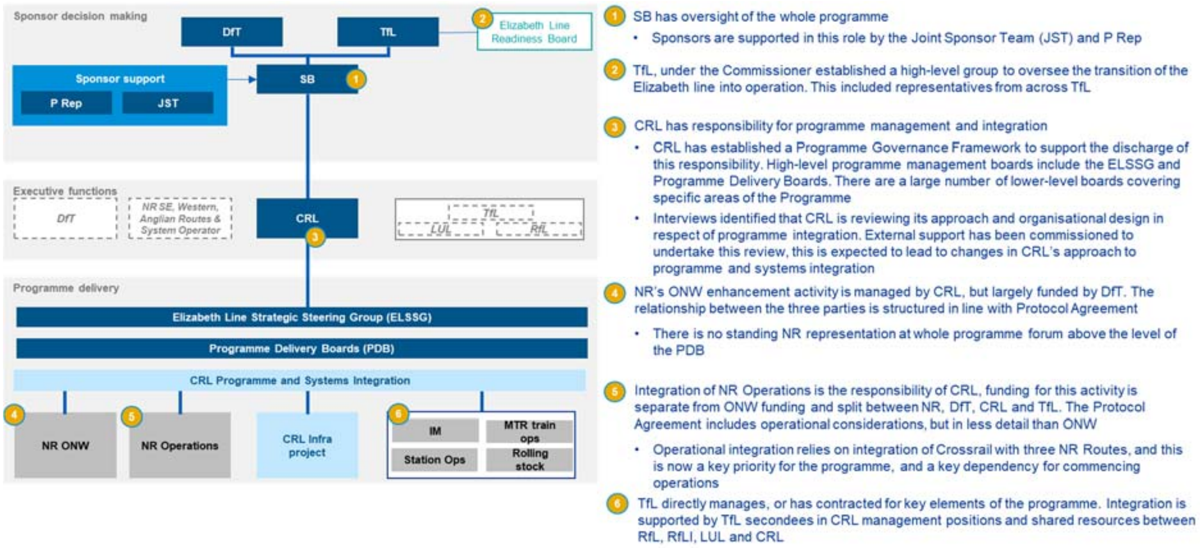
6.3.1 Programme integration responsibilities

Under the PDA, CRL was appointed as the entity with responsibility for completion of the Crossrail project in accordance with the Sponsor Requirements. Furthermore, the PDA sets out CRL's responsibilities for overall programme management, including organising, managing and co-ordinating each of the different elements of the Crossrail programme. This responsibility extends to the commissioning, acceptance, completion and handover process for each of the various elements of Crossrail.

As the programme Sponsors, DfT and TfL oversee the whole Crossrail project. CRL has been allocated the responsibility for programme management and integration. However, in DfT and TfL's respective capacities as principal funder of NR; and parent company of RfL, RfLI and LUL; both perform additional roles in respect of programme delivery activity.

Day-to-day management of relationships with NR, RfL, RfLI and LUL forms part of CRL's role as programme manager. Figure 12 provides a summary of key interfaces and CRL Boards.

Figure 12: Crossrail Programme Integration



A summary of the interface arrangements with Network Rail, RfL, RfLI and LUL are outlined in Table 13. The table also provides commentary on the interface arrangements based on a review of documentation and interviews. It also includes some detailed recommendations, these are reflected at a summary level in Section 6.2.

Table 13: CRL interface arrangements

CRL interface arrangements			
Interface	**Outline of interface arrangements**	**Commentary**	**Detailed recommendations**
Network Rail (NR)	CRL and NR entered into a Protocol Agreement in 2009. This set out the responsibilities of NR with regard to the project, these were also agreed with Sponsors. These responsibilities include: — Delivery of ONW — Provision of other services to support CRL (e.g. engineering systems integration; operational and maintenance arrangements for dynamic testing; trial running and operations for the Central Core Area) The Protocol defines CRL responsibilities: — Specifying the Client Requirements; and — Managing the interface between the NR programme and the wider Crossrail Project Additional areas addressed in the Protocol include:	**Funding** DfT provides the majority of funding for NR ONW. This has meant DfT playing a direct role in some aspects of NR delivery. **Governance** NR representation at forum which consider whole programme issues is limited. NR has not typically attended the SB, the CRL Board, CRL EIC, or the ELSSG, and NR is not formalised as a standing member of the PDB (although we understand in practice there is regular attendance). Responsibility for operational aspects of Crossrail is split across 3 NR Routes and the NR System Operator function. The contribution and funding for NR is a standing agenda item for the CRL Board. **Interview commentary noted:**	**Interface arrangements between CRL and NR need to effectively address both ONW and operations. CRL should give consideration to the following:** — There should be NR representation at senior governance boards where whole programme issues are considered. This would encourage senior NR attention and should help more effective collaboration, transparency and escalation of issues for resolution (see in Sections 4 and 5). — There should be a clearly defined interface between CRL and NR for operational integration. — Updates to the Protocol Agreement have not been proposed. This reflects the likely timescales involved in any such

CRL interface arrangements			
Interface	**Outline of interface arrangements**	**Commentary**	**Detailed recommendations**
	— The role performed by DfT in relation to NR activity — The funding arrangements for NR works — Governance arrangements — Provisions for P Rep access to the NR programme — NR reporting requirements	— The reliance placed on DfT to support the NR / CRL interface. — An emphasis on ONW, with a need to transition the focus to Operations. — It was commented that there is a lack of a single interface with NR for Operations.	changes and the risk that this distracts from programme delivery. However, NR and CRL should ensure that at a delivery level there is a clearly defined interface with NR that is able to manage the multiple parts of NR interfacing with the programme
TfL	The interface arrangements between CRL and other TfL subsidiaries (RfL, RfLI, LUL) are formalised through a set of agreements and included as part of the Project Documents. TfL has established the ELRB a senior TfL forum to review pan-TfL issues for the handover into operation of the Elizabeth line. To effect integration and handover between CRL and other TfL entities, the CRL operations function incorporates teams from across TfL. Management is provided by the CRL Operations Director, a TfL secondee. The roles performed by other TfL subsidiaries include: — RfL: legal counterparty for procurement of the rolling stock, and MTR — RfLI: Infrastructure Manager — LUL: Stations	The CRL / TfL interface is critical for the commencement of an operational railway. The effectiveness of this interface is likely to have a material bearing on the timelines for commencement of an operational railway. Practical integration issues and interface arrangements appear to be addressed by the management structure. Mark Wild, the newly appointed CEO, is a TfL secondee, Howard Smith the Operations Director (since February 2013) is also a TfL secondee and the contract management team for the RfL procured rolling stock are based within CRL working to the Operations Director. We note the Operations Director has had a dual reporting line to the CRL CEO, and the LUL MD. Infrastructure handover is being jointly managed by teams in CRL reporting to the Operations Director and teams in other TfL subsidiaries. It should be noted for governance purposes that the rolling stock contract is subject to TfL rather than CRL arrangements. Interviews noted that improvements to CRL systems integration capabilities would support the existing measures in place to facilitate the CRL/TfL interface. It was noted that handover is likely to be challenging and therefore minimising organisation boundary issues would be important.	**CRL to have the systems integration leadership and capability to effectively manage the interface arrangements with TfL** — CRL capability must be supported by clear interface arrangements between CRL and TfL. This is especially critical in the current situation where there is some uncertainty over timeline for handover of different parts of Crossrail. — CRL and TfL's pragmatic approach to joint working is likely to be reinforced by the appointment of Mark Wild, a TfL secondee, as CEO. — CRL should ensure reporting to both Sponsors on programme delivery issues which involve delivery of TfL procured or managed contributions to the programme. DfT, which does not have secondee staff embedded in CRL, has less direct access to some key programme areas such as rolling stock and handover to the IM.

CRL interface arrangements			
Interface	**Outline of interface arrangements**	**Commentary**	**Detailed recommendations**
		More broadly TfL have instigated readiness planning through the ELRB, this is not part of the formal Crossrail governance structure Operational readiness is a critical aspect of CRL programme reporting to CRL Board and SB, given the significant public interest and implications for TfL revenue. It was noted in interviews that improved transparency across all TfL Crossrail programme related activity, provided to all Sponsors would be welcomed.	

Source: Crossrail – Network Rail Programme Protocol, Terms of Reference for Crossrail Programme related forum.

6.3.2 Programme integration: governance forum

We categorised Governance forums into 4 groups in order to consider integration responsibilities and potential changes to existing arrangements. This report focuses on 3 of those groups:

- Executive decision boards
- Management implementation boards
- External forum – non-programme delivery forum

A fourth category of "Delivery forum" has not been addressed. This category includes the detailed CRL day to day working level delivery and integration Boards. The relationship between these four categories is illustrated in Figure 13.

Figure 13: Programme integration

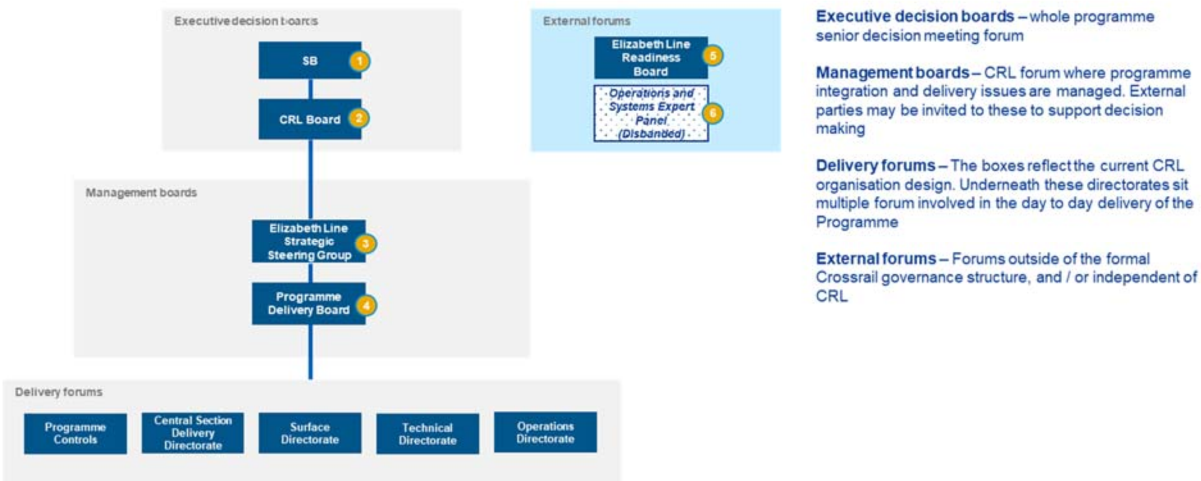


Table 14 provides an outline of the role of the Sponsor and CRL Boards, the two senior decision making forum for the Crossrail project. It also includes commentary regarding the role and performance of Boards for programme integration.

Table 14: The integration roles of Executive decision boards

Executive decision boards		
Body	**Purpose and membership**	**Comments**
Sponsor Board (SB) 1	The SB exercises joint oversight of the whole programme and oversight of benefits realisation. CRL reports to Sponsors. The ability of the SB to discharge its oversight responsibility is underpinned by the provision of sufficient timely, relevant, quality and assured information from CRL and P Rep. The JST support the SB providing a regular interface between the SB and CRL, and by managing the interface with P Rep. Both Sponsors have additional, specific responsibilities associated with certain programme delivery activities: — DFT through its interface with NR — TfL as the parent body for RfL, RfLI and LUL The Sponsor Board is formally composed of 2 Voting Members each from DFT and TfL. Additional invitees include the JST, P Rep, and CRL Executives	**To enable the SB to discharge its oversight responsibilities in the most effective manner, enhancements to current arrangements are required.** The SB relies on the representations made to it by CRL to inform decision making (e.g. expected programme cost outturn and hence the extent of additional funding required for programme completion). However, Sponsors have not been able to place reliance on key information provided (for example expectations in September 2018 that Tier 1 Contractors would be substantially demobilised by November 2018[38] [redacted]. Demobilisation dates continue to slip for most Tier 1 Contractors into 2019). As the body with ultimate accountability for the whole programme the SB: — Needs to be equipped to challenge CRL based on the information provided to it. For example, one way of achieving this may be through the addition of an Independent Member with relevant railway integration and major projects close-out experience (see Section 4). — Requires robust, assured programme reporting with metrics which clearly demonstrate performance across all elements of the programme (i.e. construction, close-out, rolling stock, operations, systems integration, etc.) (see Section 7). — Should manage P Rep to provide, inter alia, the independent assurance services that it is contracted to provide and direct R Rep to undertake further work where there remains uncertainty in the view of the Sponsors as to the performance of CRL to achieve the required outcomes by the agreed timescales. — Should consider the addition of Sponsor observers and the JST at the CRL Board[39] and require more regular attendance of the NR CEO at the SB to explain NR performance (see Section 7). — Should be focused on the most critical issues. This to be informed by escalation of issues for Sponsors' attention by the CRL Board and through the additional visibility arising from Sponsor observers at the CRL Board (see Section 4).
CRL Board 2	CRL is the nominated entity appointed and funded by the Sponsors to manage and implement the Crossrail project as defined in	**The role of the CRL Board is to provide a challenge function to the Executive management, at all times maintaining a best for programme perspective.**

[38] RAP dated 18 September 2018 (page 5)
[39] Or alternatively through other steps which achieve near equivalent transparency

Executive decision boards		
Body	**Purpose and membership**	**Comments**
	the PDA. The integration duties are set out in the PDA. The CRL Board is the ultimate programme delivery board. It takes high-level decisions and is responsible for ensuring that CRL's organisation, processes and resources are appropriate to deliver the programme.	To undertake these functions the CRL Board requires the necessary capabilities and inputs from the Executive team. These include: — Timely and quality whole programme reporting required by the CRL Board to enable it to understand potential trade-offs and programme interdependencies. This needs to include accurate reporting of progress against milestones and schedules informed by up to date and accurate assessments of productivity and progress with realistic assessments of remaining activities and assumed rates of future productivity taking proper account of the level of complexity of the tasks remaining (see Section 7); — The CRL Board members to have sufficient breadth of expertise and knowledge to effectively look across the programme and all aspects of performance and to respond appropriately to information provided (see Section 5); — That CRL internal audit and assurance procedures consider whole programme integration. This to involve assurance of partner and sub-contractor inputs. — Regular input from key delivery partners, for example by obtaining more frequent NR contributions to Board deliberations.

Source: Crossrail – Project Development Agreement, Terms of Reference for CRL Board.

CRL has established detailed programme governance arrangements across all aspects of programme delivery, these are formalised within *Crossrail Programme Governance* arrangements. Outlined below is a summary of the two top-level programme boards underneath CRL EIC. The comments include a recommendation regarding the simplification and clarification of the current programme boards and supporting details.

Table 15: The integration roles of management boards

Management delivery boards		
Body	**Purpose and membership**	**Comments**
Elizabeth Line Strategic Steering Group (ELSSG) 3	The purpose of the ELSSG is to respond quickly to any escalated issues identified during the testing and commissioning phase of the Elizabeth line, up to and including Trial Running, and effectively manage strategic trade-off decisions between the train, infrastructure and operator – with respect to requirements, cost and programme - to best support Stage 3 Opening. Decisions and agreements may be made, following review by the ELSSG, by individuals acting on behalf of the member organisations which they represent; in accordance with the authority respectively delegated in each	**Simplification of the Crossrail governance structure may support enhanced programme delivery performance. This may involve removal or redefinition of the role of some of the ~40 boards and groups defined in the *Crossrail Governance Structure* which sit below the CRL Board and EIC levels.** The ELSSG and PDB both provide programme level governance for the programme, whilst the ELSSG is primarily focused on the transition to operations, and the PDB on programme delivery. A review of the Terms of Reference identified

<table>
<tr><th colspan="3">Management delivery boards</th></tr>
<tr><th>Body</th><th>Purpose and membership</th><th>Comments</th></tr>
<tr><td></td><td>individual by each organisation’s governance regime.
The ELSSG is currently chaired by the CRL Programme Director. The Deputy Chair is the Operations Director. There is extensive CRL overlap between the ELSSG and PDB (see notes on PDB below), in addition, there are attendees from MTR, LUL and RfLI at the ELSSG, although no NR representation, or from other partners and/or suppliers.</td><td rowspan="2">some areas of commonality / overlap between these boards, in particular in the following areas:
— Both Boards report outputs to EIC. Their responsibilities relative to those of EIC are unclear;
— Interviews highlighted that reporting to both bodies is often duplicated;
— There is substantive overlap in the attendance at both bodies;
— The stated purpose of both boards include overlapping responsibilities without a clear distinction between responsibility for testing, commissioning and trial running.
Interviewees noted that the ELSSG was conceived as a senior strategic decision forum but that it had become an informal and detail focused body, not achieving its originally intended objectives.
The PDB formally meets every four weeks for two full days and is divided into two different meetings for Stages 2, 4, 5 and Stage 3. ELSSG also meets every four weeks for a shorter duration. Interviewees have commented on the duration of these meetings as being prohibitive in terms of enabling a focus on the most critical issues and their resolution.
Standing membership of these bodies does not include full programme representation. CRL may choose to consider:
— Ensuring that there is a forum where all critical delivery partners involved in programme completion and transition to an operational railway are invited. For example NR could be invited to a re-constituted ELSSG;
— Providing P Rep with a standing invitation to critical programme integration Boards to support Sponsor transparency.</td></tr>
<tr><td>Programme Delivery Board (PDB)
4</td><td>The PDB is the main review body for delivery of a safe operational end-to-end railway that meets the Sponsors’ Requirements. It is designed to assure the delivery and integration of the railway - across all railway systems, rolling stock, depots, COS and NR surface works infrastructure, combined with operations and maintenance requirements, and all Operator interfaces – is successfully achieved ahead of the remaining four commissioning stages.
The PDB has no authority in the Scheme of Authorities, except where the Programme Director and / or Operations Director wish to exercise their appointed Delegated Authority.
The PDB is currently comprised of two different meetings, each with its own chair. Chair (Stages 2, 4 & 5) Operations Director. Chair (Stage 3) Programme Director. By invitation Network Rail, MTR, LU, RfL, P Rep may each be invited.
There is extensive overlap between the ELSSG and the PDB membership (Programme Director, Operations Director, Technical Director, Chief Engineer, Delivery Director, and Head of Integration).</td></tr>
</table>

Source: Crossrail – Project Development Agreement, Terms of Reference for Programme Delivery Board.

There are a small number of forum established for the purposes of providing a mixture of challenge and to support integration activity. Outlined below are details and commentary on two of these identified through interviews and document reviews.

Table 16: External forum

External advisory forum		
Body	**Purpose and members**	**Comments**
Operations and Systems Expert Panel (OSEP) (Disbanded) 5	The OSEP was an independent expert forum set up by CRL for the purpose of undertaking independent high-level peer reviews of: — Crossrail's operations and maintenance plans and; — The Central Section Rail and Rolling Stock systems designs This panel operated in an independent advisory capacity to challenge executive and management decisions. It had no authority over decision making. The Institute of Civil Engineers (ICE) appointed the Panel Chairman and other core members of the Panel (defined as being 2 experts in addition to the Chair) and invited other ad hoc members as required from time to time where agreed with CRL and the Panel Chairman. This panel met quarterly and provided reports to the Programme Director for CRL Board submission.	**The OSEP was disbanded, Chris Green the former chair now attends the PDB.** **Independent assurance is an important component of a good practice assurance model. CRL should consider the creation of a new panel of independent experts with a remit across the whole programme to provide regular challenge to decision making at the CRL Board, relevant sub-Committees and to the Executive.** — The OSEP was established by CRL to provide expert input and challenge to CRL for operational and maintenance planning and systems design — By attending the PDB, Chris Green remains in a position to provide independent challenge. — CRL has sought to make use of the expertise of the CRL NEDs, holding ad hoc briefings with NEDs on specific topics. — CRL should consider formalising arrangements for obtaining external independent challenge which is used by the Executive and Board to support decision making.
Elizabeth Line Readiness Board (ELRB) 6	The ELRB was established as a TfL forum for coordinating TfL activity related to the Elizabeth line transition into operation. The forum was established to give sufficient visibility to senior TfL staff of the readiness of the railway in order to understand key risks and issues. The ELRB is not a decision making board but provides visibility on key issues and risks to senior members of TfL staff. Attendees include representatives from across TfL, RfL, CRL and LUL. The ELRB is chaired by the TfL Commissioner.	**TfL should be clearer as to the role and remit of the ELRB. The SB and CRL Board should be informed of any material outcomes from ELRB which influence the responsibility or action required of CRL:** — The ELRB does not perform any formal role with respect to the Crossrail Programme. — Interviews highlighted that there was some uncertainty as to the role of ELRB and the extent to which ELRB influences the direction of CRL.

Source: Terms of Reference for Operations and Systems Expert Panel, Terms of Reference for Elizabeth Line Readiness Board, interviews.

6.3.3 Handover to operations

The SA identifies that following the "Operations Commencement Date" (defined as *"the date on which Crossrail services commence on the railway"*) the joint governance arrangements cease and responsibility transitions to TfL. Programme delays mean that it is now envisaged that CRL station completion and trial running and commissioning activities will overlap with TfL (RfL, RfLI and LUL) trial operations and potentially passenger services.

Until CRL and Sponsors have agreed on a revised completion schedule and the details of the funding settlement are clear there remain two key areas of uncertainty regarding handover of accountabilities:

1) **The overlap between CRL programme delivery and TfL operational activity**

   TfL staff are already embedded as part of the CRL operations team, and the CRL Director with operations responsibilities is a TfL secondee and the CRL CEO, also a CRL secondee. These practical arrangements may help mitigate some of the potential risks, and support effective transition. However, these will need to be supported by a strategy, plan and clear governance arrangements for the handover which are reflective of the new programme plan and timelines, and which clearly defines the responsibilities between CRL and TfL before, during and after handover.

2) The appropriateness of the SA definition of the point in time where the joint sponsorship arrangements end

Sponsors should consider a revised transition strategy. Sponsors may need to consider the following when developing the revised arrangements:

a) The timing and form of the commencement of operations;

b) The extent of remaining CRL close-out responsibilities following commencement of operations;

c) The terms of the funding settlement agreed between Her Majesty's Government (HMG) and TfL;

d) Implications for the SA.

7 Reporting and controls

This section of our report addresses a number of elements of our Terms of Reference as outlined at Section 3 and which for ease of reference are repeated below:

- Considering the performance of the CRL Board, in particular its approach to performance monitoring and reporting to TfL as parent company and Sponsors and to what extent this could be strengthened with reference to other organisations with major delivery responsibilities;
- Assessing whether appropriate and effective governance controls are in place;
- Assessing whether appropriate risk management processes and reporting are in place;
- Assessing whether appropriate and effective commercial controls and contract management processes are in place;
- Reviewing whether commercial reporting / tracking and oversight arrangements should be strengthened to ensure that effective reporting to the Crossrail Board and Sponsors takes place for the remainder of the Project.

The following sub-section outlines a summary of our findings, and is then followed by our recommendations related to the Crossrail programme reporting and controls. Our recommendations are followed by a summary of the current situation and our detailed findings.

7.1 Summary of findings

A short summary of the key findings is outlined below. The detail is set out in Sections 7.3-7.6 and relates to the CRL Board Reports except where stated otherwise:

- CRL performance monitoring and reporting has not led to adequate[40] advance notice being provided of the need to materially change the Stage 3 opening date and the resulting significant cost impact.
- Reporting was neither sufficiently timely nor sufficiently clear as to the impacts and magnitude of the range of probable consequences of the issues within the programme.
- Cost scenarios reported to the Sponsors in the first half of 2018 critically did not take sufficient account of the impact of delays in infrastructure works which had a much more substantial cost impact than the delays addressed in the scenarios.
- Effective reporting of programme status relies inter alia on effective contract management, monitoring and oversight of the supply chain by contractors; of contractors and the supply chain by CRL; and on effective reporting systems and flows of information up through CRL from project and commercial teams, through to management, on to EIC, and then to the CRL Board and thereafter to Sponsors.
- The resultant reporting was neither sufficiently timely nor sufficiently clear as to the impacts and magnitude of the range of probable consequences of the issues within the programme. CRL management have explained to us that their understanding of the project costs and timeline as reported through the project management teams and systems was evolving and changing at pace during the first half of 2018 and that there were many challenges to schedule and milestones and that a variety of actions were being taken to address the challenges identified. It is evident that there were formal and informal discussions taking place between CRL and Sponsors around these matters.
- The fact of formal discussions around these matters is evident, for example, from the minutes of the June 2018 SB which record that Sponsors asked CRL to provide information for the next checkpoint (in effect the July SB) on: confidence in December delivery, alternative options to December, including a delayed opening or a reduced frequency or partial opening. We note that a document entitled "Stages 2-5 Readiness" dated 25 June 2018 and tabled by CRL at the June SB showed the Stage 3 opening date of 9 December as "Green" with no variance against a 9

[40] "adequacy" when assessed in the context of the length of the Crossrail programme and the magnitude of changes to forecast time and cost outturn recently announced.

December 2018 opening date although a significant number of the preceding Stage 3 milestones and activities were clearly shown as red or amber as follows:

Table 17: Stages 2-5 Readiness Milestone / Activities RAG

Milestone / Activity	Green	Amber	Red
Dynamic Testing	4	1	3
Pre-Trial Running	4	2	3
Combined Elizabeth line trials	1	4	0
Passenger Service	5	0	0
LU and RfLI Stations – Staged Completion for familiarisation and Trial Ops	7	1	0
Infrastructure, Trains and Testing	0	2	4
MTR, NR, LU and RFLI readiness	0	4	1

— It is also evident that there was regular reporting each period on forecast cost outturn and timeline inter alia in the CRL Board Reports during 2018[41] and in P Rep reports[42]. We have based our comments and recommendations, on what is recorded in the papers and documents that we have reviewed and the formal minutes of meetings.

— We also note the extent of delay which CRL had concluded to be relevant as an upper book-end for funding requirement was only based on [redacted] delay against the planned Stage 3 opening in December 2018 which assumption, together with not considering the impact of failing to recover delays in infrastructure works, led as a consequence to the conclusion of a £200m to £300m increase in cost above IP2 at P50.

— It is clear from the reporting of CRL and of P Rep that a large volume of work was being undertaken to mitigate delays, re-sequence works and search for alternative approaches to testing and commissioning to maintain the opening date. A feature of the increasing stretch or optimism however was a failure to identify, and / or report on a timely basis, the point at which it became unrealistic to expect all remaining activities to be completed within the diminishing timeframe for planned Stage 3 opening and which should have led to revised expectations as to time and cost outturn being developed and reported.

— More generally, we consider there was insufficient information in CRL Board reports (i) around actual and likely performance of individual contracts to enable an accurate and sufficient understanding of their likely outturn and impact on the programme; and (ii) of useful trend and

[41] We note in this regard that the Crossrail Cost Scenario Review report prepared by Jacobs and dated 19 June 2018[41] stated: "*In early March 2018 CRL presented to JST its document entitled AFCDC Scenarios whereby it proposed two scenarios and developed costs for three options within those scenarios, in order to establish and describe an estimated upper and lower limit of funding requirements (known as the 'book-ends'). During this meeting CRL stated that it felt the book-ends of the cost projections lay between Scenario A, Range 2 and Scenario B, Range 3 month delay, equating to a £200m to £300m increase in cost above IP2 at P50*."

We note the CRL Board Report for period 4 2018_19 [24 June to 21 July 2018] shared with Sponsors addressed "Are we on time" inter alia as follows:

"Overall delivery is 94.4% complete vs. planned of 96.3%. 0.6% was achieved in the Period against the plan of 0.7%. Work remains ongoing to evaluate the impact of schedule delays to critical path activities on Stage 3. Alternative scenarios have been identified and communicated, with an executive review planned in Period 5. The drive to complete all physical works and handover each element to the IMs in accordance with the agreed stage completion dates remains resolute."

The same CRL Board Report commented overall: "*Steady but vital progress continues to be made across the project, but in order to mitigate further schedule slippage, each contract is working on detailed plans to demonstrate the steps they are taking towards handing over their sites to the IMs. Despite this, significant overall schedule pressures exist across the programme and work remains ongoing at a project level to identify and evaluate the impact of schedule delays on critical path activities ahead of Stage 3. Alternative scenarios have been developed with Executive, Board and Sponsor reviews planned in August and September to discuss the schedule pressures and proposals for a revised delivery strategy. The drive to complete all physical works and handover of each element to the IMs in accordance with agreed stage completion dates remains resolute as this is key in minimising further cost growth.*

Overall, the project has now reached 94.4% complete. In the Period, the AFCDC remained unchanged at £12,810m (£297m above IP2). In the next few weeks, further defined-cost reviews will be held with key contracts in our ongoing review of emerging costs and additional cost increases in light of schedule pressures. These increases are in the process of validation ahead of being reported next Period."

[42] The role of P Rep is performed by Jacobs. See Appendix 5 for example relevant extracts from P Rep reports during March to August 2018.

other analysis to enable an adequate understanding of historic performance against plan in the context of assessing forecast cost and time to completion.

- CRL Board reports contained insufficient amounts of useful trend analysis to enable an adequate understanding of historic performance against plan in the context of assessing forecast cost and time to completion.
- The reporting of programme level progress was often by reference to cumulative and in month percentages rather than trended historic performance data. Coupled with insufficient reported information about the comparative difficulty / complexity of the activities remaining, and productivity being achieved, this added to the difficulty faced by a reader in trying to assess the likely impact of programme progress on the probability of achieving the Stage 3 planned opening date.
- There is a critical and urgent need to enhance the suite of metrics reported on in the CRL Board Reports so as provide enhanced visibility over inter alia productivity (current and assumed going forwards), progress achieved against milestones and overall timeline, programme float, net risks remaining, and AFCDC.
- The holding of contingency at Sponsor level did not lead to the ability to make timely and effective interventions due to a combination of deficiencies in performance and progress reporting by CRL and an absence of a sufficient practical ability to intervene.
- CRL has commercial management processes in place and operating but we found examples (as instanced below) of processes and contract administration requirements not being followed.
- In reviewing 12 principal contracts during their latter stages, we identified contracts where the PM had not accepted the contractor's programme, in some cases for a period of 12 months. We also found examples of PMs not providing their own determination of compensation events following the failure to reach agreement with the contractors resulting in large differences in the commercial outturn expectations between contractors and CRL. In a number of cases the resulting issues were addressed through / as a consequence of entering into supplemental agreements. In entering these agreements, and as part of the negotiation with contractors to settle disputes and disagreements on compensation events, CRL ceded some of their contractual entitlements. While it is normal to have disputes and disagreements with the contractor, the NEC process is designed to limit these by allowing for early action to agree or for the PM to determine the outcome.
- CRL has had authority to make supplemental agreements with contractors without needing to refer back to the Sponsors as to the potential impact of those agreements.
- Since 2017 the CRL risk management process has been split between the site teams who perform qualitative risk assessments and the central management risk team which performs quantitative analysis across the projects. The latter has been reduced to two people as part of the demobilisation plans aligned to a Stage 3 December 2018 opening.

7.2 Recommendations

The recommendations in Table 18 are proposed, these reflect the recommendations in the Executive Summary.

Table 18: Reporting and controls recommendations

<table>
<tr><th colspan="3">Reporting and controls recommendations

Sponsors to agree timescales for the development of the initial programme by the new CRL CEO and then the development of that programme. Obtain independent assurance of the CRL programme with a deep dive into the estimates for time and cost and providing scenarios based on various scope and other options.

Sponsors to agree the metrics and analysis required from CRL in their performance reporting, as well as a set of critical milestones to indicate CRL's performance in progressing works to plan. Reporting to include greatly enhanced visibility of productivity and progress against the most complex and highest-risk critical path tasks. Reporting to be transparent, timely, sufficient and assured. Sponsors to provide regular updates to stakeholders based on outputs provided by CRL and P Rep. Escalation to stakeholders to be triggered where reporting identifies delivery performance outside of agreed cost and schedule parameters.

Commercial controls to be enhanced, particularly regarding commercial management and administration of contracts. Where Sponsors determine it to be relevant, CRL's delegation to be reviewed and a revised CRL delegation framework to be developed. Sponsors to reserve the opportunity to review CRL decisions on certain new supplemental and settlement agreements. CRL to produce a commercial close out strategy for open contracts, as well as a proposed approach to improving supply chain productivity. Sponsors to review the funding envelope and define a process for the timing and release of funding. Appropriate steps to be taken to enable the holding of contingency at Sponsor level to be an effective measure.</th></tr>
<tr><th>Owner</th><th>Ref</th><th>Recommendations for consideration by Sponsors</th></tr>
<tr><td rowspan="4">Sponsors</td><td>7.1</td><td>Sponsors to review the funding envelope and define a process for the timing and release of funding. In confirming this new framework for the management of funding and contingency, Sponsors to consider:
— The practical challenges which CRL currently faces in being able to identify credible cost estimates and therefore to derive reliable P50, P80 or P95 values for the operation of the existing or a revised framework. These challenges are likely to continue for some time and hence, as an interim measure, any plan to define values for contingency to be held at Sponsor and at Board level with the rest at Programme level may require the pre-definition of contingency values other than by reference to CRL declared values for P50, P80 and P95 outcomes and this should be addressed;
— The holding of contingency at a Sponsor level is only effective if Sponsors have in place the following (and therefore related steps will need to be taken to ensure):
  - Sufficient and timely visibility to Sponsors of reliable information on current and expected outturn project performance;
  - Effective oversight for Sponsors including of risks and uncertainties together with planned actions;
  - Appropriate rights of intervention by Sponsors together with a practical ability to intervene on a timely basis when it seems likely that further commitments or actions or the absence of appropriate actions could take AFCDC over the expected project outturn
— Whether the interests of additional stakeholders will need reflecting in some way (e.g. GLA, HMT).</td></tr>
<tr><td>7.2</td><td>Sponsors to satisfy themselves around the development of the delivery plans with associated estimates of time, cost, risk and assessment of scope adjustments required to open the line as early as possible.</td></tr>
<tr><td>7.3</td><td>Sponsors to agree the metrics and analysis required from CRL in their performance reporting to allow the Sponsors to make their own assessment of whether the progress being achieved is in line with the plan.</td></tr>
<tr><td>7.4</td><td>Sponsors to agree the definition of additional reserved matters on which they have the right to require CRL to seek their pre-approval, and the mechanisms consequently required to be put in place. This would provide Sponsors with the option to require that Sponsors consider and approve or reject proposals as they are developed for such additional reserved matters.
Sponsors should consider defining the additional reserved matters to include:</td></tr>
</table>

Reporting and controls recommendations		
Sponsors to agree timescales for the development of the initial programme by the new CRL CEO and then the development of that programme. Obtain independent assurance of the CRL programme with a deep dive into the estimates for time and cost and providing scenarios based on various scope and other options. ***Sponsors to agree the metrics and analysis required from CRL in their performance reporting, as well as a set of critical milestones to indicate CRL's performance in progressing works to plan. Reporting to include greatly enhanced visibility of productivity and progress against the most complex and highest-risk critical path tasks. Reporting to be transparent, timely, sufficient and assured. Sponsors to provide regular updates to stakeholders based on outputs provided by CRL and P Rep. Escalation to stakeholders to be triggered where reporting identifies delivery performance outside of agreed cost and schedule parameters.*** ***Commercial controls to be enhanced, particularly regarding commercial management and administration of contracts. Where Sponsors determine it to be relevant, CRL's delegation to be reviewed and a revised CRL delegation framework to be developed. Sponsors to reserve the opportunity to review CRL decisions on certain new supplemental and settlement agreements. CRL to produce a commercial close out strategy for open contracts, as well as a proposed approach to improving supply chain productivity. Sponsors to review the funding envelope and define a process for the timing and release of funding. Appropriate steps to be taken to enable the holding of contingency at Sponsor level to be an effective measure.***		
Owner	**Ref**	**Recommendations for consideration by Sponsors**
		— Proposed material changes by CRL to the commercial arrangements around existing contracts (see recommendation 7.16) — Proposals for CRL to enter into new arrangements or take any decision which is expected to have a material adverse impact on, or which CRL consider will avoid a material adverse impact on, schedule or cost outturn. For this purpose it will be necessary to define 'material changes' and 'material adverse'. — Definition of, and adherence to, appropriate processes for timely pre-approval requests, provision of relevant information and documents to those charged with approval, and the granting or otherwise of approval including where necessary the seeking of independent advice to inform Sponsor decision-making, will be particularly important. This is so that Sponsor approval or otherwise can be provided on a timely basis, after appropriate consideration, and so that the programme is not unnecessarily impacted.
	7.5	The Sponsors to agree with CRL a set of critical milestones to indicate CRL's performance in progressing the works to completion in line with the new baseline plan as recommended in 7.12. — The determination of appropriate milestones by Sponsors and how these should be monitored and reported against by CRL should be the subject of independent advice to Sponsors. These milestones will then need to be advised to / agreed with CRL. — Sponsors to consider the rights Sponsors wish to have going forwards to intervene in the programme linked to programme performance as reflected in the milestones. Sponsors to also consider whether there may be other circumstances where they would seek additional rights to intervene. Furthermore consideration is required as to whether these rights need to differ from their current existing rights. Appropriate arrangements to support those rights will then need to be put in place. — The advised milestones should be driven from the programme and CRL should provide variance analysis for all movements in milestones along with the plan to recover the delays. — The purpose behind the milestones would be to flag early warnings of delays to the agreed baseline programme and to trigger a set of agreed actions to allow the Sponsors to understand the potential impact to time and cost and to monitor mitigation measures established by CRL. — Sponsors should define their requirements for CRL to provide variance analysis and mitigation actions where performance achieved is behind that planned.
	7.6	Sponsors to provide regular reports to the TfL Board, TfL Commissioner and DfT Permanent Secretary reporting on:

Reporting and controls recommendations

Sponsors to agree timescales for the development of the initial programme by the new CRL CEO and then the development of that programme. Obtain independent assurance of the CRL programme with a deep dive into the estimates for time and cost and providing scenarios based on various scope and other options.

Sponsors to agree the metrics and analysis required from CRL in their performance reporting, as well as a set of critical milestones to indicate CRL's performance in progressing works to plan. Reporting to include greatly enhanced visibility of productivity and progress against the most complex and highest-risk critical path tasks. Reporting to be transparent, timely, sufficient and assured. Sponsors to provide regular updates to stakeholders based on outputs provided by CRL and P Rep. Escalation to stakeholders to be triggered where reporting identifies delivery performance outside of agreed cost and schedule parameters.

Commercial controls to be enhanced, particularly regarding commercial management and administration of contracts. Where Sponsors determine it to be relevant, CRL's delegation to be reviewed and a revised CRL delegation framework to be developed. Sponsors to reserve the opportunity to review CRL decisions on certain new supplemental and settlement agreements. CRL to produce a commercial close out strategy for open contracts, as well as a proposed approach to improving supply chain productivity. Sponsors to review the funding envelope and define a process for the timing and release of funding. Appropriate steps to be taken to enable the holding of contingency at Sponsor level to be an effective measure.

Owner	Ref	Recommendations for consideration by Sponsors
		— Programme performance in the context of the agreed, revised funding envelope, forecast cost outturn and programme completion timeline; — Progress against agreed critical completion milestones; — Status of key programme risks and their mitigation; — In the event of further slippage, clarity in respect of delay impacts, including on forecast cost to completion.
	7.7	Escalation to TfL Board and DfT Board and Executive Committee should be triggered where reporting identifies programme delivery performance outside of agreed parameters (these to be defined) in terms of cost and timeline.
	7.8	Agree the timescales for the development of the new programme[43] by the new CRL CEO. Once the new programme / detailed baseline is developed the Sponsors to obtain independent assurance through an instructed deep dive review of the programme to validate that it provides a realistic reflection of the scope of work to complete and that the time allowed is logic driven and the productivity assumptions are realistic and based on agreements with the contractors. The cost estimate to complete the works should be independently reviewed to check that it takes account of the updated programme and is based on assumptions that are aligned with the contract and commercial positions agreed with the contractors. Realistic scenarios should be considered and assured.
	7.9	Sponsors to have the opportunity to review and discuss CRL's decisions on proceeding with and signing any new supplemental or settlement agreements in relation to key contracts prior to their implementation. Sponsors should seek independent input (which could be from P Rep) as to the upsides / downsides of what is proposed, prior to determining whether they have any objection to each proposed agreement. For this purpose key contracts will need to be defined by Sponsors but is expected to include at least the top 10 to 15 contracts.
	7.10	Sponsors to request CRL produce a commercial close out strategy for all the open contracts, setting out their current views on contract outturn positions without having a new agreement in place, and also with a new agreement in place. This should take account of the dates being agreed with the contractors in the development of the updated MOHS.

[43] We understand that the situation in relation to preparation of a CRL MOHS has changed since our fieldwork was completed, and that the revised CRL MOHS was not issued or shared with Sponsors as expected on 5 December 2018. In the absence of a MOHS, CRL will need to develop a plan to manage the programme that needs to be agreed with Sponsors which sets out the approach to delivering the opening of Stage 3. Sponsors should seek the provision of such a plan as soon as possible from CRL and obtain independent assurance as to its basis and robustness.

Reporting and controls recommendations		
Sponsors to agree timescales for the development of the initial programme by the new CRL CEO and then the development of that programme. Obtain independent assurance of the CRL programme with a deep dive into the estimates for time and cost and providing scenarios based on various scope and other options. ***Sponsors to agree the metrics and analysis required from CRL in their performance reporting, as well as a set of critical milestones to indicate CRL's performance in progressing works to plan. Reporting to include greatly enhanced visibility of productivity and progress against the most complex and highest-risk critical path tasks. Reporting to be transparent, timely, sufficient and assured. Sponsors to provide regular updates to stakeholders based on outputs provided by CRL and P Rep. Escalation to stakeholders to be triggered where reporting identifies delivery performance outside of agreed cost and schedule parameters.*** ***Commercial controls to be enhanced, particularly regarding commercial management and administration of contracts. Where Sponsors determine it to be relevant, CRL's delegation to be reviewed and a revised CRL delegation framework to be developed. Sponsors to reserve the opportunity to review CRL decisions on certain new supplemental and settlement agreements. CRL to produce a commercial close out strategy for open contracts, as well as a proposed approach to improving supply chain productivity. Sponsors to review the funding envelope and define a process for the timing and release of funding. Appropriate steps to be taken to enable the holding of contingency at Sponsor level to be an effective measure.***		
Owner	**Ref**	**Recommendations for consideration by Sponsors**
CRL	7.11	CRL to review and amend its financial *Scheme of Authorities* to reflect the creation of the Investment Committee. Executive delegations should be reduced, and the Board, through the Investment Committee to assume greater responsibility.
	7.12	CRL to re-establish / develop / provide the following: — A detailed bottom up schedule[44] for each contract that is logic linked, based on the known scope to complete the works (including in relation to the stations taking into account the lessons learned from Tottenham Court Road station). Each contract schedule should be progressed by the PMs taking into account change, risk, compensation events and contractor resource levels and productivity. The schedule should include an appropriately assessed time contingency allowance (float). — The schedule should be informed by rates of activity achieved to date and where different rates are used to drive assumptions about the time and cost to go, this should be clearly highlighted in reporting to Sponsors. This should include where assumptions are made about increased resources to be applied by contractors and their supply chain from those recently applied and / or where improvements in productivity are being assumed, and where this is without any specific agreement to that effect with the contractors concerned. — Once there is an agreed robust baseline then the reporting of performance and cost should be measured against the baseline plan to provide the Board and Sponsors with a transparent view on performance at individual contract level and at programme level. Reporting should include current AFC and risk allowance for each significant contract and a clear separate analysis of overall significant programme risks. Reporting of progress should take proper account of the complexity of, and effort likely to be required to complete, each principal remaining activity within each contract such that reporting is a reliable indicator of progress made and productivity likely to be achieved. — There will need to be a clearly defined strategy which enables both effective downward contract management as well as clear upward performance reporting. Contractors should be managed against challenging but achievable targets using a mixture of contractual rights and other measures. Upward reporting to Sponsors should include providing clear visibility of the forecast Stage 3 opening date as per the schedule, the level of remaining float, key critical path activities and risks etc. Sponsors should pay close attention to trends in, and to the level of, reported float in the programme as well as to reported risks to critical path activities. Public reporting of achievable opening dates will need to recognise both what is realistically expected to be achieved and the consequences of potential inconsistencies between public messages and target dates against which contractors are being managed. Where relevant CRL and Sponsors

[44] We are referring to an appropriate logic driven programme that balances the time to develop versus the time left in the programme (see Section 2.6).

Reporting and controls recommendations

Sponsors to agree timescales for the development of the initial programme by the new CRL CEO and then the development of that programme. Obtain independent assurance of the CRL programme with a deep dive into the estimates for time and cost and providing scenarios based on various scope and other options.

Sponsors to agree the metrics and analysis required from CRL in their performance reporting, as well as a set of critical milestones to indicate CRL's performance in progressing works to plan. Reporting to include greatly enhanced visibility of productivity and progress against the most complex and highest-risk critical path tasks. Reporting to be transparent, timely, sufficient and assured. Sponsors to provide regular updates to stakeholders based on outputs provided by CRL and P Rep. Escalation to stakeholders to be triggered where reporting identifies delivery performance outside of agreed cost and schedule parameters.

Commercial controls to be enhanced, particularly regarding commercial management and administration of contracts. Where Sponsors determine it to be relevant, CRL's delegation to be reviewed and a revised CRL delegation framework to be developed. Sponsors to reserve the opportunity to review CRL decisions on certain new supplemental and settlement agreements. CRL to produce a commercial close out strategy for open contracts, as well as a proposed approach to improving supply chain productivity. Sponsors to review the funding envelope and define a process for the timing and release of funding. Appropriate steps to be taken to enable the holding of contingency at Sponsor level to be an effective measure.

Owner	Ref	Recommendations for consideration by Sponsors
		should consider appropriate range rather than point reporting, reflecting the remaining risks in the programme. — At programme level develop an integrated logic linked baseline schedule that takes inputs from each contract to determine the key programme completion dates. The Stage 3 opening date should be allowed to move in line with the schedule logic. — Reporting to the CRL Board and the Sponsors which provides sufficient information on the progress of the individual contracts and the overall impact at programme level. — Reporting which includes Key Performance Indicators (KPIs) / trend assessments to demonstrate progress achieved compared to the forecast rates of progress to meet planned dates. — Where there is a slippage in a key date then CRL should report on the variance to indicate the impact and what mitigation measures will be taken to recover the delay. The recovery of a delay should not be shown in the schedules until it is achieved. The reporting should indicate the unmitigated completion date and CRL's view on the mitigated completion date, including remaining programme float. — Reporting against Sponsor Milestones which are agreed and reported directly from the programme schedule. —
	7.13	Develop an enhanced suite of metrics for reporting which at a minimum meets pre-defined criteria agreed between Sponsors and CRL and which enables clear visibility of inter alia: — Current, previous, and predicted future productivity and progress on key contracts and against key activities on each critical path with explanations where there is a significant variance between current and forecast future productivity rates. This should include dependent activities not under CRL direct control; — For systems, integration and other relevant activities which are less suited to traditional productivity measures, develop suitable metrics to give equivalent visibility of the critical path activities; — Current agreed as well as latest expected TOSD [redacted] with expected [redacted] rates for each key contract and any significant variances against reported AFCDC – together with the current cost run rate by contract being incurred; — Progress against pre-agreed milestones, and a summary of programme float (current, recent, and predicted future levels by milestone and overall); — Risks, planned mitigation and remaining key net risks with quantification; — Cost by contract, for integration activities and other CRL managed activities, and for indirect costs etc, and the overall AFCDC.

Reporting and controls recommendations		
Sponsors to agree timescales for the development of the initial programme by the new CRL CEO and then the development of that programme. Obtain independent assurance of the CRL programme with a deep dive into the estimates for time and cost and providing scenarios based on various scope and other options. ***Sponsors to agree the metrics and analysis required from CRL in their performance reporting, as well as a set of critical milestones to indicate CRL's performance in progressing works to plan. Reporting to include greatly enhanced visibility of productivity and progress against the most complex and highest-risk critical path tasks. Reporting to be transparent, timely, sufficient and assured. Sponsors to provide regular updates to stakeholders based on outputs provided by CRL and P Rep. Escalation to stakeholders to be triggered where reporting identifies delivery performance outside of agreed cost and schedule parameters.*** ***Commercial controls to be enhanced, particularly regarding commercial management and administration of contracts. Where Sponsors determine it to be relevant, CRL's delegation to be reviewed and a revised CRL delegation framework to be developed. Sponsors to reserve the opportunity to review CRL decisions on certain new supplemental and settlement agreements. CRL to produce a commercial close out strategy for open contracts, as well as a proposed approach to improving supply chain productivity. Sponsors to review the funding envelope and define a process for the timing and release of funding. Appropriate steps to be taken to enable the holding of contingency at Sponsor level to be an effective measure.***		
Owner	**Ref**	**Recommendations for consideration by Sponsors**
		The metrics should evolve over time to suit the changing needs of the project as it moves into a more systems and integration dominated phases whilst preserving the ability to provide historic comparatives and trends.
	7.14	Oversight of reporting within CRL to be provided through the 3 lines of defence. CRL to review the effective operation of the first and second lines of defence[45] and allocate additional resources and enhance processes and procedures as appropriate. Assurance of the quality and timeliness of CRL reporting for Sponsors to be provided by CRL Management validating that, and separately by internal audit testing that, the first two lines of defence are operating appropriately. The CRL Audit and Risk Committee to be responsible for ensuring that the third line of defence, internal audit, has adequately addressed commercial and financial as well as other area risk areas such as health and safety.
	7.15	CRL to consider (and potentially take advice on) how they can best drive improvements in contractor and their supply chains' productivity in a way that delivers net benefits to the programme in time and cost. Their conclusions should be put to Sponsors in a short paper setting out the proposed approach and the costs and benefits expected to be involved. Sponsors to consider, seeking independent advice as appropriate, and confirming their approval or rejection as appropriate. The improvements should be captured in trend analysis within CRL and Sponsor reporting.
	7.16	CRL should reset the commercial strategy for the completion of contract works in line with the revised milestones and payment terms and it should be produced by CRL for review by the Sponsors. Compliance to the strategy should be recorded in the periodic reporting and divergence should require an explanation of the issues, impacts and mitigations.
	7.17	Improvements could be made to the operation of the contract and commercial controls in relation to the commercial management [redacted] of the contracts. [redacted]
	7.18	In light of the recently reported delays, the loss of whatever float was included in the CRL programme (at least until a new baseline is established) heightens the risk of consequential delay impacts. Understanding the critical interfaces between contracts and planning mitigating activities to lessen the impact of consequential delay impacts will require a re-assessment of project and programme level risks. We recommend that this be addressed

[45] Being the operation of appropriate controls and processes, and of appropriate business as usual checks on the effective operation of those controls and processes.

Reporting and controls recommendations		
Sponsors to agree timescales for the development of the initial programme by the new CRL CEO and then the development of that programme. Obtain independent assurance of the CRL programme with a deep dive into the estimates for time and cost and providing scenarios based on various scope and other options. ***Sponsors to agree the metrics and analysis required from CRL in their performance reporting, as well as a set of critical milestones to indicate CRL's performance in progressing works to plan. Reporting to include greatly enhanced visibility of productivity and progress against the most complex and highest-risk critical path tasks. Reporting to be transparent, timely, sufficient and assured. Sponsors to provide regular updates to stakeholders based on outputs provided by CRL and P Rep. Escalation to stakeholders to be triggered where reporting identifies delivery performance outside of agreed cost and schedule parameters.*** ***Commercial controls to be enhanced, particularly regarding commercial management and administration of contracts. Where Sponsors determine it to be relevant, CRL's delegation to be reviewed and a revised CRL delegation framework to be developed. Sponsors to reserve the opportunity to review CRL decisions on certain new supplemental and settlement agreements. CRL to produce a commercial close out strategy for open contracts, as well as a proposed approach to improving supply chain productivity. Sponsors to review the funding envelope and define a process for the timing and release of funding. Appropriate steps to be taken to enable the holding of contingency at Sponsor level to be an effective measure.***		
Owner	**Ref**	**Recommendations for consideration by Sponsors**
		as a matter of urgency and the outputs are taken into account in the updated MOHS, or at least the MOHS is tested to assess the potential impacts of these delays.
Both	7.19	CRL has been operating a comprehensive change management process since the beginning of the project. However, in the event that further change is required that impacts the baseline plan, then a change control process should be implemented that allows time for Sponsor review to understand what is changing and why it is changing. The criteria for escalating change for review to the Sponsors should be agreed between the Sponsors and CRL. An example might be to escalate all change that impacts the opening of Stage 3 by more than two weeks and / or outturn cost by £25m.
Commercial Reporting (*see section Appendix 2 for supporting detail*)		
CRL	7.20	Guidance should be developed and issued around the application of judgement in determining AFCDC so as to help ensure a sufficient measure of consistency from period to period in the degree of optimism or pessimism which is applied. There should be sufficient clarity in the reporting such that the approach taken in relation to views taken on material subjective matters is apparent to the reader.
	7.21	Guidance should be developed / reinforced to PMs on the information to be considered and approach to be taken by them in reaching their view of the expected outturn on each contract, [redacted].
	7.22	The reporting of expected contract outturn should be clearer with a single view on each contract used for both Commercial Performance and Funding Adequacy. Where it is concluded that different bases are justified, the reporting should include a clear explanation of the differences and the reasons for them. Where there are significant differences between CRL, PMs and Contractor views, brief explanations of the most material items should be recorded. A consistent level of optimism / pessimism should be applied from period to period in determining the reported CRL view.
	7.23	We recommend for major contracts, the currently quarterly reviews by Programme Director, FD, PCD and CD that address schedule, defined cost and commercial issues are performed on a more regular basis so as to enhance control and quality of reporting. Outputs to include a single consolidated commercial position (point or range) for each contract enabling the CRL Board and in turn SB to be informed of up to date views of anticipated outturn and key issues on a contract by contract basis.
	7.24	There should be a clear record of actions arising from defined cost reviews enabling effective follow-up and monitoring as appropriate.

Reporting and controls recommendations		
Sponsors to agree timescales for the development of the initial programme by the new CRL CEO and then the development of that programme. Obtain independent assurance of the CRL programme with a deep dive into the estimates for time and cost and providing scenarios based on various scope and other options. ***Sponsors to agree the metrics and analysis required from CRL in their performance reporting, as well as a set of critical milestones to indicate CRL's performance in progressing works to plan. Reporting to include greatly enhanced visibility of productivity and progress against the most complex and highest-risk critical path tasks. Reporting to be transparent, timely, sufficient and assured. Sponsors to provide regular updates to stakeholders based on outputs provided by CRL and P Rep. Escalation to stakeholders to be triggered where reporting identifies delivery performance outside of agreed cost and schedule parameters.*** ***Commercial controls to be enhanced, particularly regarding commercial management and administration of contracts. Where Sponsors determine it to be relevant, CRL's delegation to be reviewed and a revised CRL delegation framework to be developed. Sponsors to reserve the opportunity to review CRL decisions on certain new supplemental and settlement agreements. CRL to produce a commercial close out strategy for open contracts, as well as a proposed approach to improving supply chain productivity. Sponsors to review the funding envelope and define a process for the timing and release of funding. Appropriate steps to be taken to enable the holding of contingency at Sponsor level to be an effective measure.***		
Owner	**Ref**	**Recommendations for consideration by Sponsors**
	7.25	Reporting around the nature and value of identified risks and the resulting amount included in AFCDC should be clearer.
	7.26	Reporting around Contingency should include explaining the level of Contingency concluded to be required each month in respect of identified risks where this differs from the actual contingency held. In so far as is possible the level of Contingency held should be aligned with the view formed of the level concluded to be required which should be calculated using a consistent methodology and agreed level of optimism / pessimism.
	7.27	[redacted]

7.3 Delegations

7.3.1 Sponsors' rights

CRL's delegation and levels of autonomy derive from the SA and the PDA. These documents set out the specific matters and powers reserved to the Sponsors. These matters include:

— Appointment of the Chair, CEO and NEDs

— Any amendment or waiver to the PDA or Sponsors Requirements

— The requirement for CRL to produce a RAP to address Adverse Events

— Step-in rights for both TfL and DfT.

In the current situation where IP2 has been exceeded, Sponsors have the choice to retain or adapt the powers set out in the Project Documents.

7.3.2 CRL delegation

CRL has the freedom to operate, and to deliver the programme so long as it conforms to the parameters set by the SA and PDA. CRL operates a delegated authority framework, delegation flows from the Board and is cascaded through the organisation. This is reflected by the *Scheme of Authorities*, which is approved by the CRL Board. Key aspects of the *Scheme of Authorities* includes:

— Identification of bodies with authority for financial decisions. The key bodies are the Board and the CCSC, the EIC holds no delegated authority.

— Identification of the delegation held by individual Executive Directors. The CEO, Programme Director, and FD hold Investment and Commitment Authorities, and the CD Commitment Authority only.

— The *Scheme of Authorities* has been revised twice recently (September 2017 and June 2018). In September 2017, the EIC assumed a greater role in the oversight of Investment Appraisals and the areas reserved for Board decisions were broadened. The June 2018 changes were direct consequence of the Board's concern to demonstrate governance procedures provided adequate control given IP2 had been exceeded.

A summary of Authorities to release and transfer contingency, of Investment Approval and Commitment Authority and commentary on the current position is outlined in Figure 14:

Figure 14: Delegated Authority Summary

	Summary of existing delegated authorities for funding, investment and commitment authorities		
	Funding Authority	**Investment Approval**	**Commitment Authority**
Sponsors	P95 and beyond – **DfT** held liability for contingency beyond P95 IP 2 (P80 to P95) - Contingency held by **TfL**	No authority or visibility	No authority or visibility
CRL Board	IP 1 (P80) – CRL Board held contingency, referred to as **Board Contingency**. Board authority was required in order to release **Board Contingency** to **Programme Contingency** for use. The Board has unlimited authority over the release of **Programme Contingency**.	Unlimited Authority	Unlimited Authority
CCSC	IP 0 (P50) – CCSC had authority over the CRL held P50 contingency CCSC had authority to release **Programme Contingency** to **Delivery Contingency** and to **Contract Budgets** up to a limit of £25 million per event	£10m	£100m
Source of delegated authority	• **Project Development Agreement** • **CRL Scheme of Authorities**	• **CRL Scheme of Authorities, the Scheme of Authorities defines:** *Investment Authority must be granted before a contract is awarded. Contracts which will give rise to CRL incurring only indirect or overhead costs (indirect expenditure) and transactions which will give rise to land acquisition costs do not require these authorities* *Commitment Authority as the authority to commit to contract award. For direct expenditure, Commitment Authority can only be granted subject to the grant of Investment Authority. For indirect expenditure, this authority can only be granted subject to the availability of a sufficient Current Control Budget.*	
Comments	**Crossrail has exceeded IP2, and Sponsors are in the process of agreeing a revised funding package. Funders and CRL will need to agree a revised framework for management of funding and contingency**	**The CRL Board may determine that under a new funding settlement, that CRL requires a new *Scheme of Authority* to reflect the conditions of the settlement.**	

Note: "Unlimited" is the term used in the *Scheme of Authorities* to refer to Board authority. This authority is exercised within certain parameters, for example it is limited by the extent of agreed funding

Source: Scheme of Authority, Project Documents.

7.3.3 Revised framework for management of funding and contingency

Our recommendations on the matters to consider in confirming the new framework include:

— The practical challenges which CRL currently faces in being able to identify credible cost estimates and therefore to derive reliable P50, P80 or P95 values for the operation of the existing or a revised framework. These challenges are likely to continue for some time and hence as an interim measure, any plan to define values for contingency to be held at Sponsor and at Board level with the rest at Programme level may require the pre-definition of values other than by reference to CRL declared values for P50, P80 and P95 outcomes and this should be addressed;

— The holding of contingency at a Sponsor level is only effective if Sponsors have in place the following (and therefore related steps will need to be taken to ensure):
  - Sufficient and timely visibility to Sponsors of reliable information on current and expected outturn project performance;
  - Effective oversight for Sponsors including of risks and uncertainties together with planned actions;

- Appropriate rights of intervention by Sponsors together with a practical ability to intervene on a timely basis when it seems likely that further commitments or actions or the absence of appropriate actions could take AFCDC over the expected project outturn.

— Whether the interests of additional stakeholders will need reflecting in some way (e.g. GLA, HMT); and

— Whether the Investment and Commitment authority levels of the CCSC need revision.

7.4 Commercial reporting and tracking

7.4.1 CRL's reporting system

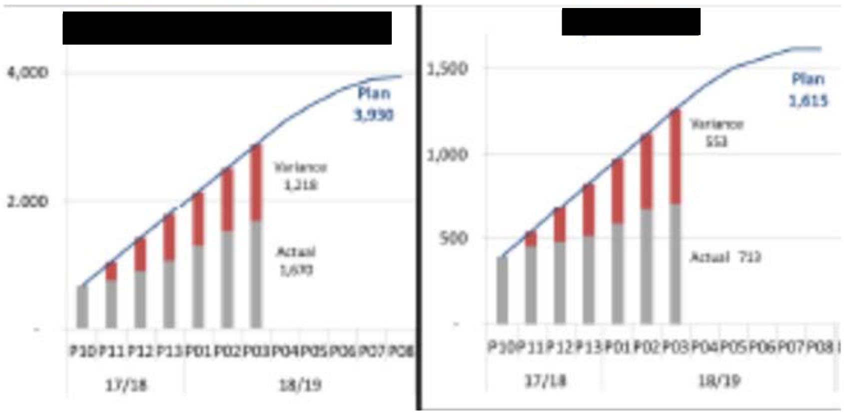
We have set out in Appendix 2 an overview of CRL's reporting processes relevant to the scope of our review. The rest of this section focuses on the principal performance reports provided to the CRL Board and the Sponsors with a view to commenting on the extent to which effective reporting has taken place over the last 12 months and seeks to highlight areas for improvement required to strengthen the programme reporting going forwards.

7.4.2 CRL Board Reports

The CRL Board reports provided to us[46] included a large amount of commercial information but in our view insufficient clear trended data on physical progress against plan. In our view this missed the opportunity to provide readers with better information to assess the likelihood of achieving the increasingly demanding rates of progress which were building up period by period.

This could have been better addressed by reporting historic as well as current rates of progress against critical metrics and then showing the trending consequence, overlaid where appropriate with clear explanations as to how an assumed accelerated trend would be achieved and whether previous projected accelerations had succeeded or failed. One of the metrics where progress was graphically reported historically against plan in the CRL Board Reports was IRN completion. From the graphs set out in Figure 15 it is clear that the variance was consistently getting wider against plan implying that completion was going to be substantially later than Plan.

Figure 15: CRL Board report: Phase 2.1 IRN Status



Source: CRL Board Report P03 2018_19

By comparison however the analysis of progress on Stage 3 critical contracts (see Figures 16 and 17) was inter alia set out in the same CRL Board Report in a manner that did not enable visibility of the level of trended performance needed over time against plan, to achieve the timeline. These metrics show the recorded point progress against plan as a percentage and a projection of the completion date visually. It is not clear though from these tables how rates of recent actual progress compare with the rate of progress needed to achieve the assumed dates of completion. Furthermore we have

[46] We were provided with copies of CRL Board Reports covering the 13 periods to Period 4 2018_19 inclusive.

some concerns about the reported spot completed percentages given the amount of time now confirmed as required to complete some of these contracts.

[redacted]

Schedule performance by key contract and deliverable was reflected in the same report as follows:

[redacted]

In hindsight and given the volume of work still remaining to be completed, and the now extended timeline to Stage 3 opening, these reported schedule performance percentages appear high. We understand they were drawn from PRISM. For each contract on PRISM there are a set of project key milestones, and each milestone has a weighted value assigned. A milestone completed in the period will claim 100% of its weighted value. PRISM then adds up the weighted value for each milestone across all the contracts up until the reporting period, to arrive at an overall percentage complete figure. This figure is used for the CRL Board reports. We note that the weightings will have been based on a judgemental weighting of effort which may or may not be in line with what is now understood to be the effort / hours actually required to execute those activities.

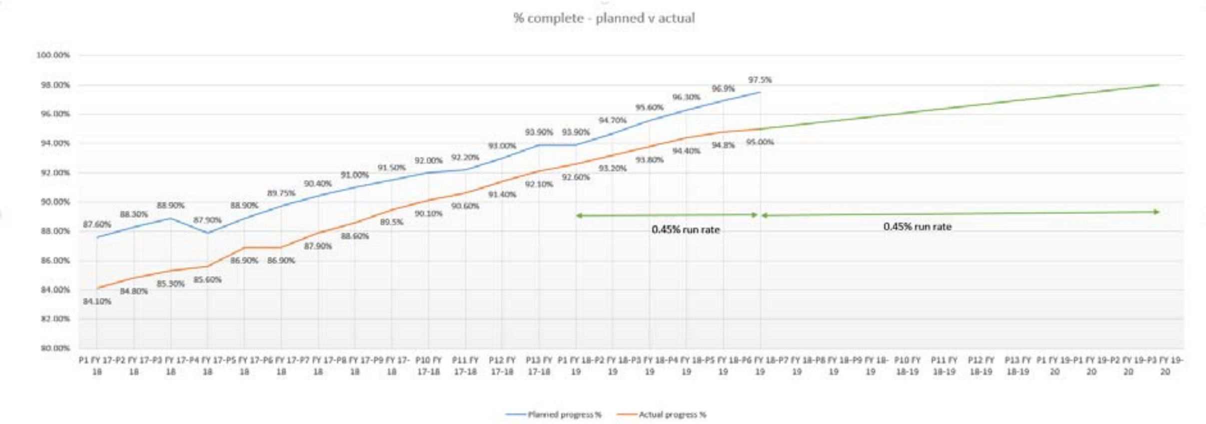
We note that the trend of actual progress being achieved period by period, and that required to hit Stage 3 opening in December 2018, is not clear from this table.

We note the CRL Board reports explain in some detail the issues that result in time pressure on the programmed activities and in some cases describe impacts and mitigation measures on individual contracts, however they do not provide a programme level impact assessment of all contract delays to indicate the impact on the Stage 3 opening date. The reports do state that CRL is working towards delivering mitigation strategies to maintain the completion date.

We have analysed the percentage complete information recorded in each Board report since P1 2017-18 which has been provided to us. The data provided in the reports suggests that the overall programme progress has consistently been circa.3 periods behind planned progress through to P6 2018_19. The average progress achieved over the period is 0.5% per period, but since P1 2018_19 this dropped to 0.45% per period.

The following chart summarises the progress data from the Board reports. We have added a trend line assuming a future progress rate of 0.45% per period, which adds 11 months to P6 2018_19 which would indicate a completion date during P3 2019-20. It is however important to note that rates of progress in completing the final tail of activities can decrease - particularly if some of the most challenging aspects remain to be completed and / or there is rework identified during the closing review stages. It is not readily apparent from the data provided in the CRL Board Reports we reviewed, whether the level of difficulty remaining in the tasks to be completed on for example the main station contracts, is similar to, greater or less than that addressed in recent periods. Good reporting regimes develop means of identifying and clearly communicating such matters. For the purposes of illustrating the impact on potential completion dates, we have shown below the consequences of trending the current rate of progress of 0.45% per period.

Figure 18: Reported Progress – Planned and Actual



Source: KPMG analysis based on data drawn from CRL Board Reports

The report does not provide detailed variance analysis as to the specific reasons why the actual progress achieved in the month is less than the planned progress and how this will be recovered. Until the announcement of the delay to the Stage 3 opening date made by CRL at the end of August 2018, CRL was reporting that the Stage 3 completion date would be achieved.

We note that the Period 3 2017_18 report includes a critical path analysis indicating that dynamic testing would start in October 2017 for a period of 9 months[47]. The P6 2018_19 report indicates that dynamic testing will commence on 22 October 2018 for a period of 16 weeks[48], which is one year later than indicated in the report 16 periods earlier.

The Board reports provide lots of information and data but do not provide sufficient critical analysis to enable the realistic achievability of the Stage 3 opening date to be fully understood. In our experience of programmes of this scale and complexity we would expect the forecast programme to completion to be progressed against actual contractor progress achieved, taking into account all compensation events that have either been agreed with the contractor or which have been assessed by the PMs. In a logic driven programme the critical path will determine the end date. Delays to works on the critical path will impact the end date. The MOHS available during the course of our fieldwork was not an integrated logic driven programme.

We would expect that the result of the reported delays at contract level to have a cumulative impact at programme level that progressively delays the Stage 3 opening date and that this would be visible to the CRL Board and to the Sponsors. If this had been reported to the CRL Board and to the Sponsors progressively as the delays impacted the end date this would have provided the opportunity to challenge the CRL delivery teams on the mitigation measures being put in place and the likelihood of recovering the delays. It would have also enabled Sponsors to better understand the impact on time and cost of the mounting challenges.

From discussions with various CRL executives (i.e. those in place at the start of our fieldwork) it seems that their approach was to avoid reporting slippage to the Stage 3 opening date whilst putting plans into place to mitigate the delays. It is of course entirely appropriate to target a challenging planned opening date but there is a critical need to report internally the actual position and what is realistically achievable. It seems that over time more and more stretch or optimism became incorporated into the programme through assumptions around shorter activity durations and in some cases parallel running activities to reduce elapsed time but with a consequence that efficiency became more difficult to sustain, float decreased, and time required to complete activities started to exceed the programme time allowed.

[47] Page 10 of the CRL Board Report P03 2017_18

[48] Page 7 of the CRL Board Report P06 2018_19

It is clear from the reporting of CRL and of P Rep that a large volume of work was being undertaken to mitigate delays, re-sequence works and search for alternative approaches to testing and commissioning to maintain the opening date. A feature of the increasing stretch or optimism however was a failure to identify, and / or report on a timely basis, the point at which it became unrealistic to expect all remaining activities to be completed within the diminishing timeframe for planned Stage 3 opening and which should have led to revised expectations as to time and cost outturn being developed and reported.

This lack of transparency coupled with excessive optimism appears to have contributed to why the CRL Board failed to re-set the forecast timing for the opening of Stage 3 by around nine months until just over three months before the planned opening date[49].

7.4.3 Commercial reporting - Remedial Action Plans

As requested by Sponsors, we reviewed the robustness of CRL's approach and assumptions used to arrive at their forecast outturn cost of up to £13.8bn. This was set out in RAP 2, was described as a P95 outturn cost and was based on so called '[redacted]' aligned with a Stage 3 opening date of [redacted] This outturn cost, and all others we refer to in this report, excludes ONW. RAP 2 in turn built upon an earlier Remedial Action Plan issued on 18 September 2018 (RAP 1).

Whilst the forecast outturn cost is described in CRL's RAP 2 as a P95 outturn cost, the calculation is not the product of a detailed P95 risk analysis process nor is that number in our view in line with what we consider to be an outturn cost which has a 95% probability of not being exceeded.

CRL's approach to forecasting outturn cost in RAP 2 essentially comprised a high level top down approach to adjusting the forecast outturn cost as reported at P04 2017_18 rather than a detailed bottom up assessment made in conjunction with a detailed completion programme.

In summary therefore the RAP documents whilst pulling together a huge amount of analysis and detail in a relatively short amount of time, were not based on a detailed bottom up analysis and ascribed P50, P80 and P95 to forecast outturns which were not based on a P50 / P80 / P95 process.

7.4.4 Programme level reporting

CRL do not have an integrated logic linked baseline schedule that takes its progress inputs from each of the contracts. This is what we would expect to see on a programme of this scale and complexity. CRL developed a milestone based schedule which is described in the following section.

We understand that in essence the commercial programme level information summarised in the CRL Board Reports essentially comes from a mixture of PRISM, the MOHS, and inputs from the CD and PD (further detail is set out in Appendix 2).

7.4.5 MOHS

The reporting at programme level is provided through the MOHS - a milestone based schedule which summarises the individual contract milestones at programme level. It is not a detailed bottom up schedule and it is not logic linked. It shows the key contract milestones but does not record progress.

At the time of completing our fieldwork, CRL was updating its MOHS and had aimed to finalise it for 30 November 2018[50]. As part of this exercise they started to undertake a detailed assessment of the issues, sequencing, scope undertaken and plan to complete the contracted works at TCR station. This will provide an approach for the other, less progressed stations to follow to improve the accuracy of the estimate of time and resources required. This is a logical approach and will need to be implemented at all of the stations as it will validate the scope of work to complete each contract. We understand that the exercise on TCR is not complete but it has highlighted issues that had not previously been recorded (for example learning points in relation to radio cabling). We understand the

[49] The date for Stage 3 opening was re-set from December 2018 to autumn 2019 in an announcement on 31 August 2018. In RAP 2 dated 2 October 2018, some 5 weeks later, [redacted]. There are currently some uncertainties as to whether this revised date can be achieved and, it is clear that if achieved, there is likely to be a long tail of work remaining thereafter.

[50] This was changed to be presented to the CRL Board on 5 December 2018; it was presented but was not approved or issued to Sponsors.

exercise has focussed on identifying learning points which can be shared with other stations. We have been told that completing the same exercise for all stations could take another couple of months.

The re-assessment of the approach to completion and scope is essential to develop a robust baseline programme to completion. We understand that this might not be available until the second quarter of 2019 although an interim programme is expected to be issued sometime in December 2018 (it was delayed from planned issue to Sponsors on 5 December).

[redacted]

Given the above fluidity in the quality and completeness of the data underpinning the current MOHS, there are inevitable consequent frailties and uncertainties in the resulting reporting by CRL of time to completion and final outturn cost.

7.4.6 Comments and recommendations

Effective performance reporting on large complex programmes relies on a number of critical elements and varies significantly in design from programme to programme. We have noted below some of the underlying features we consider to be important elements of effective programme reporting;

— A robust baseline of total scope, and achievable schedule, cost and risk assessments;
— Appropriate selection of metrics and data for reporting and tracking of performance;
— Reliable base data, which has been subject to good 1st and 2nd lines of defence;
— Appropriately designed reports containing analyses to demonstrate current performance versus the baseline and transparent forecasts of future performance versus the baseline based on the right data; and
— A sufficient understanding by the reader of what the reports say and don't say and whether, when and what intervention is required.

7.5 Contract and commercial controls

Crossrail is a complex programme delivering work on multiple fronts through multiple individual contracts that need to be controlled and administered in a consistent and effective way. Detailed controls are in place for the administration and commercial management of the individual contracts. We have looked at the control procedures, we have questioned CRL staff and reviewed the various reports that result from the contract and commercial processes in order to assess how effectively these controls are implemented.

CRL operates a Contract Administration Manual (CAM) that sets out how the administration of the NEC3 contracts should be implemented. The responsibilities within the contracts are explicit and the CAM does not take precedence over the conditions of the contract. In addition there are a number of other commercial procedures, templates and guidance documents to support the administration of the contracts, the management of change and of contingency.

Further information is set out at Appendix 3.

7.5.1 Governance of contract and commercial controls

Historically the contractors' views of the commercial position on the contracts have diverged from the position taken by the CRL PMs. [redacted] In order to re-focus the contractors on delivering their scopes of work, and deal with process issues, the CRL CD negotiated supplemental agreements with the contractors. We have reviewed a number of the historic[51] supplemental agreements and noted that [redacted]

[51] We requested a sample of supplemental agreements relating to station contracts

Under the existing governance arrangements the CD negotiated these agreements with the contractors and sought approval from the CCSC. The CRL Board was also appraised of progress. There is no current requirement for CRL to request Sponsor approval.

[redacted] Sponsors who confirmed they have no objections to the approach taken by CRL at a meeting on 20 November 2018. A paper was duly presented (which we have not seen) and which led to confirmation being provided to CRL on 21 November 2018 that Sponsors had no objection to proposed settlement agreements on six of the contracts including [redacted]

Since the discussions were held regarding the two additional supplemental agreements mentioned above, we note that [redacted]

It is clear from discussions with the CRL CD that the approach taken on [redacted] cannot be applied to all station contracts. We suggest that CRL is asked by the Sponsors to produce a commercial close out strategy for all the open contracts, setting out its current views on contract outturn positions – both without having a new agreement in place, and with a new agreement in place. This should take account of the dates being agreed with the contractors in the development of the updated MOHS.

It is recommended that the Sponsors have the opportunity to review and discuss CRL's decisions on proceeding with and signing the new supplemental agreements prior to their implementation.

7.5.2 Comments and recommendations

Improvements could be made to the operation of the contract and commercial controls in relation to the commercial management [redacted] of the contracts. [redacted]

The commercial strategy through to completion and close out of the contracts should be produced by CRL for review by the Sponsors. Compliance with the strategy should be recorded in the periodic reporting and any divergence should require an explanation of the issues, impacts and mitigations.

7.6 Risk management processes and reporting

During our review we noted that the risk management process changed in 2017 from a devolved project risk process with risk management and analysis undertaken on each individual project to a more centralised process. The following table sets out the key changes post-2017.

Table 19: Risk management processes and reporting

Risk management processes and reporting		
Risk process	**Pre-2017 change**	**Post-2017 change**
Management of project risk registers	Quantitative at project level by project risk managers	Qualitative at project level. Quantitative centrally with a central risk management team
Project level quantitative risk assessment	Project Team	Central risk management team
Programme level quantitative risk assessment	Central risk management team	Central risk management team

Risk management processes and reporting		
Risk process	**Pre-2017 change**	**Post-2017 change**
Project contingency amounts determined by	Project Manager	Central commercial team
Unresolved trends	Raised in PRISM cost management tool against the individual contracts and their associated cost estimates were automatically included in the risk allowance and AFCDC figures for that contract without consideration of the level of certainty	URT and commercial risks are managed separately
Risk Management tool	ARM was used to capture, record and track all risks across the programme	ARM was shut down in May 2018 and active risks were exported to spreadsheets to be managed centrally at programme level

The Programme Risk Management procedure revision 7 requires the central risk management team to undertake a series of activities including those listed below. We note that the team was substantially demobilised in 2018 when the ARM tool was shut down, leaving only one or two people in the central risk management team to:

- Ensure that CRL teams use the designated tools to maintain up-to-date risk data which is of suitable quality and is in accordance with the process.
- Ensure records are held to demonstrate risk management practices follow the risk procedure (e.g. records of meetings, approvals).
- Ensure that CRL teams understand their risk management obligations and are actively engaged in the Risk Management Process.
- Liaise with the Head of Programme Risk to ensure continued alignment in approach with requirements.
- Undertake risk workshops as and when required to identify risks across the contracts and highlight risks that may impact the CRL opening of Stages 1-5.
- Support risk reporting requirements.
- Support the delivery of quantitative cost and schedule risk analysis.

7.6.1 Comments and recommendations

CRL had a risk management process in place that was in line with what we would expect to see on large complex programmes of work of this scale and complexity. However at the start of 2018 it modified the processes to remove the control of risk and contingency management from the projects to the central programme level. At the same time it decommissioned the ARM database where all risks were tracked and stored and downloaded the data on current risks to excel spreadsheets.

The risk management resources were also demobilised leaving only one to two people to manage in the central risk management team.

In our experience it is unusual to manage risk through qualitative assessments at project level when the project teams are best placed to quantify risks and assess probability. Whilst it is normal on most projects to expect risk levels to reduce towards the end of the project, in this case the integration of all aspects of the works is the responsibility of CRL, and is one of the largest risk elements of the entire programme.

More detail of our review of risk processes is set out in Appendix 4.

In light of the recently reported delays, the loss of whatever float was included in the CRL programme (at least until a new baseline is established) heightens the risk of consequential delay impacts. Understanding the critical interfaces between contracts and planning mitigating activities to lessen the impact of consequential delay impacts will require a re-assessment of project and programme level risks. We recommend that this be addressed as a matter of urgency and the outputs are taken into account in the updated MOHS, or at least the MOHS is tested to assess the potential impacts of these delays.

8 Sponsor assurance

This section outlines recommendations related to Crossrail programme Sponsor assurance. These recommendations are followed by a summary of the current situation.

The Terms of Reference ask that we address:

Considering the current role and effectiveness of the Project Representative team to provide independent assurance and oversight of Crossrail Limited on behalf of Crossrail's Joint Sponsors.

8.1 Summary of findings

A short summary of the key findings are outlined below. The detail is set out in Section 8.3-8.5.

— The R Rep reported many of the key issues and risks to the achievement of the Stage 3 opening date but did not provide an assessment of the potential / likely impact on the opening date.

— Jacobs were asked to prepare an independent review of the approach taken by CRL in the development of scenarios on the costs to completion and reported thereon in June 2018. However, Jacobs did not set out in their report to Sponsors that an additional scenario in which CRL failed to recover their delays to infrastructure works should have been considered and priced. Had CRL and / or R Rep considered such a scenario then such a scenario would have identified a more substantial increase in the AFCDC.

— The R Rep did not adequately challenge CRL in its assumptions that it could recover their delays to maintain the Stage 3 opening date including as to the achievement of TOSD dates and an assumed substantial reduction in cost run rate.

8.2 Recommendations

The recommendations in Table 20 are proposed, these reflect the recommendations in the Executive Summary.

Table 20: Sponsor assurance

Sponsor assurance recommendations for consideration *Sponsors to confirm the scope of P Rep for whole programme assurance and the requirements and expectations of P Rep in their reporting to Sponsors. Sponsors to consider obtaining regular independent advice to augment P Rep assurance and to identify potential gaps in P Rep activities.*		
Owner	**Ref**	**Recommendations for consideration by Sponsors**
Sponsors	8.1	Sponsors to: — Confirm the requirements to be placed on the P Rep to provide whole programme assurance. P Rep should set out the approach it intends to follow to provide this assurance for the remainder of the programme. Sponsors should then review, iterate as necessary, and agree an approach with P Rep which Sponsors consider to be appropriate and sufficient. The approach to be followed should be periodically revisited by P Rep and Sponsors to ensure it remains suitable to the needs of the Programme and risks to be addressed; — Agree with P Rep the CRL meetings which P Rep should attend, information to which they should have access and how P Rep should report back to Sponsors; — Periodically ask the P Rep team to demonstrate that they have the right mix and depth of resources deployed to meet the evolving needs of the programme, and that they have had expected access to meetings, people and information; — Challenge P Rep to express their view as to the realistic range of schedule and cost outturn where P Rep express concerns about the risks to CRL's reported schedule and AFCDC. This view should be sufficiently clear for Sponsors to understand the potential consequences of the concerns identified; — Clarify with P Rep that Sponsors expect P Rep to provide clear recommendations on a timely basis of steps which Sponsors should be taking in response to any significant P Rep concerns around schedule and cost outturn. Sponsors should communicate that these are expected to include recommendations as to matters on which Sponsors should be seeking additional inputs / analysis / responses from CRL, and any recommendations of any additional independent assurance review which P Rep considers would add material value. We note recent consideration of whether to integrate JST and P Rep. We recommend that JST and P Rep remain separate so that JST can continue to fulfil the role of directing, managing and constructively challenging P Rep in their provision of independent assurance to the Sponsors.
	8.2	Sponsors to define the method for obtaining assurance that CRL reporting is sufficient, accurate and transparent. Sponsors to consider obtaining regular, independent advice which enables them: — To judge whether P Rep's current remit and outputs are providing sufficient assurance to Sponsors across the full range of programme challenges or whether additional steps are required to assess and consider the information being received in relation to the programme; — To assess whether the pace of change in the nature, quality, and extent of, CRL reporting around programme progress, forecast cost outturn and key risks is likely to provide sufficient transparency of programme status, likely outturn, and key risks net of mitigating actions being taken. In particular whether the metrics being reported are sufficiently reliable and tailored to the differing needs of construction, systems and integration etc activities to provide sufficient visibility of current and expected performance and outturn; — To assess periodically and more deeply (for example at pre-defined stages) if project status and likely cost and time outturn broadly aligns with that being reported; — To assess whether the shape and pace of addressing the issues highlighted by / implementing the recommendations in this independent report on the review of governance arrangements and in the related report on financial and commercial matters, is progressing as it ought and whether the actual steps being taken are sufficiently addressing the underlying issues.

Sponsor assurance recommendations for consideration *Sponsors to confirm the scope of P Rep for whole programme assurance and the requirements and expectations of P Rep in their reporting to Sponsors. Sponsors to consider obtaining regular independent advice to augment P Rep assurance and to identify potential gaps in P Rep activities.*		
Owner	**Ref**	**Recommendations for consideration by Sponsors**
	8.3	Sponsors to draw up an action plan comprising the recommendations for Sponsors set out in this and the related financial and commercial report. Agree and record within the action plan, the actions to be taken, prioritisation, timelines, and responsible individuals. Define the extent of progress which Sponsors wish to see achieved from their own and CRL actions, by pre-set milestone dates in each of the critical priority areas, such as in the case of CRL, creation of a sufficient schedule, enhancing CRL reporting etc Define the means by which assessment will be made of the progress in implementing Sponsor and CRL actions and of the extent to which each underlying objective has been achieved. Define how these matters will be independently assured, and to whom and how frequently the implementation progress and results of the independent assurance will be reported. Agree with CRL an appropriate set of arrangements including initial agreement between Sponsors and CRL of the actions proposed to be taken by CRL and by when, arrangements for period visibility of a copy of the CRL action plan updated for progress in closing agreed actions and the results of CRL's own regular monitoring, assessment and independent assurance of the implementation and impact of the actions. The initial agreement between Sponsors and CRL of actions to be taken will need careful consideration by Sponsors of: — The prioritisation sequence proposed by CRL — The timeline proposed for implementation — How satisfactory completion of an action is proposed by CRL to be established — Where CRL concludes that the approach to addressing an issue needs to be varied from that outlined in a recommendation so as to enable more rapid addressing of the underlying issue, then Sponsors will need to satisfy themselves that the changed approach will be sufficient to address the underlying issue highlighted Define how, how often and by whom, the rolled up action plan (Sponsors' and CRL actions plans combined) will be reviewed and the means by which resulting required actions will be communicated and in turn followed up.
	8.4	We consider it would be good practice going forwards for JST to make a formal note of key matters arising from their review of the P Rep reports, and matters discussed with and agreed actions resulting from discussions with P Rep each period beyond those directed formally by Sponsors through the Sponsor Board. This could for example then be briefly summarised and included either as a single additional page to the JST Paper issued to Sponsors each Period or as a separate short paper. This would also provide a vehicle for drawing Sponsors' attention to any key messages and P Rep findings set out in that period's P Rep report and assist in raising the visibility of key P Rep messages.

8.3 Requirements

The contract with the P Rep sets out the following requirements:

Under the heading 'Purpose', the P Rep contract (Contract RM3730) states *"Independent assurance and oversight of Crossrail Limited on behalf of Crossrail's Joint Sponsors ("the Sponsors") – the Department for Transport and Transport for London – is key to ensuring that the project's costs, schedule and risk profile are well understood. This will ensure that the project continues on time and to budget until Crossrail services are fully operational from 2019."*

Clause 2.9 states that the P Rep acts as an independent expert, reviewing progress across the programme and CRL's management information, as well as carrying out detailed reviews of parts of the programme and reporting to the Sponsors through the JST.

The P Rep's role is formally defined in clause 25.3 of the PDA as including, without limitation, the following:

"3.1.1 Advising and raising appropriate points of challenge to the Sponsors on any increase in the risk of triggering the Intervention Points;

3.1.2 Providing independent, informed advice and recommendations to the Sponsors on progress of the Crossrail Project in respect of time, costs and quality

3.1.3 Providing the Sponsors with oversight and analysis of changes in scope, including any Change:

3.1.4 Monitoring CRL's reporting output and carrying out additional audits or reviews to satisfy the Sponsors of the adequacy and completeness of the same; and

3.1.5 Advising the Sponsors with regard to the capability and resources deployed by CRL."

8.4 Reporting

8.4.1 Context – reporting by CRL

We have been asked to comment on the current role and effectiveness of the P Rep team to provide independent assurance and oversight of CRL on behalf of Crossrail's joint Sponsors. We have addressed this in the remainder of this section. In this sub-section however we also provide some observations on the reporting by CRL. This is because in considering the role and effectiveness of P Rep to call out issues in relation to project time and cost outturn, it is important to note that the primary responsibility for correctly reporting project forecast schedule and cost outturn on a timely basis, lies with the Directors of CRL.

We have addressed in Section 7, issues arising from our review as to whether CRL's commercial reporting / tracking and oversight arrangements should be strengthened and have made a number of recommendations.

CRL's reporting of commercial outturn failed to provide timely visibility of the achievable cost and schedule outturn for a significant number of periods - although it did highlight many of the challenges and risks. We note in this regard that with just over 3 months remaining before Stage 3 was due to open, the timeline for Stage 3 opening was delayed by nearly 10 months, and then changed again a month later by a further 3 months.

It is clear that the causes of the need to serve an Adverse Event Notice on 31 August 2018 and to advise the SB on 3 September of a material change in Stage 3 opening and AFCDC had not suddenly occurred in a matter of weeks since the end of Period 5 (18 August 2018). At this point the AFCDC was reported at £12,810m, which was only £297m in excess of IP2 and the date for Stage 3 opening was still reported as being December 2018.

Indeed many of the causes and the accumulation of challenges had been evident in the P Rep reports for some time. It seems clear that CRL continued to drive its staff and contractors towards the hoped for achievement of a 9 December 2018 Stage 3 opening notwithstanding the mounting difficulties of achieving this. Whilst the strategy was to maximise near-term progress, the resulting reporting by CRL, including to Sponsors, failed to distinguish on the one hand between the date being targeted in managing the supply chain, and the potential outturn cost if that target were to be achieved, and on the other hand reporting a realistic range of schedule and cost outturn. Over time the realistic range became materially different from the target.

Against this context of CRL Board Reports not sufficiently highlighting the increasing risks to cost and schedule outturn and not revising forecast cost outturn or the opening dates for Stage 3 or subsequent milestones, sufficiently early enough, we turn now to address the role and effectiveness of P Rep.

8.4.2 Regular reporting by P Rep

The P Rep has been issuing monthly reports to the JST which typically include an Executive Summary as well as detailed sections on Cost, Stages 2, 3, 4 and 5 and Health and Safety matters as well as other content. These reports are also issued to the CRL Board for information.

Our review of P Rep reports[52] indicates that they included a substantial volume of commentary on the risks of delays and of increased costs. This is evident from the extracts we have included at Appendix 5 drawn from P Rep reports dated between 1 March 2018 and 16 August 2018.

Whilst the executive summaries and main bodies of the reports set out a range of significant and serious issues in relation to cost, risk and time, it should be noted that these reports did not always:

- Provide sufficient assurance / visibility as to the degree of (or lack of) robustness / certainty which underpinned the then current MOHS. This was absolutely critical as CRL's continuing assumption that achieving a Stage 3 opening was an appropriate basis for calculating the AFCDC outturn was the single most critical factor impacting the scale of forecast cost outturn;
- Make sufficiently clear the interpretation which should be placed by the reader on P Rep's conclusions when they stated that there was a 'high risk' or 'very high risk' of not achieving the Stage 3 opening in December 2018 through for example illustratively indicating what percentage probability range was meant by 'high risk' or 'very high risk' (i.e. up to 20% risk, 20% to 40% risk, 40% to 60% risk, more than 60% risk etc) and importantly the extent of the potential consequential delay (i.e. 1 period, 3 periods, 5 periods or 7 or more periods …). This would have given a sense of the potential cost outturn consequence of an ongoing cost run rate which would be likely to continue at around £120m per period unless significant contractor demobilisation occurred; or
- Provide sufficient advice or recommendations in their reports including recommendations as to what further steps should be taken by Sponsors in response to the issues identified both so as to:
  a) enhance assurance around and reduce the risks attaching to forecast cost and schedule outturn; and
  b) make clear what steps should be taken by Sponsors to request CRL to provide additional information and / or take specific actions;

In some cases themes identified did not appear to have been sufficiently developed or worked through in the main body or sometimes into the Executive Summary of P Rep reports. For example:

- Report 110 (Period 13 2017_18 covering the period to 31 March 2018 and dated 26 April 2018) commented in the main body that it had recommended CRL should stop reporting that there was a 71% probability that Stage 3 would open on time as the analysis was many months out of date and based on a variety of assumptions. P Rep continued that they considered the probability to be significantly lower. We note however that in the Executive Summary of that report, the Cost and Schedule Dashboard noted that "*SACR 18 gave confidence level of finishing on time Stage 3 - 71% probability*" … and the only caveat added was *"(this is now out of date)"*.
- Report 113 (Period 3 FY 2018_19 being the period to 23 June 2018 and dated 19 July 2018) details the substantial overspend which has occurred to date and confirms it has been included within AFCDC. However it does not comment sufficiently on the likelihood of that trend continuing nor its impact were it to do so, nor whether sufficient amounts for further potential overspend have been included in AFCDC.

[52] We were provided with copies of P Rep reports for each period in 2017_18 and those for the first 5 periods in 2018_19

Figure 19: P Rep period report; Cumulative delivery over-spend at each period

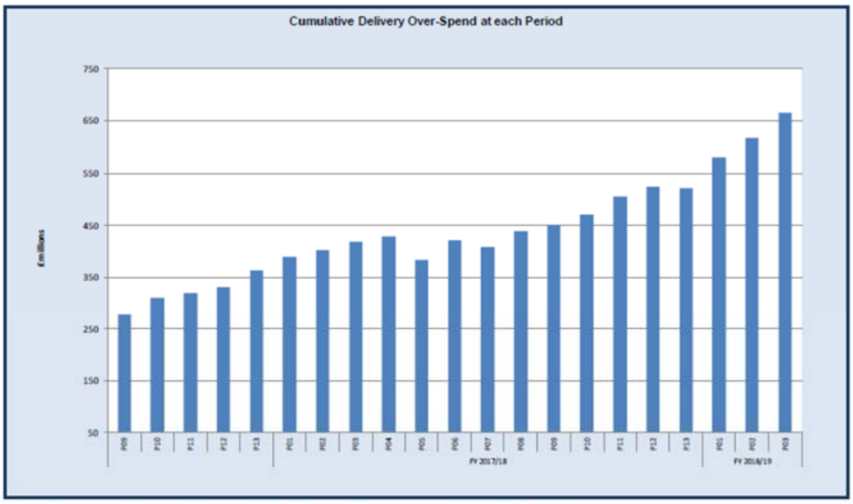


Figure 1 - 3 ~ Cumulative Delivery Overspend at each Period

The cumulative delivery overspend has increased in Period 3 by £48m to £666m (Period 2, £618m). This overspend is included in the AFCDC.

Source: P Rep Period 03 2018_19 Report

— Report 113 comments that trends in Cost of Work Done (COWD) and increasing AFCDC suggest they will intersect as a worst case at around £13.0bn by P10 2018_19 if cost increases continued in a linear fashion although the report notes that it is expected the rate of increase will tail off as work is completed. It is unclear why it was appropriate to assume for the purpose of this analysis that Stage 3 would still be completed by Period 10 FY 2018_19 and that costs would therefore stop being incurred by that date. We note that the report comments that "*As requested by Sponsors, we understand CRL is reviewing the MOHS and its confidence of opening Stage 3 on time in December 2018. Any major delays to this opening or station construction are likely to further increase costs.*" We note that P Rep seemed not to be in a position to sufficiently comment on the extent to which the MOHS and its forecast opening date for Stage 3 were based on an adequate and current understanding by CRL of work to be completed or based on assumed achievable future run rates of productivity when taking account of productivity rates actually achieved to date.

8.4.3 CRL cost scenarios - February 2018

In February 2018 when CRL was updating its AFCDC projections in line with the then current revised MOHS, the JST requested that CRL produce some sensitivity analyses around their cost forecasts. CRL prepared two sets of cost scenarios with three options each to quantify the costs associated with the following completion circumstances:

— The sensitivity of the cost forecast to achieve the Stage 3 completion date of 9th December 2018, including acceleration and prolongation costs.

— The impact of a potential software delay resulting in delay to opening and prolonged maintenance of the physical asset.

In relation to the second scenario, under each of the three options, CRL assumed that all physical works were completed on schedule with delays in Stage 3 opening of [redacted] due to delays in testing and commissioning with the third option also allowing for a major commissioning event leading to a [redacted] delay to Stage 3 opening.

The primary objectives were to provide:

— a quantum of the actual cost of completion against potential delivery scenarios and any resulting variation from the approved IP2 funding limit;

— an upper "book end" estimate of the cost to complete such that the Sponsors could understand the potential magnitude of additional funding that may be required.

The range of outcomes from these scenario calculations was £283m over the IP2 allowance of £12,512m for the acceleration to protect the Stage 3 opening date, and £344m over the IP2 allowance of £12,512m for the software delaying the Stage 3 opening date by [redacted].

8.4.4 P Rep review of the MOHS – report dated 15 March 2018

P Rep reported on the MOHS at the SB on 21 March 2018 (Meeting 91). The minutes of Part A for that meeting record: *"[P Rep] presented on P Rep's assessment of the Master Operational Handover Schedule (MOHS). [redacted] emphasised that P Rep believe the schedule is ambitious, contains virtually no float and relies on first time delivery.*

Polly Payne noted the starkness of P Rep's assessment and said Sponsors should challenge CRL on whether they agreed with this assessment."

We note that the Jacobs report (Paper 91-01) was dated 15 March 2018 and it stated on page 1:

"*The assessment encompassed the following elements:*

- *The risks associated with any assumptions or omissions that underpin the MOHS;*
- *Planned productivity rates for critical activities, relative to historic performance;*
- *Risk to key milestones and implications;*
- *Level of float and overall time risk allowance.*

From that assessment we believe that MOHS 2018 is ambitious, contains virtually no float, and relies upon the delivery of systems and stations at productivity rates that have not been reached in the past.

The principal critical path within MOHS is the Rolling Stock/Signalling dynamic testing sequence. This sequence is extremely tightly scheduled and offers very little scope for failure, without impact upon Trial Running and Trial Operations. The sequence relies upon the provision by Bombardier Transportation (BT) of Rolling Stock with proven and reliable software functionality, but a high risk remains that train software development will not keep pace with project requirements.

There are other key challenges and risks, such as the timely completion and integration of fixed infrastructure and the production of associated assurance documentation."

The report continued noting:

"The new Master Operational Handover Schedule (MOHS 2018) was signed off by CRL and its partners on 16 February 2018, presented to the Joint Sponsor Team (JST) and Project Representative (Prep) on 19 February 2018, and presented to Sponsor Board on 22 February 2018. Although Stage 3, 4 and 5 Opening dates have been retained, most activities and milestones have been re-baselined."

"It should be noted that the forecast curve for delivery of Anchor Milestones over the next 6 months is much steeper than the previous 6 months, requiring a significant increase in production. This aspiration to increase productivity, resulting in steepening of the forecast curve, is also prevalent across most systems and stations projects."

In relation to Key Risks, the P Rep paper stated: *"The new MOHS contains a large number of assumptions and therefore risks. The key risks*[53] *are:*

- *BT is not able to deliver the trains in accordance with its schedule;*
- *Tier 1 Contractors are not able to increase their productivity as required;*
- *Installation and testing of ventilation systems cannot be accelerated;*
- *Tier 1 Contractors are not able to obtain resources needed to cover peaks;*

[53] We have just listed here the first 5 Key Risks in a much longer list, which we presume to be written in the order of priority

- *Some stations may not be ready for scheduled non traction power-on dates;"*

"These key risks are due to assumptions built into the MOHS. Any of these has the potential to impact on the Stage 3 Opening date……

We believe the schedule is very optimistic and extremely challenging, with many problems needing to be resolved. In addition, there is almost no schedule float to allow for any errors or mistakes."

In relation to Stations, P Rep noted: *"The forecast performance curves for each of the stations now show a steep increase in their gradients. We are concerned that this may reflect an "optimism bias", on the part of CRL, in the assumed rates of production that can be achieved by their respective contractors. Historically, CRL's contractors have found it difficult to achieve and sustain such high rates of production.*

[redacted]

[redacted]

From the above it is clear that P Rep considered the MOHS to be very optimistic. However despite all of the points raised and the resulting discussion this did not lead to a conclusion that the outturn cost should be re-assessed on the basis of failing to achieve Stage 3 opening on 9 December 2018. There is no mention of any concern that demobilisation of main contractors would significantly run later than the then current assumptions, and accordingly it seems that concerns about the risks of an extended timeline to Stage 3 Opening seems to have been linked with an assumed much lower cost run rate. This is consistent with the cost scenarios developed by CRL which adopted a similar set of assumptions.

The minutes for Part B of the Sponsor Board on 21 March 2018, reflect that CRL were challenged on whether 9 December 2018 was still deliverable: "*[DfT] asked whether CRL would agree with P Rep's assessment that there were significant risks to the December date. [CRL] said there were significant risks but these were being mitigated by CRL*."

8.4.5 P Rep's Crossrail Cost Scenario Review dated 19 June 2018

Jacobs reported as follows in describing the objectives, approach and conclusions from their cost scenario review;

"As the Crossrail infrastructure programme (tunnels, track and stations) entered its final year of construction and delivery in 2018, CRL (Crossrail Ltd.) began to update its cost projections and the likely potential total completion cost, otherwise known as the potential outturn. In support of this process the JS (Joint Sponsors - Transport for London and the Department for Transport) asked CRL to prepare cost scenarios, in order to provide a quantum of the actual cost of completion against potential delivery scenarios, and any resulting variation from the approved IP2 funding limit of £12,512m. The cost scenarios were aimed at understanding:

a) The sensitivity of the cost forecast to achieve the Stage 3 completion date of 9 December 2018.

b) The impact of a potential software or control system delay resulting in a prolonged delay to opening.

Following submission of the cost scenarios by CRL, the JS Board requested an independent review of the work completed, primarily to provide assurance on the reasonableness of the approach taken by CRL in compiling the scenarios, and to provide confidence or otherwise in the likely potential outturn cost upper limit known as the 'book-end'.

This report details and presents the scope, methodology, analysis and findings associated with the completion of the independent cost scenario review. The review utilises cost and programme data from CRL and hence the numbers and data presented are based on CRL's figures. No cost or schedule data was independently prepared, verified or developed during this review.

The main findings of the review are:

a) The methodology followed by CRL to develop the cost scenarios, given the constraints and objectives at the time of preparation, was understandable and reasonable.

b) Based on the premise that Stage 3 opening on 9 December 2018 is achieved, the expectant potential outturn at the time of this report is circa £300m above IP2.

c) The upper limit book-end as determined by the cost scenario review, including the completion tail scenarios, is in the region of £400m above IP2.

d) Material cost reductions are unlikely to be achievable, as the opportunity to re-phase work or de-scope, and still deliver a functioning railway system has passed.

The project is strongly focussed on achieving Stage 3 opening on 9 December 2018 and all projects are experiencing a concertina affect as work is compressed against a hard completion deadline. Consequently, there is negligible float for future problems, delays and defects correction and the likelihood of construction completion work extending into trial running, trial operations and passenger operations is high.

Based on the findings of this cost scenario review the recommendation to Joint Sponsors is to be prepared for additional spend in the region of £300m, with an upper limit of circa £400m above IP2, to deliver the CRL scope.

Overall this represents a 3% variation of CRL AFCDC (Anticipated Final Crossrail Direct Cost) compared to the agreed funding allowance (IP2), which when compared to similar magnitude major projects reflects a strong delivery performance in terms of actual cost vs. budget performance."

P Rep's findings confirm that the approach taken by CRL was reasonable but in considering cost outturn do not sufficiently challenge the adoption of the assumption, or explore the cost implications of changing the assumption that, all the physical works would be completed on schedule (save for a major commissioning event under one option).

In our view this was a missed opportunity to test adequately and challenge CRL's assumptions around the timing of completion of physical works and to take sufficient account of the significant concerns raised by Jacobs' review of the MOHS completed in March 2018. Any cost scenario developed at this time that allowed the Stage 3 opening date to materially slip due to delays to the construction works and hence to main contractor demobilisation would have flagged the scale of the potential cost overrun that is now being assessed. CRL's scenario exercise and P Rep's independent cost review were both based on the insufficiently justified assumption that completion of physical works on schedule was achievable together with achieving Stage 3 opening (although with options needed to accelerate). As a result they indicated that the cost overrun was within only 3% of the IP2 funding allowance.

In our view therefore the Jacobs' Cost Scenario Review report dated 19 June 2018 insufficiently challenged the appropriateness of continuing to adopt the assumption that Stage 3 opening would still occur on 9 December 2018. The premise for the outturn cost scenarios was not only achieving Stage 3 opening on 9 December 2018 but that the tail of work remaining to be completed thereafter would be such as to only give rise to a much lower cost run rate per period. This was in hindsight a flawed pair of assumptions. Given the concerns which P Rep had flagged in their 15 March 2018 report on their review of the MOHS (referred to above), as well as concerns in subsequent period reports, we consider the opportunity was missed to more robustly challenge the appropriateness of these assumptions and to explore the potential likely range of cost outturn, based on more realistic assumptions.

8.4.6 Oversight of P Rep and reporting by JST

We note that the JST prepared a report[54] each period to Sponsors which typically consisted of a short covering memorandum (often 2 to 3 pages in length) drawing out key points around cost and programme etc. and which was prepared by a member of the JST. Attached were copies of the current period CRL Board Report and P Rep report for that period. We understand these JST reports and the attached copies of the CRL Board Report and P Rep Report for the period were typically sent to Sponsors ahead of the SB meetings, rather than as part of the formal pre-read materials (although we noted for one SB pack provided to us, the JST papers were provided as part of the pack).

We note that JST is responsible for a number of matters including the oversight and direction of programme assurance / P Rep. We note that directions given to P Rep from Sponsors emerge as actions from the SB for the JST to enact and we have seen a number of examples of such actions, follow-up and subsequent reporting back to the SB recorded within the SB packs.

We understand there was regular interaction between the JST and P Rep although we have been told there were no formal regular minuted meetings. We also understand JST reviewed the P Rep reports each period although we have not seen any notes of those reviews. We have seen copies of various weekly action reports which we have been told were prepared for meetings between JST and P Rep.

We reviewed a number of the JST Reports produced each period and noted that they summarised developments and progress by CRL but did not make any specific reference to what P Rep had reported.

We did note references in papers tabled by JST to SB to concerns raised by P Rep[55]. However there did not seem to be any regular note produced by JST of P Rep's overall views although we would note that P Rep were present themselves at SB, and their reports had been pre-circulated to Sponsors and that comments on certain matters were noted in the Chairman's Agenda for SB meetings.

We consider it would be good practice going forwards for JST to make a formal note each period of key matters arising from their review of the P Rep reports, matters discussed with and agreed actions resulting from discussions with P Rep beyond those directed formally by Sponsors through the SB. This could, for example, then be briefly summarised and included either as a single additional page to the JST Paper issued to Sponsors each Period, or as a separate short paper. This would also provide a vehicle for drawing Sponsors' attention to any key messages and P Rep findings set out in that period's P Rep report and assist in raising the visibility of key P Rep messages.

We note that the Chairman's Agenda for SP Board 96 includes a recommendation to consider integrating JST and P Rep from the end of September 2018. We recommend that JST and R Rep remain separate so that JST can continue to fulfil the role of directing, managing and constructively challenging P Rep in their provision of independent assurance to the Sponsors.

Finally we consider that Sponsors should agree with P Rep and CRL the types of meetings Sponsors expect P Rep to be invited to attend, and that P Rep should advise Sponsors on a timely basis if P Rep consider there to be relevant information or meetings to which access has not been possible.

8.4.7 P Rep attendance at Sponsor Board

We were also provided with SB Meeting Packs covering Meeting 84 (1 August 2017) through to the proposed pack for Meeting 100 (10 December 2018). We note that for most meetings, P Rep attended by invitation both Parts A and B of the meetings. The minutes indicate that at some

[54] We were provided with copies of JST Report Packs for 18 consecutive meetings from P01 2017_18 to P05 2018_19.
[55] Examples include papers 92-03 and 93-05

meetings P Rep presented on the outcome of specific instructed reviews[56]. At all SB meetings they were present to provide information and to respond to questions.

SB Meeting Packs typically include a significant number of interactions with and from JST:

— Papers prepared on specific topics for the SB sometimes in response to actions agreed at previous SB Meetings.
— Presentations made by JST on specific topics.
— Discussion and agreed actions for JST to implement. Some of these required either direction to be given to P Rep (for example the additional three phase review performed by P Rep). JST to work with P Rep on specific matters, or other actions for JST to address themselves.

8.5 Comments and recommendations

The reporting shows that P Rep clearly reported that there were significant time risks to the Stage 3 opening date but we consider that in the reports reviewed there were insufficient recommendations as to what actions should be taken by the Sponsors to understand better the issues or the impacts of those issues.

8.5.1 Our observations

It is evident that the P Rep team has a lot of knowledge and experience of the complexities of the programme, and that it has done a lot of work reviewing and analysing the data and reporting received from CRL. The P Rep has flagged key risks within its periodic reporting but it did not provide the Sponsors with appropriate analyses to demonstrate the potential impacts of the identified key risks, nor has it in its reports, in the relevant period, sufficiently advised on and / or recommended the steps that need to be taken to investigate or forecast the scale of the potential impacts.

[56] An example is Meeting 91A of the Sponsor Board where P Rep reported on their review of the MOHS.

Appendix 1 Terms of Reference

Terms of Reference: Crossrail Governance Independent Review

Summary

Following the announcement by Crossrail Limited (CRL) of a delay in opening of the core section, DfT and TfL as joint Sponsors of Crossrail and TfL as the owner of CRL have asked for a review of CRL's governance and the oversight of the company's activities.

The consultant is separately appointed to review CRL's assessment of the ongoing funding requirement and cash forecast, which includes a review of some aspects of CRL's governance. This review complements that other appointment and recognises there may be some aspects common to both reviews.

Scope

The scope comprises a review of the governance arrangements for the oversight by DFT and TfL as Joint Sponsors of the Crossrail Project including but not limited to the matters listed below. The review should focus on current effectiveness and scope for improvement for the remainder of the project while also considering the historical context that has led to the need for this review.

Those matters are:

- considering the governance of all elements of the Crossrail programme including the integration of the rolling stock and operational readiness;
- considering the performance of the CRL Board, in particular its approach to performance monitoring and reporting to TfL as parent company and Sponsors and to what extent this could be strengthened with reference to other organisations with major delivery responsibilities;
- considering the role, composition and governance of the CRL Board and steps that could be taken to provide greater oversight to Sponsors for the remainder of the Project;
- consideration of the role and effectiveness of Sponsor representation on the CRL Board;
- consideration of the composition of the Sponsor Board and the mechanisms for reporting to it and reporting by it;
- considering the oversight by the project's Sponsors and to what extent this could be strengthened for the remainder of the project with reference to other large and complex public sector projects;
- considering the current role and effectiveness of the Project Representative team to provide independent assurance and oversight of Crossrail Limited on behalf of Crossrail's Joint Sponsors;
- assessing whether appropriate and effective governance controls are in place;
- assessing whether appropriate risk management processes and reporting are in place;
- assessing whether appropriate and effective commercial controls and contract management processes are in place;
- reviewing whether commercial reporting/tracking and oversight arrangements should be strengthened to ensure that effective reporting to the Crossrail Board and Sponsors takes place for the remainder of the Project;
- considering the role and performance of the committees of the CRL Board, including its Audit Committee (recently subsumed into the CRL Board);
- considering going forwards options for who is most appropriate to make decisions on the remuneration of CRL Board members and senior executives and whether Sponsors should be more closely involved;
- making recommendations on any changes to the control or governance environment from the reviews above.

Appendix 2 Commercial reporting

Approach

In this appendix we have reviewed the commercial reporting of key contracts, as covered in the CRL Board Reports.

Recommendations

Recommendations arising from our work are as follows:

- Guidance should be developed and issued around the application of judgement in determining AFCDC so as to help ensure a sufficient measure of consistency from period to period in the degree of optimism or pessimism which is applied. There should be sufficient clarity in the reporting such that the approach taken in relation to views taken on material subjective matters is apparent to the reader.
- Guidance should be developed / reinforced to PMs on the information to be considered and approach to be taken by them in reaching their view of the expected outturn on each contract, which should include taking an informed view on Contractor Compensation Events.
- The reporting of expected contract outturn should be clearer with a single view on each contract used for both Commercial Performance and Funding Adequacy. Where it is concluded that different bases are justified, the reporting should include a clear explanation of the differences and the reasons for them. Where there are significant differences between CRL, PM and Contractor views, brief explanations of the most material items should be recorded. A consistent level of optimism / pessimism should be applied from period to period in determining the reported CRL view.
- Reporting around the nature and value of identified risks and the resulting amount included in AFCDC should be clearer.
- Reporting around contingency should include explaining the level of contingency concluded to be required each month in respect of identified risks where this differs from the actual contingency held. In so far as is possible the level of contingency held should be aligned with the view formed of the level required which should be calculated using a consistent methodology and agreed level of optimism / pessimism.
- The NEC3 guidance on Contractor Programme acceptance should be followed and where Contractor programmes are not accepted this should be reported to the CRL Board with details of the potential implications.

Detailed Findings

We have reviewed the portions of recent CRL Board reports[57] which focus on programme schedule and cost performance. The three sections which contain the most critical information relevant to these matters are:

- Cash Forecast and Funding Adequacy
- Commercial Performance
- Current Position - Schedule

We have traced the key reported figures in each of these sections to their source documents and actions. The source data flows from the tier one contractors through to the CRL project site team and CRL central project controls team as shown in Figure 20.

For most reported figures, there are direct sources of data which can be traced and evidenced, and most are calculated in a consistent manner or pulled directly from the PRISM system. However, one key reported figure, the AFCDC associated with each contract, does not have a clear evidenced source. Several different sets of source data are considered, including URTs which originate from the project site teams as well as the PM view and Contractor view of forecasted defined costs. A 'New AFC' for each project is then determined by the CRL central project controls team and the Commercial

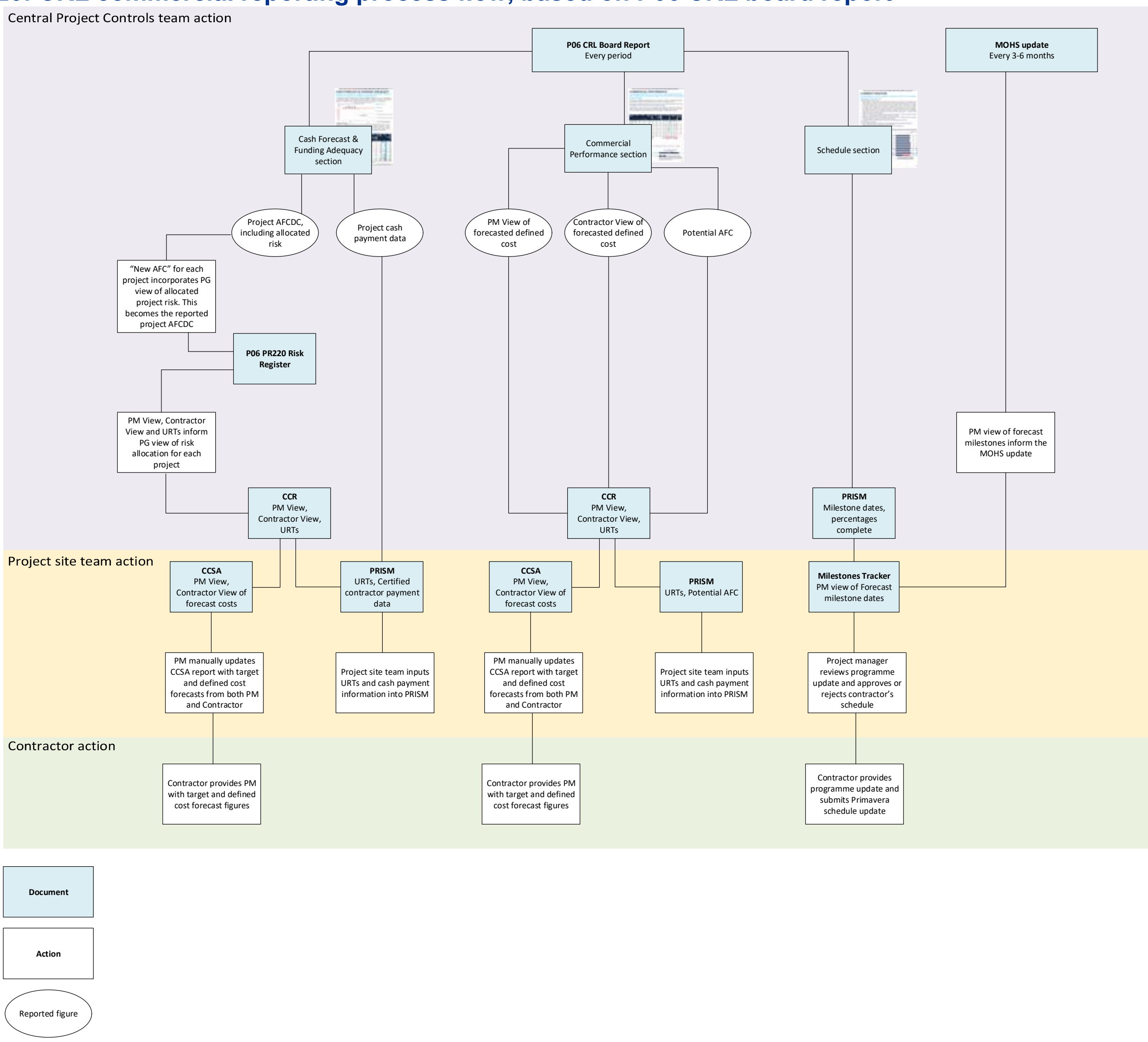
[57] Periods 05 and 06 2018_19

Director using these data sources and the application of judgement. This ‘New AFC’, as shown in Figure 20, becomes the reported project AFCDC.

Unlike other reported figures, it is more difficult to assess whether project AFCDC figures have been determined in a consistent manner from period to period as we did not find written documentation to evidence how these figures were calculated and how the various data sources have been considered.

It was unclear to us, therefore, how consistency was maintained in what was reported as project AFCDC from period to period. We recommend that this be addressed going forwards in order to enable trends in likely outturn cost to be better understood.

Figure 20: CRL commercial reporting process flow, based on P06 CRL board report



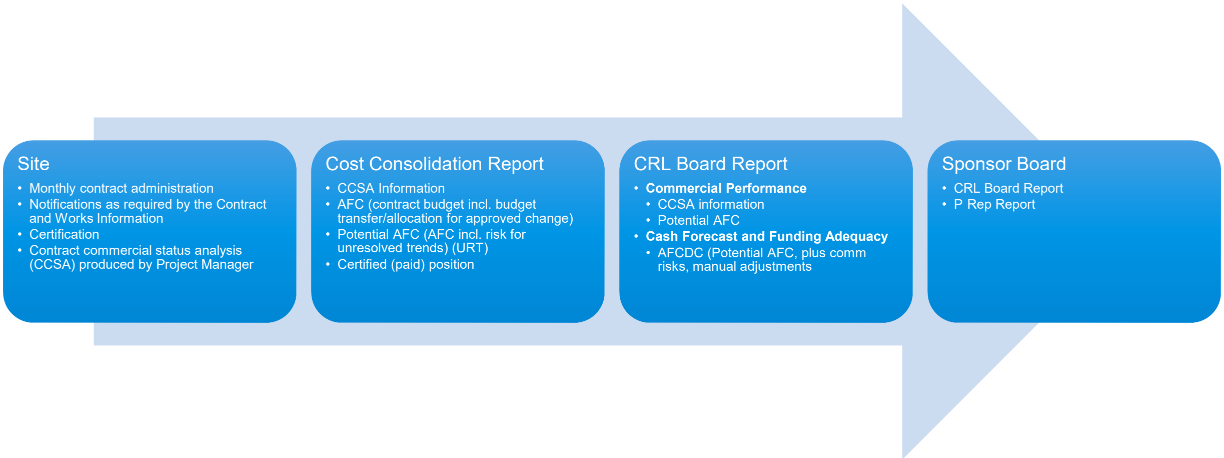
Cost and commercial reporting

We reviewed the commercial reporting process and identified various levels of data consolidation, concluding in the SB report, separated into two key sections:

— Commercial Performance

— Cash Forecast and Funding Adequacy

Figure 21: Cost and commercial reporting flow process



Commercial Performance

The Contract Commercial Status Analysis (CCSA) report is prepared by the PM for each contract and includes both current and forecast target and cost statements:

— Target position is based on the tendered contract price adjusted for: accepted change, notified change pending acceptance of contractor quotation, notified change pending project manager assessment, notified change pending decision in principle, rejected change, withdrawn change, changes associated with other contract mechanisms (such as price adjustment factor for inflation).

— Cost position is based on the cost incurred to date adjusted for: potential disallowed cost (taken or to be evidenced), fee percentage, forecast cost associated with risk.

— Adjustments for other issues such as damages and incentives which are not classed as part of the Price for Work Done to Date

The target and cost positions are reported by the PMs based on both the PMs' and the Contractors' contractual status including assessments of both current and forecast positions. Comparison with forecast target is relevant to the determination of the final cost outturn to the extent of any expected pain / gain amounts. For the avoidance of doubt, the CCSA is not used to calculate the AFCDC. It is used as part of informing overall CRL risk allowances.

We noted that within the CCSA documents (we reviewed a number) there is a hidden tab which details both the PMs' and their understanding of the Contractors' respective positions on Contract Dates (both current and forecast) including Completion, Sectional Completion, Key Dates and Bonus Milestones. It appears that the information in these documents has not been updated and does not flow through to the reporting we reviewed. In another tab the PM can provide an independent view based on their experience and expertise on contentious matters relating to contractual entitlement and assessment. This seems to be the PMs' negotiating position on target. It was not apparent that this information had been considered within the commercial performance section of the reporting.

Cash Forecast and Funding Adequacy

The cash forecast and funding adequacy is determined by a variety of blends of the AFC,

- **AFC** The summation of initial agreed budgets of all contracts, inclusive of agreed budget changes (arrived at by the CCSC)
- **Potential AFC** as above, with the addition of 'potential' budget changes associated with all URTs
- **AFCDC** as above, with the addition of all CRL risk as well as technical, land and property, utility and NR financing costs.

We note that the two tables "Cash Forecast and Funding Adequacy" and "Commercial Performance" which appear on consecutive pages[58] in this important section of the CRL Board Report cannot be easily reconciled by the reader. This is evident from the subtotals highlighted and detail set out within Figure 22 below.

[redacted]

[redacted] We note that at this time, risk registers were qualitative rather than quantitative and that the CRL CD took an overall view on the risk value he considered appropriate to take. The analysis set out in the Board Report makes it difficult to see what the considered PM's position would have been, and what key judgements have been made in arriving at the different central view.

Figure 23 indicates that the £12,810m stated as the total AFCDC at P05 2018_19, [redacted]

CRL stated that the P06 AFCDC figures were meant to reflect the RAP 1 cost position, which was done by increasing the risk associated with specific key contracts. In moving from P05 to P06 following RAP 1, the AFCDC increased from £12,810m to £13,293m. The CRL Board report explains the increase of £483m is primarily due to an increase in cost and schedule risk. Where CRL believed the RAP figures did not adequately cover all the risk on a given contract as of P06, it has forecasted a higher AFC for the contract than would be suggested by RAP 1. Hence, the increase in AFCDC in P06 is slightly higher than the increase in AFCDC per RAP 1.

We note the P06 CRL Board Report states that the £84m of Contingency held is insufficient to cover the £574m of risk exposure.

We also note that the P06 CRL Board report states that the majority of the £574m risk total (£530m) is Programme risk not allocated to projects. However the CRL Programme unallocated risk register and PR220 risk register for P06 suggests the opposite is true, showing £467m of the £574m risk total is associated with specific contracts, and split into cost risk and schedule risk.

[58] Pages 14 and 15 of Period 05 CRL Board Report 2018_19

[redacted]

We note that it is not particularly easy to understand the level of optimism or pessimism taken on the individual contracts and whether a consistent approach has been taken period to period.

A view of the commercial risk means that, of the key contracts indicated in Figure 23, only [redacted].

[redacted]

[redacted]

[redacted]

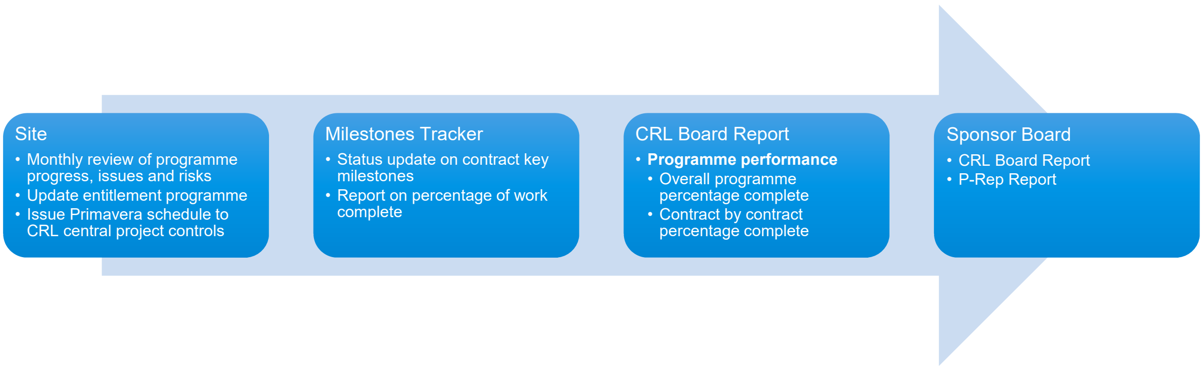
Programme reporting

There are two layers of updates that take place during the progress review cycle:

— Updating the programme schedule;
— Updating the milestone tracker.

Figure 25 shows the programme update and reporting flow process from site to the CRL Board level.

Figure 25: Programme reporting flow chart



Updating the programme schedule

The contractor prepares its updated entitlement programme at the start of the progress review cycle for the PM's review and approval. The PM submits the latest Primavera schedule to CRL central project controls team who retain a copy on the CRL Primavera planning software. The project manager reviews the programme and then accepts or rejects the schedule in line with the NEC3 non-acceptance criteria and notifies the contractor. [redacted]

[redacted]

In accordance with clause 31.3 of the NEC3 Engineering and Construction contract, the PM should either accept or notify the contractor of his or her reasons for not accepting the programme within two weeks of the contractor submitting a programme for acceptance. Permitted reasons for not accepting a programme are:

- The contractor's plans which it shows are not practicable;
- It does not show the information which the contract requires;
- It does not represent the contractor's plans realistically; or
- It does not comply with the Works Information.

[redacted] We would expect the PM to work collaboratively with the contractor to agree an acceptable programme prior to the formal submission of the programme for acceptance. In the event that the contractor continuously fails to provide an acceptable programme to the PM, this should be escalated and flagged in the monthly board reports as a major risk item.

[redacted] While programme maintenance by the PM is not a strict requirement for the contract management, it is considered best practice within the guidance included in the NEC Managing Reality book, and a necessity to retain the Employer's right to levy delay damages and make project manager's assessments for compensation events.

Updating the milestones tracker

Following the programme review with the contractor, the PM updates the milestones tracker based on his / her view of progress. The milestone tracker comprises a list of predefined milestones for each contract. These were defined by the project managers at the start of the contract and represent the steps involved in completing the work scope.

The milestones set will vary from contract to contract due to the differences in complexity. Each milestone has a planned date, weighted value, forecast date and percentage complete value. The planned date is the set baseline date and is used for performance monitoring. The planned date is reset each time CRL re-baselines its programme. The current baseline was set around the time of the latest MOHS approval.

The weighted value is determined by the PM to quantify the amount of work and resource effort associated with achieving the milestone. The forecast date shows the current date the project manager is forecasting to complete the work to deliver the milestone. This date is reviewed and may be revised during the progress review cycle. The percentage complete value is updated each period by the project manager to show the actual percentage of work completed to date towards achieving the milestone. The milestone can claim a 100 percent once the project manager confirms with the contractor that all the works relating to the milestone have been completed.

The milestone structure for each contract is set up in the CRL PRISM cost management software and is updated by the central project controls team during the progress review cycle using the information provided in the updated milestones tracker. Central project controls run a number of reports off PRISM; one involves a PRISM calculation to arrive at an overall percentage of work completed for the individual contracts. This information is reported in the 'CURRENT POSITION' section of the Board report in the table shown in Figure 26.

[redacted]

[redacted]

Another PRISM report that rolls up the percentages of work complete across all the contracts' milestones is generated to calculate the percentage of work complete on the overall programme. This is reported in the 'ARE WE ON TIME?' section of the Board report shown in Figure 27.

Figure 27: CRL Board Report P6 2018_19 page 17

3. ARE WE ON TIME?

Overall delivery is 95.0% complete vs. planned of 97.5%. 0.2% was achieved in the Period against the plan of 0.6%. In the Period, work was ongoing in regard to the additional detailed analysis around the revised Stage 3 strategy necessary in order to deliver a new Master Operational Handover Schedule in October 2018.

While it is common practice to use a milestone based method to assess and report on programme performance, judgement is required to assess the effort required to complete each activity and if this is misjudged then the percentage reported as complete will be impacted. Poor estimation of effort required to complete remaining activities can also impact thinking around the achievability of planned completion dates. We have not attempted to review how activity effort assumptions were determined.

We note that re-baselining has occurred a number of times. Whilst this has its advantages, it can create the illusion of being on or nearly on target where reporting is only against the new and not also the original baseline.

CRL was reporting in Period 6 2018_19 that the programme was slightly behind schedule but on track to achieve the Stage 3 opening in December 2018. Reporting against an earlier baseline would have shown a wider gap between the planned percentage complete and the actual percentage complete, highlighting the more significant increase in productivity required as compared with historical rates achieved, if CRL were to meet the December 2018 Stage 3 opening date. Alternatively had there been more and clearer reporting of productivity trend information in the CRL Board reports (actual to date and forecast to achieve Stage 3 opening) this weakness would have been more readily apparent.

Appendix 3 Commercial controls

Compensation Events

In accordance with the Contract Administration Manual the Project Manager should determine both the principle and valuation of compensation events in a progressive and timely and efficient manner.

[redacted]

[redacted]

[redacted].

In such instances the Project Manager is able to determine that the event is too uncertain to forecast reasonably and state assumptions for the Contractor to provide a quotation (direct and time related cost).

In the event a Project Manager's assumption is incorrect, it can later be amended by a further compensation event adjusting the respective add or omission.

We have been made aware that the supplemental agreements previously signed were required as the contractors were due compensation events with significant time and cost associated.

The supplemental agreements therefore incorporated the value of the unagreed compensation events. To align the supplemental agreement completion dates with the latest MOHS CRL required the tier one contractors' commitment to revise their programmes. To gain their commitment CRL made a number of concessions such as revising the target price based upon agreed compensation events, revising the defined cost, removing liquidated delay damages or including a damages window and introducing milestone incentives.

[redacted], [redacted].

Assessing the Contractor's Programme

[redacted].

In accordance with clause 31.3 of the NEC3 Engineering and Construction contract, within 2 weeks of the Contractor submitting a programme for acceptance the Project Manager is required to either accept or reject the programme based on four defined contract criteria:

— The contractor's plans are not practicable;

— It does not show information which this contract requires;

— It does not represent the contractor's plans realistically;

— It does not comply with the Works Information.

[redacted]

It is generally better to have a programme in place which needs adjustment than for the project to go a significant length of time with no accepted programme. If a contractor's programme must be rejected on the basis of it not being 'reasonable' or 'practical', the rejection should be justified and supported with reasons as to why.

Without an accepted programme on a project, the assessment of compensation events becomes significantly more unwieldy and less accurate. In assessing the 'effect of the event on the last accepted programme' the project team may be adjusting for the event against a programme several months out of date.

Project Manager's Authority

The contract administration manual details that "*whilst the parties to the contract are the Contractor and the Employer the majority of client duties under the CRL NEC3 contract fall to the Project Manager to undertake*". As such *"the Project Manager is obliged to act in accordance with the instructions of, and in the interests of, the Employer so as to secure completion of the works in an economical and efficient manner subject to the duty to act impartially in relation to the assessment and certification of matters of contractual entitlement"*.

The above is to be read in conjunction with the direction that the Project Manager's decisions on matters of contractual entitlement (e.g. compensation event assessments, extensions of time) are subject to the duty of impartiality and are not constrained by the *Scheme of Authorities*.

[redacted]

[redacted]

[redacted].

[redacted]

It is important that the PMs assesses compensation events in accordance with the contract where they do not accept the Contractor's quotation. This approach should be adopted on all contracts regardless of any planned settlement agreements to formalise the commercial position.

[redacted]

Contract Review Process

Reporting regime from contract level:

- There is a cut-off point each period when the project teams are required to enter their unresolved trends into PRISM and prepare their CCSA reports.
- The individual projects are reviewed by the delivery directors and the contract AFCs are reported to the PDB.
- The central cost team review trends and the other reports.
- URTs are reviewed every two weeks at the CCSC.
- The overall programme is reviewed each period at the PDB which is chaired by the Programme Director with attendance from other members of the CRL executive.
- Every quarter the major contracts are reviewed in detail the Programme Director, FD, PCD and CD addressing schedule, defined cost and commercial issues (direct cost review).
- The AFCDC is finalised for the CRL Board report at a meeting including the CEO, FD, PCD and Commercial Director.
- The Board Report is then issued and key points presented at the CRL Board meeting.
- The P Rep team produce their report in parallel but hitherto[59] have not attended CRL Board meetings.
- The JST Board report is finalised after the CRL Board meeting.

The monthly reported data lacks clarity and key risks / red flags are not clearly shown in the board report. It is not possible to review the contract AFC and risk allowances for each contract as there is no detailed breakdown of the AFCDC as well as the total risk of the project.

The actions from the defined cost reviews are not formally recorded.

We were informed that each quarter there is a direct cost review undertaken by the Commercial Director where the PMs present their current AFC including assumptions on schedule and risk items. Following these meetings the Commercial Director updates the commercial risk register (P220) based on his adjustments to the contract AFC and the inclusion of risk allowances.

Within the CRL Board Report for Period 6 2018_19 there is a table[60] showing the Contractors with the highest 'cash-to-go' position. This includes a breakdown of the AFCDC figure (£13,293m) including the AFCs for the 13 key contracts that align to the CCSA reports and a balancing figure of £8,794m.

There is no detailed breakdown presented of the balancing figure.

[59] We were advised by P Rep that they have not attended CRL Board meetings

[60] Page 14, Period 06 CRL Board Report 2018_19

Appendix 4 Risk management processes

The summaries below of the processes prior to 2017 and the current processes are based upon information and explanations provided by employees of CRL, and supplemented by information learnt during our fieldwork.

Risk management prior to 2017

Prior to March 2017, the primary differences in the risk management process were as follows: Risk registers were managed at project level with project contingency amounts determined by Project Managers. Contingency funding for specific project risk items would either come from project contingency or sector contingency depending on the nature of the risk item.

As Unresolved Trends (URTs) were raised against contracts in PRISM, their associated cost estimates were automatically included in the risk allowance and AFCDC figures for that contract, without consideration for the level of certainty of the URTs.

Risk management was conducted using Active Risk Manager (ARM), Crossrail's risk management system. ARM was shut down in May 2018 and active risks were exported to Microsoft Excel to be managed by individuals at programme level, i.e. through the programme unallocated risk register and the commercial risk register.

URTs. Prior to March 2017, URTs which were raised against a contract in PRISM were automatically included in the risk allowance and AFCDC figures for that contract, without consideration for the level of certainty of the URTs. As a result, draft URTs often impacted project AFCDC figures unnecessarily, before the project team had adequate information to estimate accurately the cost of the trend, and manual manipulation was required to exclude draft URTs. To resolve this issue, the process has since been amended in that project URTs and commercial risk are managed separately. The current process is detailed further in the following section.

ARM. ARM was a risk database configured to record the most up-to-date risk data on a project, and was the source of risk reporting. The Central Risk Team managed risk registers in ARM on behalf of all CRL projects.

March 2017 amendments. In March 2017 CRL's risk management approach was amended as follows:

- Centralisation of risk management team
- Project level risk management to emphasize pre- and post-mitigation positions and risk mitigation actions
- Project teams to provide qualitative risk registers to the central risk team to facilitate programme-level QRA
- Programme-level QRA completed periodically, to allow modelling against funding Intervention Points
- No further QRA is carried out at project or sector level

Central risk team. In accordance with the Programme Risk Management procedure, revision 7, there is a central risk team who undertake the following activities. This team was significantly demobilised in 2018, in alignment with the shutdown of the ARM system. The central risk team activities described are to:

- Seek to ensure that CRL teams use the designated tools to maintain up-to-date risk data which is of suitable quality and is in accordance with the process.
- Seek to ensure records are held to demonstrate risk management practices follow the risk procedure (e.g. records of meetings, approvals).
- Seek to ensure that CRL teams understand their risk management obligations and are actively engaged in the Risk Management Process.

- Liaise with the Head of Programme Risk to ensure continued alignment in approach with requirements.
- Undertake risk workshops as and when required to identify risks across the contracts and highlight risks that may impact the CRL Opening Stages 1-5.
- Support risk reporting requirements.
- Support the delivery of quantitative cost and schedule risk analysis.

Current risk management process

In summarising the current risk management process we have focused on relevant aspects of CRL's approach to commercial risk management in relation to the programme.

URT Process

A URT may be one of three types of trends:

- Scope or change that the PM has instructed or will instruct the contractor to implement, which will likely become a compensation event;
- Scope or change that the contractor has notified the PM of, using an early warning notice, which will likely become a compensation event;
- An update of the anticipated final cost as determined by the PM, which may be based on any matter, such as a change of programme or productivity.

URTs are held within the PRISM system; they are grouped by project but raised against specific contracts within the project, one of which being the main NEC contract. PM's enter URTs into PRISM once they become aware that the cost will materialise, though they may not know what the extent of the cost will be. True project risks, which may or may not materialise and require mitigation, do not appear as URTs. The changes made to the risk management process in 2017 included the decision to move to a subjective assessment of project risks, as project scope at that point was reasonably well defined.

As new trends are raised by the site teams, they are added to the URT total for a project. As these unresolved trends are resolved they are removed from the URT total for the project. Those that are formally approved as compensation events are added to the contract AFC. Thus, the URT metric provides a snapshot in time of the potential trends on a project, rather than a cumulative value.

The timeline of a new URT is as follows. When a new URT is raised by the project site team, it may be initially entered into the PRISM system as a Draft URT with an order of magnitude value. Once the site team has collected enough information to estimate accurately the cost of the trend, it will turn the draft URT into an official URT in the system. The time elapsed between a draft and final URT can vary from 1 week to 1 year, and this function is under project site team control. The CRL management team keeps an Aged Trend Report to monitor URTs which remain in draft form for several periods. Once a URT reaches official status, those with a value of £250,000 and under are typically approved by the relevant delivery director within four weeks. If the value of a URT is between £250,000 and £10 million, it must go to the CCSC for approval and if the value is over £10 million, it must go to the CRL Board for approval. These approvals may take an additional 2-4 weeks. Further, as a part of CCSC meetings occurring every two weeks, the CCSC receives a list of unapproved URTs over £3 million in value on each project. Those that appear on the list as new URTs are flagged to allow the Head of Trends to review.

The URT total for a project is considered by the Commercial Manager and the risk team when determining the level of commercial risk allocated to the project in a given period. Though the URT total for a project previously fed into a project's risk and AFCDC figures automatically, these metrics are now considered separately. The commercial risk allocated to a project as a part of the quarterly risk analysis is intended to cover the value of relevant URTs.

Quarterly Risk Analysis – Programme Unallocated Risk

Each row in the Programme Unallocated Risk Register is a priced element of risk and details:

- The QRA ID;
- Description/impact of the risk;
- Directorate, director and owner of the risk;
- Details regarding risk consequences and modelling notes;
- Minimum, most likely, and maximum cost;
- Distribution type; and
- Current period's True Expected Value (TEV), previous period's TEV, and the change between periods.

The TEV assigned to each risk is a weighted average calculation, based on the risk's potential cost and probability, though it is not a simple multiplication of the two factors. TEV values for each risk are added together to produce the total risk figure for the programme.

Quarterly Risk Analysis – Commercial and Project-Level Risk

In previous periods, total URT cost across the programme was allocated to an individual row in the Programme Unallocated Risk Register, labelled PR1001 (outturn cost). This line item has now been eliminated, and instead URTs are considered by the Commercial Director and risk team when determining risk values in items PR220a and PR220b.

The PR220 risk register details for each key contract:

- Net risk allocated to the contract per the previous period
- Contract AFC in the current period, per the Cost Consolidation Report (CCR)
- Total URT value, per the CCR
- Potential AFC, per the CCR
- 'New AFC' for the contract
- Additional risk allocated to the contract in the current period, defined as the gap between the Contract AFC and the New AFC
- Total commercial risk allocated to the contract, defined as the additional risk per the current period plus any residual net risk from the previous period

The majority of the commercial risks defined in a given period are derived from the exposure between the Contract AFC of a project and the New AFC forecasted for the contract. This is the basis for the majority of the general risk allowance at programme level. The commercial risk allocated for each contract is divided into a schedule risk allowance and a cost risk allowance, which make up risk items PR220a and PR220b, respectively.

Determination of the New AFC for each project is preceded by a face-to-face review of to-date and forecasted defined costs on the project (Defined Cost Review), which takes place between the Project Director, Commercial Director, Risk Manager, and principal members of the project site team. Within this review, the costs to date, cost forecast, key project risks and commercial position are studied to inform both the commercial risk position and the CCSA report for the end of the period. Ideally, an agreement is reached between the project site team and the CRL management team on an accurate defined cost forecast for the project, though this is not always the case.

The New AFC is then determined by the Commercial Director with consideration for the total URTs raised on a project, as well as the exposure between the Contract AFC, the PM's view of the AFC and the Contractor's view of the AFC.

We have observed that in Period 6 2018_19, of the 26 contracts for which a 'New AFC' has been determined, seven fall below the PM's view of AFC for that contract, seven fall above the Contractor's view of AFC for that contract, and five fall between the PM view and the Contractor view. In every case, the Contractor's view was higher than the PM's view. For seven projects, there was no PM view or Contractor view available.

When asked, the CRL management team stated there is no written documentation or calculations to detail how the New AFC is developed, nor detailing which potential costs within the PM's view or Contractor's view have been excluded and the justification for these exclusions. We also have been told that the project site teams are not aware of these New AFC figures nor the risk allowance allocated to their projects.

Though a comprehensive review of the PR220 risk item is conducted once a quarter, to align with update of the Programme Unallocated Risk Register, we were told a strategic review of the PR220 item occurs each period in between to identify specific issues that may significantly affect the risk item.

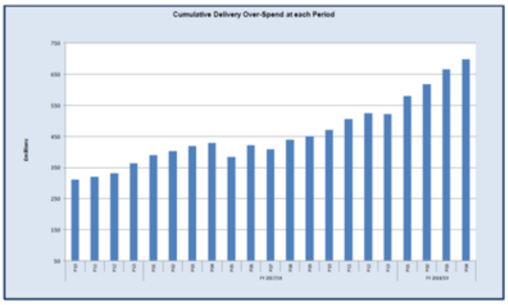
Contingency management

In the event the full requested amount in RAP 2 was to be funded, including the Additional QRA amount, the CRL management team had proposed dividing this sum into budget and contingency. Once the final MOHS is published, bottom-up forecasts will be built for each project, and verified and agreed with the site teams. These forecasts will serve as the updated Contract AFCs and, if CRL management's above proposal is followed, the sum of the forecasts will determine how much of the requested funding between the Early dates figure and the Late dates figure will be allocated as programme budget. The balance of funding beyond this budget, up to the full amount requested in RAP 2, would be allocated as contingency.

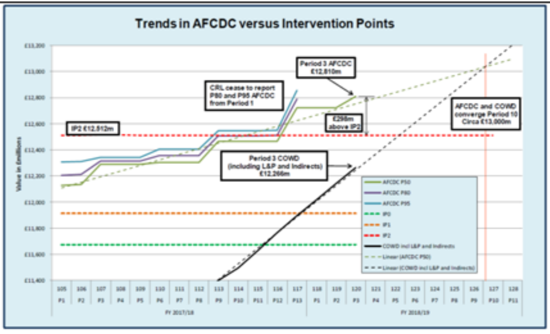
Further to CRL management's proposed approach, contingency would be split into Board contingency and programme unallocated risk contingency, held by the CRL team. Further, the Additional QRA figure requested in RAP 2 would be help separately from the primary requested funding.

Of course, the amount now requested is greater than RAP 2.

Appendix 5 Extracts: P Rep reports 1 March 2018 to 16 August 2018

R Rep Report	**<u>Report extracts</u>** **Cost** **Phase 3**	**<u>Report extracts</u>** **Cost and Schedule Dashboard** **Executive Summary**
Report 114 16 Aug 18 *Re Period 4* *24 June to 21 July 2018*	**<u>Cost</u>** There has been a sustained 70% increase in delivery overspend since Period 7. The cumulative delivery overspend, against the CRL internal budget at each period, has increased in Period 4 by £32m to £698m (Period 3, £666m) as shown in Figure 1 - 3.  *Figure 1 - 3 – Cumulative Delivery Overspend against CRL Budget at each Period* Projecting linearly both the current rate of increase of AFCDC and COWD to present a worse case scenario, they intersect above £13bn in Period 10, as shown in Figure 1 - 2. However, the actual growth for AFCDC and the progression of COWD are unlikely to be a continuing linear trend and both are expected to tail off as the works approach completion. **Scenario costs** CRL has reported that the AFCDC has exceeded the costs set out under scenarios A1 to A3 inclusive and B1. We are aware that CRL has concerns with Stage 3 opening and is currently reviewing its schedule. We await the outputs from the CRL review of its MOHS and its revised delivery strategy. Any major delays to Stage 3 opening or station construction will further increase costs. We would expect CRL to update its cost forecast once the schedule review has been completed. **<u>Phase 3</u>** **Summary** The culmination of the latest evidence set out in this, and previous reports, leads us to the conclusion that Stage 3 Opening is highly unlikely to be achieved on 9 December 2018. CRL summarised the current challenges it faces at Sponsor Board on 26 July 2018. Indicative scenarios for Stage 3 Opening are being considered by CRL, predicated on different levels of dynamic testing success. CRL has advised that additional work and further discussions with Partners is required before a revised delivery strategy is formalised and presented to its Board meeting on 29 August 2018 and to the	**<u>Executive Summary</u>** **Financial** The Intervention Points have not changed in Period 4 and the AFCDC remains at £12,810m, which exceeds IP2 by £298m. We are concerned that cost pressures remain across the programme, which will cause the forecasts to increase substantially at Period 5 or Period 6. Separately, CRL is currently preparing a revised cost forecast to reflect the revised delivery strategy. **Stage 3 Opening - Infrastructure and Systems:** The evidence set out in this report leads us to the conclusion that Stage 3 Opening is highly unlikely to be achieved on 9 December 2018. CRL is reviewing the schedule and we believe they should present a revised delivery strategy at the next Sponsor Board.

	next Sponsor Board, which has now been arranged for 3 September 2018. CRL is reviewing indicative scenarios for Stage 3 Opening; 52 Anchor Milestones are forecast to be later than the MOHS late date; CRL report ongoing challenges and risks to every critical path; There are 19 Readiness Tasks that have been rated 'Red'; Actual progress at most Stations and Shafts has again deteriorated this period; [redacted] Completion of rail infrastructure remains CRL's declared priority; **Schedule** As reported previously, significant schedule pressures and poor productivity have built up over several months. These have resulted in an overwhelming set of issues bringing significant risk to the critical paths leading to Stage 3 Opening. At Period 3, we reported "we believe there is a very high risk that Stage 3 Opening will be delayed or the opening will be sub-optimal". The culmination of the evidence set out in this, and previous reports, leads us to the conclusion that Stage 3 Opening is highly unlikely to be achieved on 9 December 2018. Our assessment is that almost all of the dates shown as forecast for September 2018 are ambitious and unlikely to be delivered on time. We expect CRL will produce new forecast dates in Period 5 or 6, once the new delivery strategy has been developed and agreed.	
Report 113 19 Jul 18 *Re* *Period 3* *27 May to 23 June 2018*	**Cost** The rate of COWD has been steady through the life of the project, averaging approximately £120m per period, as shown in Figure 1 - 2. Together with the increasing rate of defined costs and the costs pressures at [redacted] there is the likelihood that the AFCDC will continue to rise. Projecting linearly both the current rate of increase of AFCDC and COWD to present a worse case scenario, they intersect at approximately £13bn in Period 10. The actual growth for both AFCDC and COWD are unlikely to be a continuing linear expansion, but is expected to tail off as the works approach completion. The cost review carried out by the independent Jacobs commercial team indicated that growth towards £400m above IP2 was based on contemporaneous cost performance and productivity circumstances at Period 13 and assumed all work will be complete in time for Stage 3 opening. Since Period 13, the AFCDC has risen again, with a substantial step increase in Period 3, and the programme is still experiencing ongoing prolongation and disruption, compounding productivity and increasing costs. [redacted] CRL [redacted] Defined Cost forecasts are indicating a rising rate of increase that introduces risk of increase to the AFCDC that is challenging to predict.	<u>**Executive Summary**</u> **Financial:** The Intervention Points have not changed in Period 3 but CRL has increased the AFCDC by £87m to £12,810m, which exceeds IP2 by £298m. This increase consumes almost all of the increased funding made available by Sponsors. We are concerned that cost pressures remain across the programme that may cause the forecasts to be increased again before completion. The AFCDC is now £20m in excess of the financial budget and the contingency budget of £228m is not sufficient to cover the risk exposure of £249m. **Stage 3 Opening - Infrastructure and Systems:** The programme still contains a large number of significant risks and we believe there is a very high risk that Stage 3 Opening will be delayed or the opening will be sub-optimal. CRL remains committed to start Pre-Trial Running on 11 September 2018 and Combined Trials on 1 October 2018; continuing to balance the demands of



The cumulative delivery overspend has increased in Period 3 by £48m to £666m (Period 2, £618m). This overspend is included in the AFCDC.

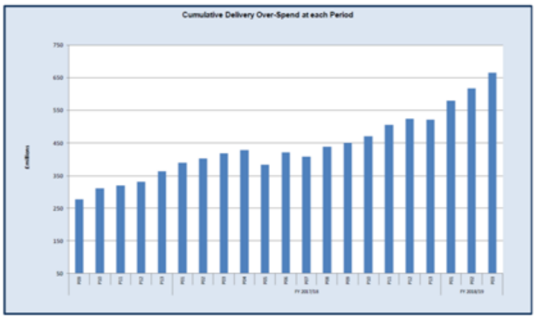


Figure 1 - 3 ~ Cumulative Delivery Overspend at each Period

CRL reports that, in Period 3, it spent £51.2m above the 2018/19 Business Plan. The Business Plan for Direct Costs was set in Period 6 2017/18, and since then there has been a significant increase to the AFCDC (£0.5bn) and delays to MOHS dates for the key contracts and, as such, variances to the Business Plan are unavoidable. The CRL Period 3 Board Report provides the details of the overspend which, in summary, continue to be dominated by prolongation and delays. These costs are included in the AFCDC.

Scenario Costs
The Crossrail Cost Scenario Review report issued by Jacobs on 19 June 2018 set out an analysis of CRL's calculations for various scenarios presented in March 2018, using Period 10 data when AFCDC was at £12,464m. It also reviewed CRL's completion tail scenarios based on Period 13 forecasts when AFCDC had increased to £12,723m, causing a £211m breach of IP2 (£12,512m). At that time, the expected final cost was £300m above IP2 or £400m as an upper bookend, assuming all essential construction work was finished on time and Stage 3 opened on 9 December 2018, or shortly thereafter.

construction completion against dynamic testing in order to achieve the best outcome for the Crossrail Programme. Poorer than expected dynamic testing progress, a large outstanding test workload and the significant financial benefits of completing installation prior to Combined Trials (thus avoiding the constraining effects of working under the RfL ROGS railway rule book) is leading CRL to target construction completion as a priority.

CRL remains extremely concerned at the readiness of Stations, Shafts and Portal (SSP) sites to start Phase 3 testing. Ongoing schedule drift is complicating what had already become an unsupportable demand for additional resources, and recruitment of specialist staff is proving difficult.

Continued delays are impacting upon the stations' completion of fit-out, and slow progress of the physical work is delaying subsequent submission of documentation. [redacted]

Report 112

21 Jun 18

Re Period 2

29 April to 26 May

2018

Phase 3

CRL face a number of significant challenges during the next few months; see details in the following Sub-Sections and in CRL's Board Report. The time available for completion of work and the opportunities for delay mitigation in order to achieve Stage 3 Opening are reducing. Therefore, there remains a high risk that Stage 3 Opening may be delayed or the opening will be sub-optimal.

High risk that Stage 3 Opening may be delayed or the opening will be sub-optimal;

Cost and Schedule Dashboard

Schedule & Progress: CRL face a number of significant challenges during the next few months; there remains a high risk that Stage 3 Opening may be delayed or the opening will be sub-optimal.

Executive Summary

Financial:

	RfL and CRL have jointly created an Elizabeth Line Countdown Board Tracker (ELCBT) which sets out the readiness tests and related criteria for management of tasks leading to Interim Milestones. These are supported by Deep Dive meetings to review specific concerns, and T- meetings to review matters outstanding at each IM review. The first Tracker was presented to the PDB meeting on 5 June 2018, although this was a draft and more data needed to be added. An updated version was issued at the Interim PDB on 20 June 2018. We believe this is a good step forward, focussing all parties on the issues and risks to be resolved leading up to each target date. Nevertheless, this tool does not resolve the issues and we believe all milestones are at risk. The three target Interim Milestones are: - IM1 - 30 August 2018 – Dynamic Testing under CCRB7 (to deliver Pre-Trial Running); - IM2 - 24 September 2018 – Pre-Trial Running (to enable Combined Trials); - IM3 - 3 December 2018 – Combined Trials (for Stage 3 Opening Revenue Service). **Stations Shafts and Portals** Schedule and cost pressures continue across most of the main central section stations. Further delays are impacting on the completion of fit-out, subsequent testing & commissioning and the forecast IM handover dates. **Bond Street Station:** [redacted]	The Intervention Points have not changed in Period 2, and the AFCDC at remains at £12,723m, resulting in a breach of IP2 by £211m. Costs continue to increase so we expect an increased forecast in Period 3. The independent Jacobs commercial team has reviewed the scenarios costings prepared by CRL and has issued its final report. **Stage 3 Opening - Infrastructure and Systems:** CRL has advised that Trial Running and Trial Operations target dates have been delayed and merged into 'Combined Trials' which are scheduled to commence on 1 October 2018. Prior to this, a new 'Pre-Trial Running' period is due to commence on 11 September 2018 for 3 weeks. Following completion of line-wide SCADA delivery on 31 May 2018, [redacted] continues to support Stations, Shafts and Portals Phase 3 testing demands with interim software drops. [redacted] [redacted] CRL has continued with the delivery strategy of Blockade Working in the period and four Dynamic Testing Windows have now been completed. Despite the greater functionality now available for testing as a result of increased software maturity and the fixing of software baselines for trains and infrastructure, the results have been mixed. CRL face a number of significant challenges during the next few months. The time available for

		completion of work and the opportunities for delay mitigation in order to achieve Stage 3 Opening are reducing. Therefore there remains a high risk that Stage 3 Opening may be delayed or the opening will be sub-optimal.
Cost Scenario Review 19 June 2018	Revised forecasts were submitted to the Sponsors and JST at the end of February 2018 who then commissioned Jacobs to undertake an independent review of the updated cost projections. The review was conducted in three phases as described below. <u>Phase 1 – Initial Review</u> The purpose of phase 1 was to provide: Independent assurance to JS that the approach taken by CRL in updating its cost projections, in order to reflect MOHS 2018, is appropriate and well founded. An evidence based assessment of any concerns, risks, opportunities or issues that remain, and help the JS understand the resulting magnitude and importance in terms of programme success. Importantly phase 1 was conducted by an independent Jacobs team who were not part of the incumbent Project Representative team (R Rep), nor part of any other CRL activity at the time. <u>Phase 2 –Further Review</u> On completion of phase 1, further work was considered beneficial and JST commissioned phase 2 with a view to: Demonstrating the reasonableness of judgements made by the CRL executive team in compiling the scenarios by conducting a focussed review of critical contracts. Providing JS with greater confidence in the range of outcomes by seeking to qualify the potential outturn range versus the CRL cost scenarios, and consider the wider implications for the overall programme position based on data led trends. Given the tacit knowledge and access to data held within the R Rep team, all parties agreed that phase 2 was to be completed openly with the R Rep team supporting and providing data, context and perspective. <u>Phase 3 – Completion Tail Review</u> Following the presentation of the phase 2 findings at JS Board on 19 April 2018, it was agreed that CRL should develop and prepare a new scenario(s) describing a construction completion tail, and that for expediency this should be done in consultation with the Jacobs independent cost scenario review team. The objectives of phase 3 were to:	As the Crossrail infrastructure programme (tunnels, track and stations) entered its final year of construction and delivery in 2018, CRL (Crossrail Ltd.) began to update its cost projections and the likely potential total completion cost, otherwise known as the potential outturn. In support of this process the JS (Joint Sponsors - Transport for London and the Department for Transport) asked CRL to prepare cost scenarios, in order to provide a quantum of the actual cost of completion against potential delivery scenarios, and any resulting variation from the approved IP2 funding limit of £12,512m. The cost scenarios were aimed at understanding: a) The sensitivity of the cost forecast to achieve the Stage 3 completion date of 9 December 2018. b) The impact of a potential software or control system delay resulting in a prolonged delay to opening. Following submission of the cost scenarios by CRL, the JS Board requested an independent review of the work completed, primarily to provide assurance on the reasonableness of the approach taken by CRL in compiling the scenarios, and to provide confidence or otherwise in the likely potential outturn cost upper limit known as the 'book-end'. The main findings of the review are: a) The methodology followed by CRL to develop the cost scenarios, given the constraints and objectives at the time of preparation, was understandable and reasonable. b) Based on the premise that Stage 3 opening on 9 December 2018 is achieved, the expectant

	- Develop a cost scenario(s) that take a more pessimistic view on construction completion and describe a tail of work which may extend into trial running, trial operations and passenger operations. - Stress test the upper limit book-end numbers and provide JS with further reassurance and confidence surrounding the upper limit book-end value. Exclusions and Limitations included: - The cost scenarios are based on the premise that all essential construction work is completed in time for Stage 3 opening on 9 December 2018. On 22 March 2018 Jacobs presented its findings at the Sponsor Board Meeting; a copy of this presentation is included in Appendix F. As stated at this Sponsor Board Meeting CRL had limited time to prepare the cost scenario analysis and consequently used available data and tacit programme knowledge to compile the potential outturn costs. The approach taken was a top down analysis by competent and experienced people from within the CRL leadership team, with a desire to isolate the work from the project delivery teams. The work included an evaluation of costs to date, current spend rates, commercial exposure, forecasted costs to go, risks and unresolved trends. Overall the methodology followed by CRL to develop the cost scenarios, given the constraints and objectives, is understandable and reasonable. The process was logical and an expected approach to answer the question posed by JST. The methodology favoured tacit understanding over forensic analysis, using the current and forecast cost position at the time of completion (i.e. Period 10 2017/18) to determine potential outcomes. However, whilst the scenarios are understandable but not necessarily all encompassing, there is considerable subjectivity and experience led input and assessment. Furthermore, the acceleration and recovery costs are based on the prolongation costs and not a bottom up quantification of actual resources needed to accelerate, and they assume acceleration is achievable. Based on the work undertaken in phase 1 the following emerging findings were noted and shared with the JS board on 22 March 2018. - The scenarios assume rigid boundaries, whereas reality is likely to have variability in project completion and transition operations. - The costs and schedule are based on an optimised demobilisation at the end of Q3 2018 and the current MOHS18 is under review. - Dynamic testing complexity is understood but not clear how this is reflected throughout the programme costs and the programme is currently losing time at the back end to thoroughly test. This is a concern.	potential outturn at the time of this report is circa £300m above IP2. c) The upper limit book-end as determined by the cost scenario review, including the completion tail scenarios, is in the region of £400m above IP2. d) Material cost reductions are unlikely to be achievable, as the opportunity to re-phase work or de-scope, and still deliver a functioning railway system has passed. The project is strongly focussed on achieving Stage 3 opening on 9 December 2018 and all projects are experiencing a concertina affect as work is compressed against a hard completion deadline. Consequently, there is negligible float for future problems, delays and defects correction and the likelihood of construction completion work extending into trial running, trial operations and passenger operations is high. Based on the findings of this cost scenario review the recommendation to Joint Sponsors is to be prepared for additional spend in the region of £300m, with an upper limit of circa £400m above IP2, to deliver the CRL scope.

- Changes in commercial models from pure Option C to modified arrangements through supplementary agreements may erode commercial incentives for completion and expose CRL to subcontractor claims.

- There are differences in the CRL vs. Contractor views on the defined cost position, and one-month delay equates to [redacted] costs.

- The current scenarios provide an overview of potential cost increase ranges, but are not definitively the “book ends”.

Phase 2

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted].

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

CRL developed and prepared two new scenarios titled Range Tail 1 and Range Tail 2, hereinafter called Tail 1 and Tail 2 (T1 and T2). The scenarios were developed on the following premises:

- Based on similar assumptions to Scenario A2 but updated to reflect known issues.
- Potential carry over of non-critical work.
- Updates for changes from draft MOHS to final (current at time of completion) MOHS.
- New issues that have arisen and/or been resolved.
- Comparison with P13 defined cost review and inclusion of identified additional risks.

Phase 3 Findings

Overall the completion tail scenarios contain a similar level of supported and subjective data as per the original cost scenarios (A1 to A3). The approach taken by CRL is logical and consistent with the prior cost scenario work completed, and consequently the level of uncertainty within the overall assessment is similar.

The evaluation has enabled a more detailed assessment of the upper limit by CRL, where the cost impact of delays to station and infrastructure completion, versus the current programme, were quantified and assessed. Furthermore, the more pessimistic considerations adopted in Tail 2 provide further review and quantification of an upper limit potential outturn cost.

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Importantly the tail cost scenarios take into consideration several permutations and combinations of activity completion and delay, and are therefore more balanced in their assessment of what may or may not occur. However, they support the phase 2 emerging finding that the upper book-end for funding availability should be in region of £400m above IP2.
Overall whilst the process followed by CRL to generate the cost scenarios was reasonable, understandable and logical, the certainty regarding the data used and outputs generated remains mixed, with approximately a 50% split between supported and subjective data. Therefore, the scenario potential outturn costs rely considerably on the tacit knowledge of the CRL leadership team, and their detailed knowledge of the programme and contracts, and hence they should be utilised with a commensurate appreciation of their relative accuracy.
It is also important to note that the scenarios do not cover extreme cases, such as a tunnel fire, terrorist event, main contractor liquidation, etc. and they are all premised on the basis that the essential infrastructure construction work is completed in time for Stage 3 opening on 9 December.
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Report on Semi-Annual Construction Report (SACR) 19
11 June 2018
Covering 17 September 2017 to 31 March 2018
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AFCDC and Intervention Points
The intervention points, IP0, IP1 and IP2 have not changed during the SACR19 period and remain at £11,672m, £11,912m and £12,512m respectively.
The P50 AFCDC has increased by £420m in the SACR19 period, from £12,303m to £12,723m, as shown in Figure 2 - 1 below. The predominant cause for this increase is attributed to additional risk allowances and cost pressures identified by CRL through its Q4/Period 13 QCRA. Overall, the principal cost increase contributions during the SACR19 Period are increased forecast costs for [redacted]
Risk and Contingency
<table>
<tr><th rowspan="2">Description</th><th colspan="2">£ million</th></tr>
<tr><th>P50 Risk Exposure</th><th>P95 Risk Exposure</th></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>SACR18</td><td>378</td><td>482</td></tr>
<tr><td>SACR19</td><td>475</td><td>607</td></tr>
<tr><td>SACR Period Increase</td><td>97</td><td>125</td></tr>
<tr><td>% Increase</td><td>26%</td><td>26%</td></tr>
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Figure 2 - 2 ~ Increase in P50 and P95 Risk Exposure
As shown in Figure 2 - 2; the increase in the difference between P50 and P95 is indicative of the increased level of uncertainty identified by CRL in its Q4/P13 QCRA detailed contract review.
Our review of the Q4/P13 QCRA indicates that CRL has carried out a comprehensive assessment of risk and cost pressures for the ultimate completion of the programme. The independent Jacobs commercial review team appointed by the JST attended
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The Intervention Points have not changed during the SACR19 period. Costs have increased significantly during the period such that the AFCDC at P50 has increased by £420m from £12,303m to £12,723m. The AFCDC at P50 now exceeds IP2 by £211m, thereby confirming the formal breach of IP2. The P80 AFCDC is £12,790m and the P95 AFCDC is £12,855m. The new Quantified Cost Risk Assessment (QCRA) at P50 increased to £475m, of which £340m is Unresolved Trends.
CRL continues to carry out its detailed assessment of potential delivery pressures and cost scenario planning, initiated in the latter part of the SACR19 period, to identify the threshold for funding above IP2. CRL, Sponsors and HM Treasury are in discussion to finalise the package to fund CRL to completion.
The total On Network Works (ONW) forecast cost (AFC plus VNs) at SACR19 is £2,530m, [redacted] The ONW final forecast outturn cost (FFOC) reduced by £74m from £2,450m at SACR18 to £2,376m at SACR19, to reflect the agreed cash funding. CRL has indicated that there are further
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	the CRL Period 13 QCRA completion meeting on 9 April 2018 and has also carried out its separate review. In summary, CRL has undertaken a full QCRA review in which known delivery issues have been identified and allowances included. However, we expect costs may increase later in 2018 due to continuing cost pressures on [redacted] **Tunnels and Stations** CRL no longer measures its performance/progress using Earned Value, but now measures against the achievement of selected milestones towards completion of the remaining works. The milestones were agreed with each PM and were incorporated into MOHS 2018. CRL's performance in achieving these milestones, since their implementation, has been less than planned up to the close of the SACR period. CRL started to miss a number of these milestones, in the period immediately following their assignment. We are concerned that CRL continues to forecast further delays against planned milestones in the coming periods. The station performance curves, while still maintaining the December 2018 opening date, are forecasting the need for increasing levels of production up to final completion. Such levels of production have not been achieved or sustained by any of the contractors to date. This leads us to believe that, while "station opening" may still be achievable in December 2018, a fully completed asset is unlikely to be achieved at all of the stations. The station performance curves have consistently tracked increasing delays at most of the stations. The actual/forecast curves continue to steadily migrate closer to, but have not yet dropped below, the MOHS 2018 [redacted] curve. **MOHS Refresh** The refreshed MOHS 2018 was issued by CRL in February 2018. Although Stage 3, 4 and 5 Opening dates were retained, most activities have been compressed and milestones have been re-baselined. It also includes the latest plans regarding Stage 2 Opening in two phases. Our view was that the new MOHS was highly ambitious. Since then, the programme has suffered from a number of setbacks and delays described elsewhere in this report. The accumulation of delay across all areas of delivery continues to threaten the start of Trial Running and Trial Operations, and the start date for Stage 3 Opening is becoming more vulnerable. IM readiness is becoming increasingly impacted by CRL installation completion and 'paperwork' delays, and there remains a high risk that these delays will not be manageable without impact upon Stage 3 Opening. We note that CRL has not produced a Quantified Schedule Risk Assessment (QSRA) for SACR19 and that EVM calculations of progress have been replaced with the	cost pressures in a number of NR contracts. Schedule: The refreshed MOHS 2018 was issued by CRL in February 2018. Although Stage Opening dates were retained, most activities have been compressed and milestones have been re-baselined. This is the last update to be carried out by CRL. The schedule had been revised and re-issued in April in previous years, but the update was brought forward this year as the number of delays across the programme had reduced its usefulness as a baseline document. Our view remains that the new MOHS was highly ambitious. CRL has recently advised that Trial Running and Trial Operations target dates will be delayed and merged into 'Combined Trials' which are scheduled to commence on 1 October 2018. In addition a new 'Reliability Growth' period is due to commence on 11 September 2018. These revised dates will allow more time for construction blockades and additional dynamic testing windows. The revisions will also take account of new dates for transition testing at NR interfaces. Details are not available yet so we report on MOHS 2018 dates (5 August 2018 and 9 September 2018) but future Periodic Status Reports will monitor the new dates and related milestones. CRL face a number of significant challenges during the remainder of 2018, and there remains a high risk that Stage 3 Opening may be delayed or the opening will be sub-optimal. A combination of historical schedule pressures, large outstanding workload, unrealistic performance demands, access and logistics challenges and unexpected, schedule-impacting, incidents conspired to increase pressure still further on all Stage 3 delivery workstreams in the SACR19 period. The prioritisation of resources to achieve dynamic testing in Zones 1 & 2 on 26 February 2018 had a significant impact upon the ability to

monitoring of milestones. Our views regarding these milestones are set out elsewhere in this report.

CRL has recently advised that Trial Running and Trial Operations target dates will be delayed and merged into 'Combined Trials' which are scheduled to commence on 1 October 2018. In addition a new 'Reliability Growth' period is due to commence on 11 September 2018. These revised dates will allow more time for construction blockades and additional dynamic testing windows. The revisions will also take account of new dates for transition testing at NR interfaces. We will monitor this new strategy and report in our PSRs during SACR20.

CRL face a number of significant challenges during the remainder of 2018, and there remains a high risk that Stage 3 Opening may be delayed or the opening will be sub-optimal.

Stage 3 Opening - 9 December 2018

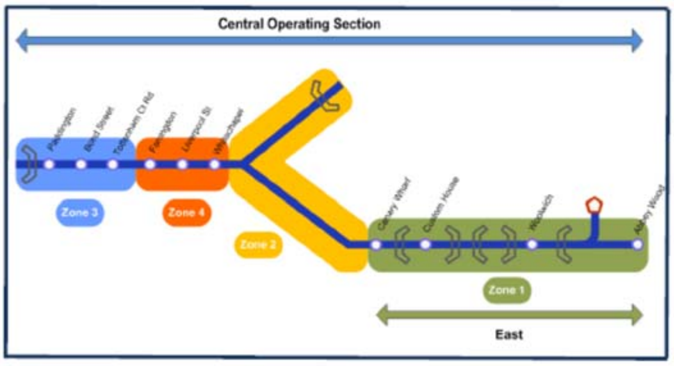

Figure 4 - 2 ~ Testing & Commissioning Zones

4.4.1. Dynamic Testing in Zones 1 & 2 (continuing from 26 February 2018)

Dynamic testing in Zones 1 & 2 started on 26 February 2018 and has continued into the current SACR period, carefully segregated from ongoing installation completion and energisation readiness activities in Zones 3 & 4. Dynamic testing will be effectively confined to Zones 1 & 2 until the planned start of dynamic testing in All Zones, on 11 June 2018.

The daily day/night alternating pattern for construction and dynamic testing was replaced by "blockade working", implemented on 25 April 2018. Blockade working comprises a repeating 2 week working cycle to operate up to Trial Running, split between 11 day construction "blockades" and 3 day dynamic testing "windows". This approach provides opportunities to realise the significant efficiencies necessary to deliver MOHS and has flexibility for the balance between construction and dynamic testing to be adjusted to suit actual progress.

The creation of discrete dynamic testing "windows" provides for better planning and delivery of dynamic testing, in longer and dedicated time periods. However, despite these potential advantages, dynamic testing continues to make slow progress, largely limited by software functionality. CRL has recently proposed to delay the current start of Trial Running and to extend blockade working until September, principally to allow the full scope of dynamic testing to be completed, including any

deliver fixed infrastructure in Zones 3 & 4. Poor installation progress in Zones 3 & 4 and practical difficulties with the transition between "construction" and "dynamic testing", inherent in the split day/night delivery approach at the time, influenced CRL's decision to adopt Blockade Working. Delivery now takes place in a repeating 2 week working cycle, split between 11 day construction "blockades" and 3 day dynamic testing "windows".

Systems and installations have already been identified which will not be complete ahead of Trial Running (e.g. Tunnel Ventilation) and absolute completion dates, and minimum requirements for formal Handover have not been fully agreed between CRL and RfL.

Stations completion continues to experience considerable challenges, with fit-out works delayed by contractor's poor performance, lower than planned levels of resource and productivity, and programme changes. Late delivery of Station systems is driving delay into the completion of Phase 3 integration testing. Most stations will require Sectional Completion as full Handover will not be possible before the relevant IM takes possession. [redacted] Station is at serious risk of not being complete for Stage 3 Opening. CRL is seeking schedule improvements from the Tier 1 contractors.

The time available for completion and the opportunities for delay mitigation in order to achieve Stage 3 Opening are reducing. Successful completion of dynamic testing ahead of Trial Running is a fundamental prerequisite, and this relies upon the ability to make good progress, yet to be demonstrated, with the integration of [redacted] systems. Opportunities to improve general train reliability could become more limited due to the possibility of decreasing the Trial Operations period.

Pressure is increasing upon RfL to accommodate CRL delivery shortcomings and to absorb the

	software modifications and re-testing. The additional time will also allow for completion of outstanding infrastructure, Phase 3 integration testing with Station Systems and delivery of assurance. Further detail is awaited. On completion of Dynamic Test Window No. 2 on 13 May 2018 only 36 tests out of a grand total of 509 tests had been completed, 14 of which do not requiring re-testing. It is therefore vital that there is an immediate improvement in order to complete the full testing scope. Insufficient improvement leading to tests not being carried out might delay Stage 3 Opening. However, an "opening" of some description is still possible without all the tests having been completed, albeit with operational restrictions in place. **4.4.2. Zones 3 & 4 Infrastructure Delivery** Zones 3 & 4 installation has continued in the current SACR period and blockade working was implemented on 25 April 2018, as described in Section 4.4.1 above. As with dynamic testing, construction in "blockades" has allowed for improved planning of installation works in longer and dedicated time periods. While the long-term performance benefits have yet to emerge some improvements are evident, and early successes include the completion of all Central Section OCS installation and assurance documentation (including IRNs) on 14 May 2018. Other delivery workstreams critical to Zones 3 & 4 energisation, such as Permanent Earthed Section (PES) installation by NR at PML and WBP have kept largely to an extremely tight schedule. **Appendix B: Commentary on CRL's SACR 19 Report** Appendix B contains comments on CRL's SACR19 report where we feel they are necessary, but this should not be regarded as a detailed critique. ***CRL Section 2: Chairman and Chief Executive's Overview:*** CRL indicate that 'good physical progress has been made across the programme during this SACR period'. We agree that physical progress has been made but disagree that it has been good. Substantial delays have occurred during the last SACR period (e.g. DT in Zones 1 & 2 being 4 months later than planned) which have resulted in a very compressed programme, increased costs, and a reduced period for Trial Operations. CRL state that 'MOHS18 demonstrates the sequence of activity that will deliver the Elizabeth line on time.' As noted elsewhere in our report, there are significant risks that may result in Stage 3 Opening or some stations not being opened on time. CRL cannot offer any guarantee that the Elizabeth line will be opened on time. ***CRL Section 4: Plans for the Next Six Months:*** CRL gives an overview of its plans for the next six months including critical path analysis. Sponsors should note that CRL lists 9 key challenges, 10 strategic schedule risks, and 16 Stage 3 assumptions. These describe the significant issues CRL need to resolve to achieve Stage 3 Opening on 9 December 2018.	schedule pressures arising from incomplete works.

Report 111

24 May 18

Re Period 1

1 Apr to 28 Apr 2018

Schedule

Progress during Period 1 reinforces our view that there is a high risk that the scheduled start dates for Trial Running and Trial Operations will not be achieved, and that Stage 3 Opening may be delayed.

Appendix B indicates 44 Anchor Milestones (21 in Period 13) which are forecast to be delivered later than the MOHS baseline [redacted] date.

The key issues are now:

- [redacted]
- Installation and testing of ventilation systems has not been accelerated as planned by CRL, and has been further delayed, see Section 3.5;
- Energisation of non-traction power systems remains delayed following further problems at Limmo, see Section 3.5;
- Phase 32 integration testing continues under threat, mainly due to delays to communications software implementation, to installation of permanent ventilation, and to power-on dates, see Section 3.5;

Stage 3

There remain significant challenges on all fronts, and there remains a high risk that one or more stations will not be ready, and that Stage 3 Opening will not be achieved on the planned date. CRL has recently advised that Trial Running and Trial Operations target dates will be delayed, and that a checkpoint system will be implemented to manage progress.

Sixteen Readiness Tasks have been given a "Red" by the ELRSG.

Continued schedule pressures and further delays at Stations, Shafts and Portals. Completion of IRNs still remains significantly behind the rate required to support MOHS. Systemwide schedule pressure is building as delays occur.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Cost and Schedule Dashboard

Cost: IP0, IP1 and IP2 have not changed in Period 1. The AFCDC (P50) has also not changed in Period 1 and remains at £12,723m, exceeding IP2 by £211m.

Schedule & Progress: The MOHS remains highly ambitious. Overall period performance has struggled to match that required to deliver MOHS, and there have been further slippages in milestone dates. CRL has recently advised that Trial Running and Trial Operations target dates will be delayed, and that a checkpoint system will be implemented to manage progress. There remains a high risk that Stage 3 Opening will not be achieved.

Executive Summary

Financial:

The Intervention Points have not changed in Period 1. The AFCDC at P50 remains at £12,723m. The AFCDC at P50 continues to exceed IP2 by £211m, so we expect CRL to confirm a formal breach of IP2 at SACR19. The P95 AFCDC is £12,855m. Period 1 has again seen cost increases to both CRL assessments and Contractors' estimates for Target Costs and Defined Costs.

CRL is preparing a new cost to complete scenario which considers the impact of a completion tail extending into Trial Running and Trial Operations, with some construction work extending post Stage 3 Opening. Jacobs has reviewed the approach taken by CRL and is currently completing a final peer assessment as part of the overall cost scenario review work.

Schedule and Progress:

The Master Operational Handover Schedule (MOHS) remains highly ambitious. There is little or no float available ahead of Zones 3 & 4 dynamic testing, or to allow

KPMG

	[redacted] [redacted] [redacted] [redacted] **Costs** From Period 1, CRL has reduced the level of detail for commercial and contract administration reporting. CRL has discontinued to report the AFCDC to P80 or P95 as a planned consequence of CRL's demobilisation of risk management and the curtailment of all future QRA analysis. CRL is preparing a new cost to complete scenario which considers the impact of a completion tail extending into Trial Running and Trial Operations, with some construction work extending post Stage 3 opening. Jacobs has reviewed the approach taken by CRL and is currently completing a final peer assessment as part of the overall cost scenario review work. The cumulative delivery overspend has increased in Period 1 by £58m to £580m (Period 13, £522m). CRL reports that spend and performance in Period 1 continues to be dominated by [redacted], which together accounted for 82% of Delivery's Cost of Work Done.	sufficient completion of works ahead of Trial Running. .
Report 110 26 Apr 18 *Re* *Period 13* *4 to 31 March 2018*	**Schedule and Progress** We note that CRL still includes its SACR18 QSRA data within its Board report. This indicates a 71% probability that Stage 3 will be opened on time. We re-iterate our comments in previous reports that the data set included a large number of assumptions, and that this calculation is now several months out of date. We have advised CRL to remove the information, as it is no longer relevant. We believe the actual probability of Stage 3 opening on time is substantially lower than 71%. **Schedule and Progress** Although CRL and its contractors are working to the targets set in the MOHS, there remain significant challenges on all fronts. There remains a high risk that one or more stations will not be ready, and that Stage 3 Opening will not be achieved on the planned date. **Completion and Handover of integrated systems** Notwithstanding the installation recovery potential that blockade working offers, a huge backlog of associated Systemwide IRNs and other assurance documentation remains. Completion of documentation is critical to progression to dynamic testing and handover, and a significant increase in performance is necessary now to avoid downstream delay.	**<u>Cost and Schedule Dashboard</u>** **Schedule and Progress** The MOHS remains highly ambitious. Overall period performance has struggled to match that required to deliver MOHS, and there have been notable slippages in key dates for Stations, Shafts and Portals systems, Phase 3 integration testing, completion of NR works to facilitate Zones 3 & 4 energisation and IRN production. There remains a high risk that the start dates for Trial Running, Trial Operations and Stage 3 Opening will not be achieved. **<u>Executive Summary</u>** **Financial** The Intervention Points have not changed in Period 13. The AFCDC

Stations, Shafts and Portals

The cumulative plan and actual percentage completions reported for all stations remain roughly aligned. However, minor differences between the planned and actual percentage completions, at some of the stations, are starting to grow.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Completion and Handover of Integrated Systems

The success of MOHS 2018 is highly reliant upon the performance of the [redacted] main works contractor [redacted] as the principal enabler for completion of the Central Section. CRL has worked closely with [redacted] in the period, seeking to develop a delivery schedule which is aligned with the MOHS6; [redacted] The [redacted] schedule is based upon "blockade working", a change in strategic delivery approach designed to meet the MOHS dates. This approach addresses the problem that [redacted] delivery and dynamic testing have effectively "saturated" the tunnel environment, with little scope for gaining performance improvement in one workstream without having significant impact upon the other; it also overcomes the fundamental inefficiencies of the current philosophy of alternating between dynamic testing and construction (on days and nights, respectively).

With only approximately 15 weeks until the start of Trial Running on 5 August 2018, this is probably the last opportunity for a significant change to be implemented and for sustained performance improvements to be realised.

Rolling Stock

There has been a significant development since our last report, with the uploading of TCMS v7.1 onto the train. This enables it to carry out single train tests in Automatic Mode (without auto-reverse). Despite the slippage of circa 5-6 weeks, BT is holding

at P50 has increased by £256m to £12,723m. The AFCDC at P50 exceeds IP2 by £211m, so we expect CRL to confirm a formal breach of IP2 at SACR19. The P80 AFCDC is now £12,790m and the P95 AFCDC is £12,855m. The new Quantified Cost Risk Assessment at P50 increased to £475m, of which £340m is Unresolved Trends. Although the Target and Defined Cost gaps are showing signs of closing, the convergence is slow and the value for both still shows an increasingly upward trend.

	to its programme of receiving authorisation to operate for Trial Running by 26 June 2018. This date is 6 weeks from the start of Trial Running. We continue to have concerns whether there will be sufficient Rolling Stock to fully operate the tests required in the Trial Running Period. The total number of trains required for Trial Running is not scheduled to be reached until 17 August 2018, two weeks after the start of Trial Running on 5 August 2018. There is also the possibility that the trains could be unreliable, based upon performance on the east. This would hamper Trial Running exercises. **Dynamic Testing** Testing in the Central Section is being complemented by off-site testing at BT's facilities at Derby, and at Melton Test Track.	
Report 109 29 Mar 18 *Re Period 12* *4 Feb to 3 Mar 2018*	**Schedule and Progress** As noted in our Period 11 report, we believe the MOHS is very optimistic and extremely challenging. Progress in Period 12 and part of Period 13 reinforces our opinion that there is a high risk that the start dates for Trial Running, Trial Operations and Stage 3 Opening will not be achieved. In light of the risks and issues set out in this report, we recommend that Sponsors consider preparations in case of a delay, or sub-optimal openings, of Stages 2 and 3. We understand a deep dive into Crossrail readiness was held with TfL Board members on 20 March 2018 where funding and schedule were discussed with TfL and CRL leadership teams. We noted last report that CRL's aspiration to increase productivity sufficiently to meet the new MOHS may not be achieved. The new data for actuals and forecasts at Period 12 has revealed that some productivity targets have not been met. In our last report, we noted that the new MOHS contains a large number of assumptions and therefore risks. Some of these assumptions are already being challenged, such as increased productivity of tunnel ventilation systems installation. The key risks remain as: - [redacted] - [redacted] - Installation and testing of ventilation systems cannot be accelerated; this is proving to be the case; - [redacted] - Some stations may not be ready for scheduled non-traction power-on dates; energisation has been delayed;	**<u>Cost and Schedule Dashboard</u>** **Cost**: IP0, IP1 and IP2 have not changed in Period 12. **<u>Executive Summary</u>** **Stage 3 Opening** With significant amounts of construction still outstanding, CRL struggles to find the optimum balance between dynamic testing and installation, which best serves the Crossrail Programme. Schedule compression due to ongoing delays and adherence to the Stage 3 Opening date has progressively increased demand for access to, and occupancy of, the Tunnels and Stations. CRL continues to work closely with [redacted] to pursue productivity improvements. Recent delays to the power supply energisation sequence and the installation of permanent tunnel ventilation may have consequences for the final integration and testing of Station systems, if not successfully mitigated. [redacted]. There remains a high risk that one or more stations will not be fully operational, and that Stage 3 Opening will not be achieved on the planned date of 9 December 2018. We recommend that CRL commences contingency planning in case Stage 3 cannot be opened as planned.

Stage 3

Although CRL and its contractors are working to the targets set in the new MOHS, there remain significant challenges. There remains a high risk that one or more stations will not be ready, and that Stage 3 Opening will not be achieved on the planned date. We recommend that CRL considers contingency plans in case Stage 3 cannot be opened as planned.

There are now twenty-two Readiness Tasks that have been given a “Red” by the Elizabeth Line Readiness Steering Group (ELRSG). The twenty-two Readiness Tasks can be attributed to three categories:

- COS infrastructure and interfaces not being in a position to support dynamic testing;
- Train software not being in a position to support dynamic testing;
- CRL not receiving data, or it being below the necessary quality, from the Tier 1 contractors. This impacts upon IM training courses for both operations and maintenance personnel, completion of maintenance plans and finalisation of assurance reviews. These activities need to be completed so that the IMs can prove they are able to accept and operate the railway.

Stations, portals and shafts

The cumulative plan and actual percentage completions, reported for all stations, remain aligned in Period 12 having been re-baselined in Period 11. Most of the stations achieved their planned milestones in the Period.

The MOHS 2018 schedule performance curves, for each of the stations, are either coincident with or very close to the [redacted] curves. The actual/forecast curves remain well within the re-baselined [redacted] envelope. This suggests that CRL is currently holding to the challenging re-baselined schedules at each of the station sites.

We await to see how each of the contractors perform against the steep increase in the gradient of the forecast performance curves over the coming months. We remain concerned that this may reflect a possible “optimism bias”, on the part of CRL, in the assumed rates of production that can be achieved by their respective contractors. Historically, [redacted]

Dynamic Testing

Dynamic testing runs between 25 February 2018 and 5 August 2018, over a total period of 23 weeks; this compares with the period of 35 weeks provided for in MOHS 2017. The reduction in dynamic testing time illustrates the schedule compression that has been incorporated into the MOHS in order to maintain the Stage 3 Opening date and highlights the critical reliance upon progress being strictly in line with plan. Achievement also

	depends upon BT's ability to deliver software functionality to match CRL's schedule requirements. **Completion and Handover of Integrated Systems** The success of MOHS 2018 is highly reliant upon the performance of the [redacted] main works contractor [redacted] as the principal enabler for completion of the Central Section. However, [redacted] Systemwide delivery remains at its limits for the efficient utilisation of plant and manpower, and maximisation of access and productive work time provides the most likely means of meeting demanding MOHS timescales and extracting localised schedule float. A particular focus is the amount of time necessary for positioning works trains and establishing safe systems of work ahead of working shifts on site. Attention is being given to the possibility of adopting a blockade-based approach, rather than daily shift patterns, to reduce unproductive time. Intuitively, there appear to be a number of benefits, including the potential for improved clarity of working arrangements on site and the creation of arguably a safer working environment. Ultimately, though, this is an extreme form of "trading" of dynamic testing activities against installation activities within a constrained and "finite" working environment. If justified, adoption needs to be swift in order to reap maximum schedule benefit. **Rolling Stock** The development of the train software continues, but there have been problems with meeting some of the MOHS dates. In addition, we have concerns whether there will be sufficient Rolling Stock to fully operate the Trial Running Period. This is not a concern regarding the manufacturing rate, but with the acceptance process.	
Report 108 1 Mar 18 *Re Period 11* *7 Jan to 3 Feb 2018*	**<u>Schedule and Progress</u>** The new Master Operation Handover Schedule (MOHS 2018) was signed off by CRL and its partners on 16 February 2018, presented to JST and PRep on 19 February 2018, and presented to Sponsor Board on 22 February 2018. Although Stage 3, 4 and 5 Opening dates have been retained, most activities and milestones have been re-baselined. We believe the schedule is very optimistic and extremely challenging, with many problems needing to be resolved. In addition, there is almost no schedule float to allow for any errors or mistakes. Key features of this MOHS are delays to a number of significant key dates, as well as the compression of almost all activities. There is also a significant amount of construction work to be completed during late 2018, when Trial Operations are being executed; see Section 3.7. We are aware that CRL is attempting to mitigate these issues in order to	**<u>Cost and Schedule Dashboard</u>** **Cost**: IP0, IP1 and IP2 have not changed in Period 11. Although the AFCDC (P50) has marginally reduced by £0.1m, the reported AFCDC remains at £12,464 for Period 11. This exceeds IP1 by £552m with only £48m headroom to IP2. **Schedule & Progress:** MOHS 2018 has been formally "launched", providing the baseline and schedule framework for the completion of the Crossrail Programme. It identifies the key critical milestones for energisation, testing, handover and RfL post-handover testing, leading

	achieve Stage 3 Opening in December but we are concerned that this may not be possible in all cases. **Stage 3** CRL has now issued its refreshed MOHS which sets out its plan for delivery of Stage 3 Opening. There remains a significant risk that one or more stations will not be fully operational, and that Stage 3 Opening will not be achieved on the planned date of 9 December 2018. **Stations, Portals and Shafts** The schedule performance curves, for each of the stations, have been re-baselined to reflect CRL's 2018 MOHS refresh. The curves for each station are, as a result of the MOHS 2018 refresh, coincident with plan. We note that this has resulted in a steep increase in the gradient of the forecast performance curves over the coming months. We are concerned that this may reflect a possible "optimism bias", on the part of CRL, in the assumed rates of production that can be achieved by their respective contractors. Historically, CRL's contractors have found it difficult to achieve and sustain such high rates of production. [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] **Completion and Handover of Integrated Systems** Key dates in the dynamic testing phase through to Trial Operations are shown in Figure 3 - 3. These dates have remained largely unchanged during the last period while MOHS 2018 has been finalised. While this might be read as indication of plan stability, it must be stressed that the MOHS as now cast contains virtually no schedule float. Aside from right-first-time	to delivery of Stage 3 Opening on 9 December 2018. While MOHS has the support of all stakeholders, it is ambitious, contains virtually no float and relies upon right-first-time delivery at rates that have not been sustained in the past. There is therefore a high risk that the start dates for Trial Running, Trial Operations and Stage 3 Opening will not be achieved. **<u>Executive Summary</u>** **Financial**: There is a significant risk that IP2 will be breached at SACR19, if not before. **Schedule and Progress:** The principal critical path within MOHS is the Rolling Stock/Signalling dynamic testing sequence. This sequence is extremely tightly scheduled and offers very little scope for failure, without impact upon Trial Running and Trial Operations. The sequence relies upon the provision by BT of Rolling Stock with proven and reliable software functionality, but a high risk remains that train software development will not keep pace with project requirements. **Stage 3 Opening:** There remains a significant risk that one or more stations will not be fully operational, and that Stage 3 Opening will not be achieved on the planned date of 9 December 2018.

	execution, management of access to the Tunnels and Stations for completion and maximisation of productive work time will have the greatest influence upon success. Across Systemwide, limits have been reached for the efficient utilisation of plant and manpower, and (with the notable exception of C660 fibre splicing and testing) increases in resources will have no significant effect upon productivity. **Dynamic Testing** MOHS 2018 contains the latest and best available information from BT on Class 345 test train dynamic testing scope and progress. Collaboration and information sharing between BT and CRL has improved significantly over recent months, and lack of openness appears to have receded as an obstacle to achieving railway integration. Nevertheless, given past performance, serious concerns remain with [redacted] to match CRL's schedule requirements. **Cost** CRL has reported a marginal reduction of £0.1m for Period 11, but the CRL declared AFCDC (P50) has not changed from Period 10 and remains at £12,464m. This exceeds IP1 by £552m with only £48m headroom to IP2. The AFCDC (P80) is also unchanged at £12,507m, which is £595m above IP1 and only £5m under IP2. The AFCDC (P95) exceeds IP2 by £35m. The cumulative delivery overspend has increased in Period 11 by £34m to £505m (Period 10, £471m). CRL reports that spend and performance in Period 11 continues to be dominated by [redacted], together accounting for 81% of Delivery's Cost of Work Done in Period 11. The overall contingency budget of £189m is insufficient to cover the P50 risk exposure of £319m by £130m, a £2m deterioration from Period 10. The centrally controlled Delivery contingency at Period 11 remains at £48m. **CRL 2018/19 Business Plan Review** The Programme Director's office is planned to effectively close down on 31 August 2018, with minimal 10% oversight allocation from a single Transcend Contract Manager until 17 December 2018. Although it is understood that CRL is setting up a close out delivery structure, this is believed to be principally geared to finalising the necessary compliance and operation and maintenance manuals to achieve final handover. We are not comfortable that this date supports the current Programme delivery needs. CRL has rationalised the Delivery resources towards the December 2018 Stage 3 completion date based on the MOHS 2017 milestones and critical paths. This presents a concentration of resources active across many delayed work fronts and interfaces that require extension from the previous business plan to many roles. Consequently, the majority of roles disappear from the end of August 2018 and CRL is setting up a separate follow on CRL Close-out organisation.	

	CRL is planning to shut down all its Finance resources by the end of May 2018, save for the Finance Director and Senior PA to the Finance Director, who remain until mid to end August 2018. Confirmation will need to be sought from TfL that it is acceptable to and prepared for the transfer of the residual finance activities after 31 May 2018. Most of Programme Controls are due to depart by end May 2018 and the rest by August 2018. However, programme resources have been extended from the previous business plan and complemented with additional planners up to 17 May 2018. The residual planning resource thereafter reduces to just a Sector Planner until 17 August 2018 and Controls Transition Manager until 17 December 2018. The risk analysis team effectively shuts down from the end of August 2018 with the Risk Manager departing at the end of May 2018. CRL has already advised that P13/SACR19 will be last time it will carry out a QCRA and will be streamlining its cost reporting as a consequence. The dates within the CRL business plan assumptions for Dynamic Testing and Handover for Trial Operations have already slipped by a month for each and CRL has publically announced critical pressures on both schedule and cost that threaten completion dates and exceed budgets. We therefore regard it premature for CRL to plan to reduce such programme management functions at such a critical and important phase of the programme which is already facing delivery risks. The restructure of commercial resources appears to be driving towards 17 August 2018 conclusion. The commercial resources have been extended from the previous business plan and bolstered with additional quantity surveyors to mid-June 2018. A residual commercial function remains linearly decreasing until December 2018 with a single oversight resource available to 17 March 2019.	

Contact us
KPMG Major Projects Advisory
15 Canada Square
Canary Wharf
London

www.kpmg.com\uk