



Crossrail Project Representative

Crossrail Joint Sponsor Team

Sponsor Summary

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Note: This report relies on the information set out in CRL's Period 11 reports augmented by more current information received by PRep during the course of our routine discussions with CRL since the Period close on 2 February 2020. Note that information emerging after the close of Period 11 is subject to formal confirmation by CRL in its Period 11 reports. This report is supplemented by our weekly reports to JST and regular meetings with JST staff.

Document history and status

Revision	Date	Description	By	Review	Approved
1	26 February 2020	PSR 134 Period 11 FY 2019-20 Sponsor Summary v1.2 ~ Draft	[REDACTED]		
2	2 March 2020	PSR 134 Period 11 FY 2019-20 Sponsor Summary v1.4 ~ Final	[REDACTED]	[REDACTED]	[REDACTED]

Sponsor Summary

Health & Safety Performance

There have been no significant safety incidents in the Period. This is the first time since Period 10 2017/18. The Contract HSPI score has increased significantly to 2.76, the highest score since the current version of the HSPI was implemented and it is well above the target score of 2.20. It appears that highlighting contractor performance in a comparison table is driving improvement. CRL may want to consider sharing best practice from the top-performing contractor, in order to create a 'learning culture' across the Programme.

There were no RIDDOR incidents and zero HPNMs reported in Period 11. The RIDDOR AFR has decreased to 0.07 (the best performance since Period 12 2018/19) and the achievement of zero HPNMs was last reported in Period 6 2018/19. The last time AFR performance rate has reduced to 0.14, the lowest rate since Period 4 2019/20.

H&S KPI	Period 8	Period 9	Period 10	Period 11
HSPI	2.59	2.63	2.59	2.76
RIDDOR AFR	0.09	0.09	0.09	0.07
HPNM	0.32	0.34	0.37	0.32
LTI	0.17	0.17	0.17	0.14

Figure 1 - 1 ~ Health and Safety Performance COS

Programme Delivery

Transition to ROGS

CRL has implemented a number of interventions to safeguard the Trial Running [REDACTED]. We have provided commentary on three of the key interventions below.

Integrated Delivery Teams (IDT)

CRL has implemented Integrated Delivery Teams¹ (IDTs), in order to increase the autonomy of the site teams and speed up decision-making. We support the principle of IDTs and believe the teams have the potential to make a significant impact upon the completion of programme delivery. However, there are still vacancies in both Handover and the IMs and the associated delegated authorities are still not clear, with many decisions still required to be raised up into the central teams. Both issues have the potential to impact the effectiveness of the IDTs and Sponsors may want to seek an implementation plan from CRL, to assure themselves that these issues are being addressed.

Element Outstanding Works List (EOWL) Production

As reported last period, CRL is producing a consolidated list of works to complete for each Element of the project. This will allow [REDACTED] for allocation to the Alternative Delivery Model (ADM). CRL has provided the IDTs with instructions as to how to produce the EOWL lists, the principles that should be applied to determine the phasing of the work and its allocation to the ADM. Workshops have now been completed to clarify roles, responsibilities and behaviours.

¹ Each IDT comprises a CRL PM, a CRL Technical Lead, a CRL T&C Lead, a CRL Handover Lead, a Tier 1 PD, a Tier 1 Design Lead (designer) and an IM representative.

The collated list of EOWs for all Elements of Crossrail still contains inconsistencies and the phasing of works is not aligned with the principles declared by CRL management. The reasons for this are not yet clear. For example:

- Woolwich Station appears to be planning to have only 4 EOWs post-revenue service.
- While appearing to be at a similar phase of completion, Farringdon and Liverpool Street Stations have widely differing numbers of EOWs to go (i.e. 584 and 911, respectively). Farringdon Station is planning to have completed all but 20 EOWs by revenue service, while Liverpool Street is planning for 562 (which seems in line with programmes which are similar in nature).

Until the scope is defined, a robust schedule cannot be produced, and the Tier 1 contractors will continue with works which are not essential for Trial Running, or for bringing the railway into passenger service early. Based upon the activities needed to re-baseline the schedule, we do not believe scope definition will be completed until the beginning of April 2020, and so it will not be possible to underpin Trial Running [REDACTED] until then.

Alternative Delivery Model (ADM)

The ADM was developed to [REDACTED]
[REDACTED]

- [REDACTED]
[REDACTED]
- [REDACTED]
[REDACTED]

While we support the benefits of the ADM, there appears to be confusion as to the principles, ownership and timescales associated with its implementation. Clarity is required from CRL, to provide teams with an understanding as to [REDACTED], to allow [REDACTED] focus on the critical works to open the railway. We have not yet seen a detailed plan as to when or how the ADM will be mobilised.

High Level Schedule Summary

CRL has confirmed that the DCS will be aligned with the Period 10 forecast, in order to provide a new baseline going forwards. However, a QSRA has yet to be carried out, the output from which is unlikely to be available until the end of March 2020. In addition, the development of the ADM, the End-to-End Plan and EOWL initiatives, has not been concluded, and no outputs have yet been incorporated into DCS. The schedule is therefore unable to demonstrate how Trial Running [REDACTED] will be achieved.

A total of 42 out of 120 Cardinal Milestones have now been completed to date (as of Period 11), against an approved plan of 59. Of the 78 remaining milestones, 73 are now forecast beyond [REDACTED]; 4 milestones were forecast to be completed in Period 11, but only 1 milestone was achieved. 5 milestones are now forecast to be within the approved date. The number of Cardinal Milestones with more than 50 days negative float has increased in the period to 52, from 47 last period.

CRL 3 Lines of Defence

We believe it will not be possible to fully assure the DCS until August 2020, and that there is little benefit in seeking to do so. By August, CRL is planning on completing the majority of the works and the disruption to the delivery teams required to assist the assurance process may outweigh the benefits of an assured schedule. The impact of this approach is the schedule (and cost) will not be as stable or controlled as would normally be expected of a programme of this size, at this stage of the project. Our view is reinforced by the fact that the EOWs are still being developed and will not be completed until April 2020.

While we do not consider there is value in reviewing the full schedule, CRL may want to consider focussing their assurance work on the Critical Path, in order to protect [REDACTED] Trial Running [REDACTED]

1st Line of Defence

As reported previously, it is important that CRL teams all work to common standards, to ensure consistency and robustness of the product. The following numbers of procedures remain overdue and therefore the potential remains for teams to continue to work in an inconsistent manner:

Function	Outstanding Procedures (Period 10)	Outstanding Procedures (Period 11)
Chief of Staff	1	1
Project Controls	1	0
Operations	4	2
Programme Delivery	3	1
Technical	7	6

Figure 1 - 2 ~ Outstanding CRL procedures

2nd Line of Defence

Targeted Assurance Reviews

CRL has carried out two TARs. The first reviewed the provision of O&M Manuals with an examination of submissions and the review and acceptance process with Crossrail and RfL. This TAR was carried out in Period 10 looking at Contracts C530 and C610. CRL has issued the corresponding draft reports with the final report due to be issued early in Period 12.

The second TAR is looking at 'certification discrepancies' with an independent check on technical correctness. In early Period 12 CRL will consider the appropriate next steps to take the TAR forwards.

Period Assurance Reviews

The CRL Assurance Team has identified the following key observation:

Schedule Adherence

- The CRL Delivery Control Schedule (DCS) had been subject of a further refresh through a series of DCS workshops across the 5 key streams of project activity.
- The CRL Assurance Team continues to assert that, based on current performance levels, ROGS is not achievable until [REDACTED], without key interventions. This aligns with our view in our Period 8 report.

3rd Line of Defence

The TfL LoD3 Period 11 Update reported that the Workforce Planning Audit Report has been issued and the Cost and Finance Report is expected to be issued shortly. Audits for Governance and Organisational Effectiveness and Fraud are in progress. The audits for Safety Assurance Arrangements and Operational Readiness for Trial Operations are presently deferred.

Cost, Commercial & Risk

The Period 11 P50 AFDCDC remains at £15,324m. This is £361m above Sponsors Funding of £14,963m. This AFDCDC is based on DCS 10.1, with project AFCs forecast to the [REDACTED] Trial Running start [REDACTED] and a Period 9 QSRA Schedule Risk allowance of a [REDACTED] delay to the start of Trial Running.

The AFDCDC still remains dependent on the achievement of key schedule dates, which continue not to be fully underpinned by the current delivery and assurance document production rates.

The build-up of the CRL P50 AFDCDC, together with the current forecast of CTG and Risk of [REDACTED], of which [REDACTED] is allocated to Risk, provides us with assurance there is adequate provision to cover costs to a [REDACTED] delay to the start of Trial Running; however, this is based on the Period 9 QSRA. CRL is carrying out an update to its QSRA in Period 12, which may confirm or identify emerging risk or scope changes that could increase or decrease forecast.

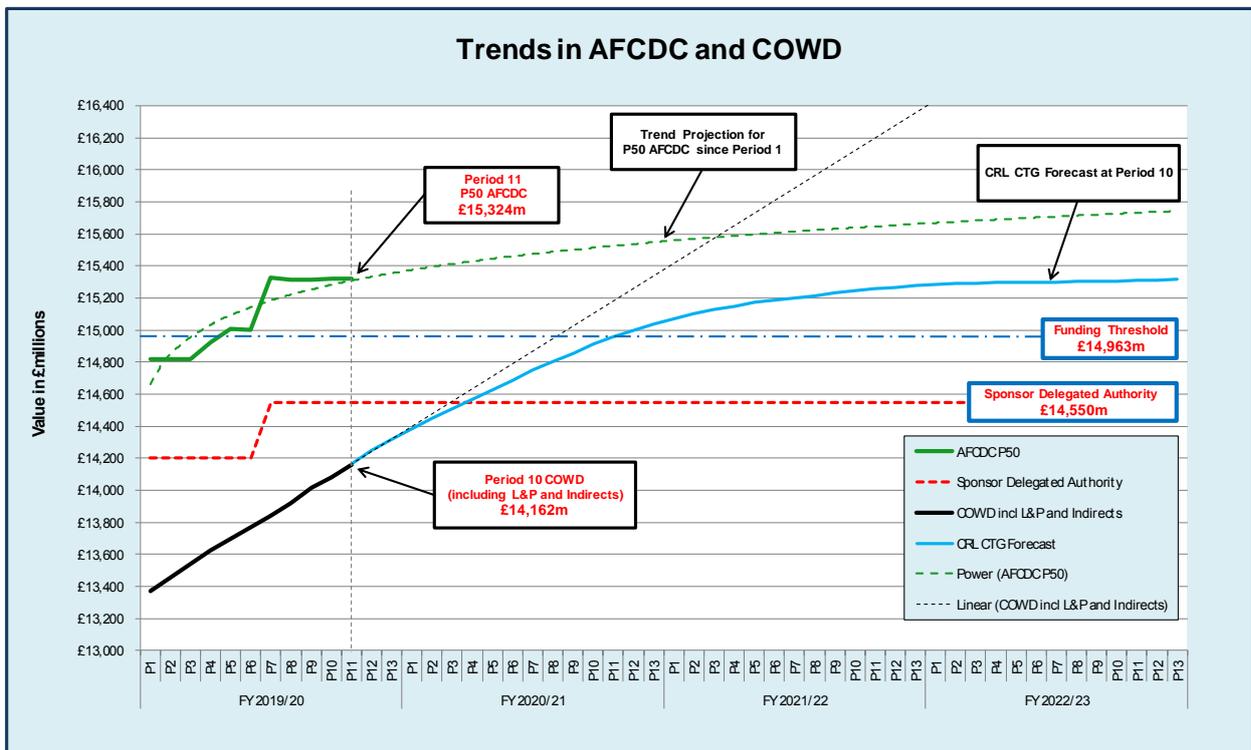


Figure 1 – 3 ~ AFDCDC Headroom to Sponsor Delegated Authority

We refer to CTG inclusive of risk, mainly due to risk being predominantly CTG in principle. Over the past 6 periods (since Period 5), COWD has increased by █████ compared to a reduction in CTG plus Risk of █████. It appears to us that the current rate of COWD spend over the past 6 periods is more than the corresponding rate of reduction for CTG plus Risk. Although Direct CTG is reducing, Risk is not seeing a corresponding equivalent reduction. Consequently, this results in an increase of Risk versus CTG percentages in Period 11 from █████ to █████; as reported in the Appendices to the Period 11 CRL Board Report.

Stage 2B

The approval by the ORR of the ETCS software has been delayed by three weeks since our Period 10 report. RfL is now forecasting the first train in service to Heathrow will be achieved by late March 2020. This reduces the time between the first train in service and having the full complement available for the May 2020 timetable (circa 7 weeks). We believe this strengthens the argument for retaining Class 360s as a contingency for a period of time after the start of the May 2020 timetable. Discussions on this are already underway between RfL and the Rolling Stock Leasing Company (ROSCO).

In the table below we show Period 1 dates to highlight the slippage to the programme over the last 11 periods. Red text denotes changes from Period 10.

The expected completion of Y1.3 software authorisation has slipped by 3 weeks in the last period², making a total of 9 weeks in the last 2 periods. As described in our last report, and discussed at Sponsor Board³, the primary cause of this delay has been the additional time taken by BT to produce the Technical File to support its application to the ORR. We have been concerned at BT's apparent difficulties in the completion of its assurance, but note that the Technical File was finally submitted on 27 February 2020. RfL is using a planning assumption that the ORR will take circa 4 weeks to review the submission, indicating possible authorisation of Y1.3 by 27 March 2020.

Configuration.	Expected completion		Risk could extend to:		Comment
	Period 1	Period 11	Period 1	Period 11	
Y 1.3 ⁴	16 Sep 19	13 Mar 20	11 Nov 19	Information no longer reported by BT	This is the configuration that will be authorised by the ORR for APIS.
Z 1.x	26 Sep 19	23 Mar 20	19 Dec 19		Passenger Service approved software.

Figure 1 - 4 ~ BT Software Configuration

The incremental FLU service introduction plan, as described in in our last report, continues to be progressed. However, the probability of the risks to the plan being realised has increased due to the delay to BT's production of the Technical File.

The delay to the timely delivery of the APIS has meant that RfL will be proceeding with a GWML-only version of the software. This is achieved by not making the ETCS component that is subject to approval by the ORR 'active'. This would allow services to begin on the GWML, providing useful mileage for reliability growth purposes. The first services, operating from Paddington to Hayes & Harlington, are expected to start in early March 2020.

² Period 10 forecast 21 February 2020.

³ Sponsor Board held on 6 February 2020.

⁴ Y1.3 and Z1.x dates form Stage 2B Vis-Board review, updated 11 February 2020.

Stage 3

There has been continued slow progress on the SSPs during the period. Four⁵ of the nine Stations and all of the Portals and Shafts, with the exception of Fisher Street, have forecast further delays to their SC3 and Handover dates in Period 11. It is not clear whether these delays are linked to the current DCS refresh, where mitigations may yet be applied to recover time, or as a result of continued slow progress with the documentation handover and certification of the assets; or possibly a combination of both. We note, however, that the Period 11 DCS baseline reportedly reflects [REDACTED] Trial Running and that schedule performance measurement has been reset by CRL, to the Period 10 forecast [REDACTED]

The continued trend of delay must be overcome if Trial Running is to be achieved [REDACTED]; it will not be achieved on CRL's current performance. Pressures are starting to build on the SSPs that may require a change in the approach to reaching Handover to the IMs, as the current strategy and processes employed are consistently taking CRL and its contractors longer than planned to deliver. The implementation of the IDTs, with clear delegated authority to sign-off on behalf of CEG and the IMs, and the application of the ADM will assist.

Approvals, Assurance and Agreements

The risks to the assurance programme are primarily concerned with the delivery of the ESJs, and the current submission rate is below the recently re-baselined target. This drift needs to be curtailed if [REDACTED] Trial Running [REDACTED] is to be met. CRL Delivery, Tier 1 contractors, CRL Assurance and RfL will need to collaborate further, to ensure that the assurance process, which is already on the Critical Path, does not delay Trial Running.

⁵ TCR, LIS, CWS and WOO stations have reported further delays to their forecast SC3 dates in Period 11.

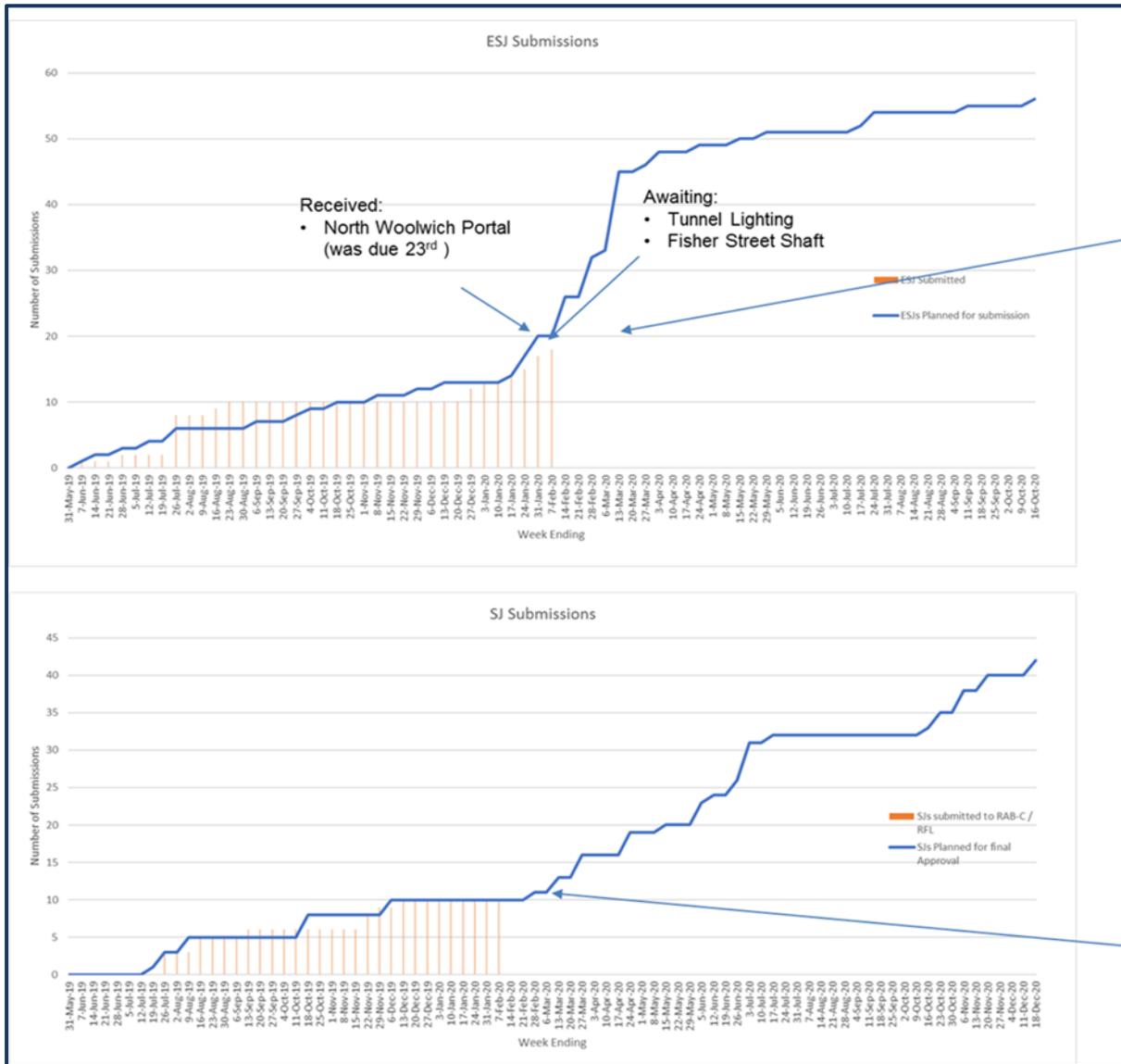


Figure 1 - 5 ~ ESJ Submissions for Trial Running (Top) & Overall SJ Submissions (Bottom)

Production of the key Handover deliverables to the IMs, including O&M Manuals, Asset Data and HMDL, continues to make slow progress. Based upon past performance, and that the current approach is likely to remain unchanged, we believe there is a high risk that the necessary documentation will not be completed in time for the Trial Running [REDACTED].

The CRL Handover team has tried various initiatives to improve the timescales for acceptance, but the IMs, Tier 1 contractors and CRL Delivery appear resigned to lengthy review cycles. If improvements are not achieved (and we are not aware of any specific plans) then CRL and the IMs may need to consider alternative arrangements for document shortfalls.

Asset data is also proving problematic for the Tier 1 contractors to deliver and is affecting the T-Minus process for various Elements; data is required to be submitted at the T-11 stage. As with O&M Manuals, alternative arrangements such as support agreements with suppliers may need to be considered if the Trial Running [REDACTED] is to be achieved.

The overall situation, as evidenced by the CARE deliverables, has not materially changed since our Period 10 report. CRL has forecast that acceptance of SSP products by the IMs is expected to gain momentum in late February 2020, and Routeway in late April 2020.

Rail Systems & Dynamic Testing

Delivery proceeds on the Central Section in line with the DCS, as updated by the schedule output of the Mega Plan 2 initiative. The weekly Routeway/T&C Vis-Board review has been re-structured and is now effectively a Level 1.5 Vis-Board review of delivery completion; it is planned that strategic issues from SSP reviews will also be considered at this meeting, where there is a potential for impact upon ROGS or Trial Running. The new review emphasises the strategic significance of the work being carried out across the Central Section and will provide better visibility of issues and facilitate quicker strategic decision-making. However, the forum must become established very quickly in order for it to have maximum benefit, and it is vital that there is representation from all parties. Notable recent absentees have included RfL and BT.

Test periods MDT 42, 43 44 and 45 have been implemented within Period 11, with delivery generally in line with previous performance, both in terms of tests performed and tests passed. However, despite recent improved focus by CRL upon test planning and readiness, delivery performance has remained lower than planned, and has continued to be susceptible to foreseeable and avoidable events during site testing. In order to further address this issue, CRL has implemented a regime of detailed measurement and analysis of end-to-end test delivery, in order to understand failures and identify improvements. The review system is known as TICAR (Testing Impact Concern Action Report) and it was first used by CRL to analyse MDT 46 performance.

The latest status of testing against the requirements for entry into Trial Running (as of 17 February 2020) is: 129 out of 141 tests performed, of which 97 have fully passed, and 12 are mitigated by Operational Restrictions. Of the 32 still to be carried out or otherwise resolved, 24 are planned to take place before 9 May 2020; the remaining 8 are, as yet, unscheduled but are under review and may not require re-test.

A significant incident during MDT 47, in which Yellow Plant under test collided with the open door of a trackside equipment cabinet, reinforces our concern at the impacts of poor Dynamic Testing delivery performance upon the achievement of Trial Running. We await the outcome of the formal CRL investigation.

Reliability Growth

The first multi-train reliability exercise was planned to take place in Period 11, but was cancelled due to unforeseen circumstances⁶, delaying the production of meaningful reliability data. The following issues remain a concern:

- The train control software strategy is key, as upgrades and release of fixes drive reliability growth. The tension in the strategy arises between the co-ordination of the BT/Siemens deliverables, the assurance process and the DCS. The introduction of software configuration TR2 (formerly P_D+12) is a case in point.
- The testing of the NR/Central Section transitions continues to be a key consideration, and CRL is negotiating with NR for additional access. Evidence of transitions operating reliably at line speed would be of particular interest to NR when it is considering the Stage 4 timetable submission.

⁶ An unexploded bomb was discovered in the Tottenham Court Road area. The exercise will now take place in late February 2020.

- Testing on the Central Section has identified a problem with the Rolling Stock/PSD interface. A fix is underway, but it highlights the necessity of integrated reliability testing at the earliest opportunity so as to understand which systems interfaces have issues.
- C610 will submit a formal proposal to the ORR to increase the number of test trains from 4 to a maximum of 8, at the end of February 2020. Assuming the ORR takes 3 months to review, there will be little opportunity for 'enhanced' reliability running in May 2020.
- The reliability workstream has been optimised within Mega Plan 2 alongside Dynamic Testing and construction, albeit with a lower priority. If the period of reliability running is not sufficient, it could delay the completion of Trial Running.

Stage 4 Summary

[REDACTED]

The risks to Stage 4 Opening are primarily a delay in Stage 3 Opening, and/or poor reliability growth (including across the transitions) in advance of Stage 4.

Stage 5B Opening

The key consideration for Stage 5B will be the timetable bidding process that will formally begin in [REDACTED]. We have previously described the importance of demonstrating that the railway is reliable during this process, especially across the transitions between the Central Section and NR. This is an important consideration for RfL's Reliability Board.

Key Areas of Concern in the Period

CRL continues to drive Crossrail completion, but the beneficial impacts over recent periods of initiatives to address: limiting AF CDC increase through risk mitigation; to align assurance document production with the DCS; and the underpinning of the DCS itself, have not yet been fully realised. Similarly, our concerns remain with the specific issues we raised in Period 10: the development of a robust scope-to-complete; slippage of BT software assurance dates; and the simplification of milestone targets to support the Trial Running start [REDACTED].

Notwithstanding the fact that further improvement initiatives are in progress, our Period 11 report records continued slippage in many parts of the Crossrail Programme. Recent schedule-critical milestones for the delivery of Routeway safety assurance documentation have been missed, and productivity projections across almost all assurance and handover deliverables are being based upon sustained performance at higher levels than previously achieved.

We now have serious doubts that Trial Running as currently conceived, will be achieved [REDACTED] without significant intervention, and we consider that the CRL Leadership Team should be challenged by Sponsors to explain the actions it is taking to address our previous concerns, and the wider issue of schedule recovery.