

Project Representative Report

**Item: Project Status Report 154 and Crossrail Response Period
5 FY2021-22**

Date: Period 5 (24 July 2021 – 20 August 2021)

1 Overview

- 1.1 The P-Rep is in place to provide the Sponsors, TfL and the Department for Transport, with oversight of project delivery, advise and raise points of challenge to the Sponsors and scrutinise progress.
- 1.2 The P-Rep observations are shared with Crossrail and are discussed in detail by Crossrail, P-Rep and the Commissioner. Crossrail then produces a written response to the P-Rep report.
- 1.3 In line with the commitments made by the Mayor for greater transparency of the Crossrail project, please find below the latest P-Rep Sponsor Summary and Crossrail's Management Response.
- 1.4 It has been necessary to make some redactions to the reports prior to publication to protect commercially sensitive material. We have sought to keep such redactions to a minimum

2 Contents

1	Crossrail response on the Project Representative Sponsor Summary Report Period 5 FY2021-22	2
2	Project Status Report 154 Period 5 FY2021-22	26



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██████████
Project Representative
Jacobs

27 September 2021

Dear ██████████,

Re: Crossrail PRep Project Status Report 154 – Period 5

I am writing in response to the PRep Sponsor Summary cover letter for Period 5.

As you note, the recent Cost to Go workshops have been very beneficial in our objective to minimise cost exposure beyond the £825m current allocated funding. Of course, delivering on or as close as possible to our Deterministic schedule remains our key focus to alleviating cost pressures across the Programme.

Cost to Go workshops have additionally now agreed the earliest appropriate demobilisation of Tier 1 contractors that have completed their bulk site works; the first demobilisation has taken place at Farringdon station. Further Tier 1 demobilisation is planned at Tottenham Court Road and Woolwich stations by the end of September 2021, and at Liverpool Street and Paddington stations by the end of ██████████. We remain committed to demobilising seven Tier 1 contractors by the end of December 2021.

CRL notes the Project Representative's concern regarding the need to demonstrate that essential scope for Stage 3 Passenger Service is accounted for and will be delivered within the current approved schedule. The management team is fully focused, and all scope reviews have centred on what is necessary to deliver a safe, reliable and maintainable railway. We have also assessed the scope items that are more efficiently done post Revenue Service under the auspices of the future operators, LU and RFL. This is a very positive step and I am confident we now have a clear alignment of scope to complete the Programme.

The Programme is at a critical and challenging stage. We are driving to the earliest Deterministic dates of our Programme, this is the best way to minimise both cost exposure and also minimise the use of time risk allowance that currently underpins our assessment that the railway will open in the first half of 2022.

The Trial Running phase is all about the completion of the final system integration and the shakedown of system reliability. Clearly this is a challenge whilst we still have defects and bugs in the system that are expected to be fixed by the ELR100 software drop in October 2021. To extract the maximum benefit from the time available for Trial Running before the deployment of ELR100, we have implemented a progressive build-up of service frequency to

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12tph. As a result of this progressive build up we are now regularly achieving sustained periods of 12 tph running.

ELR100 software pre-commissioning has been completed successfully, building upon previous testing ahead of full site deployment during the imminent October 2021 Blockade. Successful ELR100 commissioning will underpin our entry into Trial Operations; the earliest this can occur is ■ November 2021. The countdown to Trial Operations has commenced and weekly readiness reviews with representation from all our key stakeholders is progressing well, and alignment has been reached on readiness to commence Trial Operations.

Crossrail Engineering Safety Assurance Case requirements for exiting from Trial Running and relevant evidence for operating Passenger Service trains is planned to be submitted at the end of the October 2021 Blockade, and to demonstrate that infrastructure is sufficiently robust for entry into Trial Operations by having the Assurance Plan in place to resume operations post October Blockade with evidence to support assurance submission.

I hope this response provides a useful summary of the measures in place to address the specific issues you have highlighted. A more comprehensive response focussed on the content of the Sponsor Summary report will be issued as an Appendix to this letter.

Kind regards,



Mark Wild
CEO, Crossrail

Appendix – CRL Response to Period 5 PRep Report

Programme Response Category	PRep Period 5 Sponsor Summary Content	CRL Period 5 Response
<p>Observations in the Period</p>	<p>In the period, CRL completed the transfer of Whitechapel Station to the IM. With 7 stations now transferred, this represents a significant achievement within tight timescales. A Programme first was also achieved with the Farringdon Station Tier 1 contractor demobilised at the end of August 2021. Further Tier 1 demobilisation is forecast at Tottenham Court Road and Woolwich Stations by the end of September 2021, and at Liverpool Street and Paddington Stations by the end of [REDACTED].</p> <p>Further ELR100 software pre-commissioning was completed successfully, building upon previous testing, ahead of full site deployment in the October 2021 Blockade. RfLI now appears to have control of the maintenance of its assets and their compliance. 12 TPH trials have continued despite ongoing faults, with managed progressive build-up of the daily timetable allowing stable service patterns to be established.</p> <p>An updated Trial Running Plan (version J7), agreed by CRL and all its stakeholders, now reflects the known constraints and loss of testing from the previous plan. The countdown to Trial Operations has started, with weekly meetings to</p>	<p>The Project Representative is accurate in its assessment of the Stations' handover status with Whitechapel being the latest in the sequence to be handed over on 23 August 2021. The Project Representative also presents a correct view of Tier 1 contractor demobilisation which is key in alleviating the accrument of additional costs.</p> <p>The successful pre-commissioning of ELR100 signalling software is a positive step towards the commencement of Trial Operations with the imminent deployment of the final signalling software drop. The Project Representative is right to point out the challenges that have been encountered during 12TPH Trial Running services, however, the soft ramp up plan in place has enabled a gradual increase to 12TPH start of service in an effort to build greater stability and additional net mileage whilst the ELR100 signalling software deployment planned during the October 2021 Blockade is expected to resolve reliability issues.</p> <p>CRL agrees with the Project Representative's comments regarding the updated J7 Trial Running Plan. As mentioned last Period, the countdown to Trial Operations has commenced and weekly meetings are on-going.</p>

Appendix – CRL Response to Period 5 PRep Report

	monitor activities, criteria and readiness status for entry.	
Headline Concerns	<p>Further pre-commissioning testing and Yellow Plant testing has been undertaken, which is indicating some positive signs ahead of full site deployment of ELR100 in the October 2021 Blockade. However, 77 Operational Restrictions are currently in place for the trial running at 12 TPH. This is considered by RfLI and MTREL to be at the limit of what can be safely managed, and acceptance of any increase proposed by CRL (e.g. arising from the implementation of ELR100) will prove difficult. An initial 5 day trial for Auto-Reverse in early September 2021 will support the production of the final assurance case for this functionality. While this is required to support Stage 5 operations, there is currently no viable alternative for this functionality. A stable 12 TPH service is also required to enable the start of 24 TPH trials, which is now targeted for [REDACTED]; this has been postponed from August 2021, putting at risk the deterministic date for the start of Trial Operations of [REDACTED] November 2021. Generally, there are a number of indicators that point to good progress in the period, but reliability growth remains below expected levels, and signalling software and train performance remain a risk; current indicators (such as MTIN) remain well below target levels, despite train software updates.</p>	<p>As mentioned above, ELR100 signalling software is expected to reduce the number of current operational restrictions. As CRL progress through the software upgrade programme, the operational restrictions remaining are expected to reduce in severity and workload. This is a joint and highly collaborative initiative with RFL to ensure that any issues are raised in a timely manner and resolutions are agreed. Auto reverse: Soak testing took place on 26 August 2021 and 9 September 2021 as planned. Positive confirmation of functions was achieved; however, certain issues are still being resolved. Assurance has been approved by ITAP and MTR SVP for the use of Auto Reverse in timetabled Trial Running; five days have been confirmed with the first completed on 21 September 2021. On this day, the first full functionality AR train moves were completed successfully. Regarding 24TPH trial services – CRL would like the Project Representative to note that 24TPH trial (two-and-a-half-minute close headway test running) is not a prerequisite for entry into Trial Operations. It is though, a highly desirable “stress test” to inform the ELR200 software drop in 2022 to support the future combined Stage 4 and Stage 5B. These will be much more productive and stable after the commissioning of ELR100 in October 2021.</p>

Appendix – CRL Response to Period 5 PRep Report

	<p>An update to the Trial Running Staging Plan (version J7) has been implemented. However, CRL needs to satisfy itself that approximately 24 test cases for System Testing with a Train (STT) have all been accounted for and possession times considered. DCS v1.2 now forms the basis for performance monitoring for Period 5 to completion of the Programme. The new baseline has not yet been assured by CRL's LOD2. The detailed underpinning plan for Bond Street Station beyond SC2 configuration stage to SC3R is currently not included in DCS v1.2. It is expected that CRL will report the cost-to-go aligned with DCS v1.2, in Period 6.</p>	<p>A weekly Performance review is on-going for System Testing with a Train (STT) incorporating the revised J7 Staging Access Plan. The completion of STT is re-forecast for 12 November 2021 due to the need to acquire additional STT to prove a reliability build that is critical for Passenger Service.</p> <p>DCS 1.2 artefacts assurance engagement that describe the LoD2 Assurance engagement plan is now in place and relevant assurance documents have been submitted to LoD2 for review as planned.</p> <p>A baseline plan for Bond Street station is included in DCS 1.2, however, the team have been requested to develop several 'earliest opening' options. The revised detail underpinning a plan for Bond Street station beyond SC2 configuration to SC3ROGS has not been included in the DCS 1.2 whilst the earliest opening options are being developed and considered. The selected option will be reported in Period 6 and change controlled into the DCS 1.2.</p> <p>CRL reported at the September ELDG that the updated AFCDC resulting from the Cost-to-Go exercise has been aligned with DCS1.2 as at Period 5.</p>
	<p>The current Dependency closure rate indicates that there will be approximately 60 open Dependencies at the time of Trial Operations, with the likelihood that further Safety Justification (SJ) Dependencies will be added for Canary</p>	<p>CRL does not agree with the Project Representative's entire assessment regarding Assurance delivery. Recent analysis indicates a larger number of Dependencies than 60 will not be fully closed at the entry to Trial Operations.</p>

Appendix – CRL Response to Period 5 PRep Report

	<p>Wharf and Bond Street Stations. Mitigations will be required to improve on the current date for Tunnel Ventilation System (TVS) SJ sign-off, which is now forecast only 2 days before the deterministic date for Trial Operations. CRL and RfLI are changing to adopt a two-stage approach to safety assurance delivery, the CESAC and subsequent TORAC, to address the risk of non-approval associated with open Dependencies at the time of entry to Trial Operations.</p> <p>RfLI's sign-off of its own SJ documentation has slowed during August 2021, and it is not clear whether this is due to holidays or to more fundamental resource availability issues; this performance must improve. CRL is also indicating a 'flat-lining' in the closure of the EOWs for Routeway, which might be due to a poor data processing rate through CRL's management systems. A step-change in productivity will be required if delays in managing TVS and ELR100 test outputs from the October 2021 Blockade are not to slow the overall assurance process. Completion of assurance delivery is a threat to the start of Trial Operations on ■ November 2021, with more open Dependencies than anticipated and the continuing need for a just-in-time approach.</p> <p>Canary Wharf and Bond Street Stations are subject to management focus to achieve their respective SC3R and SC2 configurations against planned dates. With Canary Wharf Station now on the critical path, acceptance of StEJ proposals to support assurance, the</p>	<p>Over 90 Dependencies are held by unfinished works on Bond Street station and on non-vital communication works which will continue throughout 2022. Additionally, CRL has identified 100 Dependencies which could be mitigated for entry into Trial Operations if required with final assurance evidence arriving subsequent to the October 2021 Blockade. CRL is confident that all Dependencies will either be closed or mitigated for Trial Operations over the coming eight weeks.</p> <p>CRL notes and agree with the Project Representative's comments regarding the slow movement on assurance productivity.</p> <p>CRL is committed to and agrees with the Project Representative regarding the focus required by management at Canary Wharf and Bond Street stations in order to achieve SC3ROGS and SC2 milestones respectively. Priorities have been</p>
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Appendix – CRL Response to Period 5 PRep Report

	<p>completion of asset data delivery and timely decision-making for implementation of 'Maintenance on Behalf of Others' (MoBo), must be prioritised. While CRL remains confident of achieving the Bond Street SC2 configuration in [REDACTED], the detailed plans for delivery and completion beyond this date are subject to finalisation and management endorsement.</p> <p>CRL is implementing plans for demobilising Tier 1 contractors for 7 stations before the end of 2021. Some physical scope remains to be completed ahead of Trial Operations and Passenger Service [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] There is a risk that the alternative delivery mechanism will not be in place quickly enough to complete outstanding works necessary for the start of Passenger Service. The final allocation of scope for completion before and after the start of Passenger Service needs to be completed, to finalise the costing and AFCDC.</p> <p>The Programme faces challenging changes in the next few periods, as CRL implements a transition to a new organisation structure with a significantly reduced headcount for the start of</p>	<p>aligned at Canary Wharf station and similar alignment is imminent at Bond Street station.</p> <p>The Project Representative is accurate to state that plans are underway to demobilise several Tier 1 contractors by the end of December 2021. CRL notes concerns the Project Representative raises regarding the de-scoping strategy, however, RWT mechanism is in place as is the process of works allocation, which is functioning as planned, with works being delivered by various TfL units.</p> <p>CRL has developed a Communications and Engagement Plan to ensure that staff across the Project are aware and engaged with transition into the new organisation structure. This will be</p>
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Appendix – CRL Response to Period 5 PRep Report

	<p>2022. Maintaining high staff morale while driving hard for Trial Operations may prove difficult and will require tactful employee communication and engagement. In turn, RfLI must ensure that it is has an organisation structure and resources in place in sufficient time to take on the major transfer of roles and responsibilities, without impact upon progress towards, and transition into, Passenger Service.</p> <p>While CRL continues to make steady progress, challenges remain with completing known scope within current target dates and there is a risk that new scope will emerge from systems testing which has yet to be carried out. Our view continues to be that it will not be possible for CRL to deliver full Trial Operations on the deterministic date of ■ November 2021, and we believe that this will be confirmed once the outcomes from the blockade, which is a significant ‘enabler’ for Trial Operations, are fully understood in early November 2021. The forecast P50 date for the start of Trial Operations has moved from ■■■■■ to ■■■■■ largely due to a change in the acceptance threshold of open Dependencies, which allows entry into Trial Operations with some Dependencies not yet closed. The Stage 3 Passenger Service opening date remains stable at ■ May 2022₂, within the latter part of the declared opening window of the first half of 2022.</p>	<p>cascaded in a top-down approach. Additionally, as CRL can now confirm resources against the DCS 1.2 dates, more certainty can be provided to staff across the Programme. CRL and RfLI are working closely on transition via the Transition Working Group to ensure that activities and requirements are captured for transition.</p> <p>STT testing is substantially complete and all planned Route Wide Integration Tests are complete with only residual tests remaining to confirm issues or close out. Planning for the October 2021 Commissioning Blockade is progressing well with the ■■■ review passed successfully.</p> <p>The Auto Reverse soak testing is complete while progress continues with transition testing and ■■■ train alarm testing. Issues have emerged with TVS testing at Canary Wharf; a mitigation plan is being developed.</p> <p>CRL remains committed to achieving entry into Trial Operations on ■ November 2021 and success of the imminent Blockade is key to ensure Trial Operations is delivered as deterministically planned.</p> <p>CRL agrees with the Project Representative’s assessment of the commencement of Trial Operations in relation to Dependencies close out and also agrees that CRL is maintaining its position on delivering the Elizabeth line within the first half of 2022.</p>
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Appendix – CRL Response to Period 5 PRep Report

	<p>Issues for particular Sponsor attention are as follows:</p> <ul style="list-style-type: none"> • Past general concerns remain with schedule, cost and risk; integrated systems testing; assurance delivery; reliability growth; and stations completion. 	<p>In response to the Project Representative's issues for attention, CRL responds as follows:</p> <p><u>Schedule:</u> Period 5 saw the acceptance of the new baseline DCS1.2 and subsequent reporting will be against this new baseline. This baseline covers all remaining work through to Stage 3A, Stage 5A, Stage 5B & Stage 5C Revenue Service; these key reporting dates which have been carried forward from the DCS1.1 reporting remain on track.</p> <p><u>Cost & Risk:</u> The Period 5 AFCDC position aligns with DCS1.2. Values and assumptions have been agreed with the Project teams. It should be noted that subsequent to the Cost to Go actions, Stations remain largely unchanged with the impact of target demobilisation dates to be reflected in Period 6. Routeway has reflected the Cost to Go actions resulting in an overall reduction to their AFC position, albeit these savings have largely been allocated to the COO Reserve.</p> <p>CRL continues to work closely with stakeholders to identify, assess and manage risk associated with cost, schedule (including delivery of Stations), assurance, systems integration and reliability growth. The effect of risk is reflected in schedule and cost assessments.</p>
	<ul style="list-style-type: none"> • The allocation of scope and budgets for completion, before and after the start of 	<p>The Project continues to focus on determining the allocation of scope and budgets, and the acceleration of ADM/RWT in the short term is an</p>

Appendix – CRL Response to Period 5 PRep Report

	<p>Passenger Service, and their respective delivery mechanisms, have yet to be confirmed.</p> <ul style="list-style-type: none"> • The Cost-to-Go Workshops have confirmed that delivery within the £825m funding package is extremely challenging, and CRL is focussed on measured judgements to contain costs. • Given the extent of responsibility and scope transfer required over a limited period, it is essential that CRL and RfLI work closely to ensure effective transition for Programme completion. • Achievement of key deterministic dates relies upon delivery of multiple and complex integration tests and assurance evidence during the October 2021 Blockade; expectations must be managed. 	<p>absolute key focus of the CRL Executive in order to progress this to completion.</p> <p>CRL has not stated that delivery within the £825m additional funding is achievable, however, CRL Executive continues to be committed to exploring a number of interventions that would minimise any additional funding required.</p> <p>CRL notes and agrees with the Project Representative’s concern. Hence, CRL continues to work closely with RFLI colleagues on all collaborative endeavours across the Programme and will continue to do so through the transition process.</p> <p>CRL notes the Project Representative’s concern in the Period regarding the importance of managing expectation of activities during the upcoming October Blockade. CRL agrees and does not undermine this concern.</p>
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Appendix – CRL Response to Period 5 PRep Report

<p>Health & Safety</p>	<p>RfLI reported two RIDDORs related to separate voltage transformer incidents in Periods 4 and 5; the root causes have yet to be finalised. The overall safety indicators remain within those set by the Programme. Work is ongoing between CRL and RfLI to transition the health and safety activities and responsibilities across to RfLI. The number of Covid-19 cases has generally remained constant in Period 5. To minimise the Covid-19 threat at a critical time in Programme delivery, CRL and RfLI will maintain remote working arrangements until the start of Trial Operations.</p>	<p>CRL notes the Project Representative’s assessment of Health and Safety performance in Period 5 as accurate.</p>
<p>Programme Overview: Schedule</p>	<p>With ELDG’s approval of DCS v1.2, a schedule baseline has now been set that incorporates Period 4A schedule and the J7 Trial Running Staging Plan. Period 5 performance and all future reporting will be monitored against this new baseline. The cost, risk and contract strategy are anticipated to be aligned and finalised in Period 6, which will require all scope to be finally categorised.</p> <p>Previously reported deterministic dates are being maintained for the start of Trial Operations on ■ November 2021 and of Stage 3 Passenger Service on ■ February 2022. Canary Wharf Station SC3R is now on the critical path, with assurance activities driven by the securing of all safety acceptance certificates related to electrical and mechanical works. ELR100 also remains on the critical path.</p>	<p>CRL concurs with the Project Representative’s comments in the Period regarding the development of the DCS1.2. Finalisation in Period 6 of cost, risk and contract strategy will be change controlled into the DCS1.2.</p> <p>CRL agrees with the Project Representative’s comments, however, with the current challenges encountered at Canary Wharf station, it remains on plan to achieve handover on 4 November 2021 and has passed the T-8 Go/No-Go process.</p>

Appendix – CRL Response to Period 5 PRep Report

	<p>The countdown to the beginning of the next Blockade, on █ October 2021, is expected to start in █. Among other key activities, the blockade is taking place to allow the deployment on site of ELR100 signalling software and the completion of the TVS/Windows 10 upgrade, which are critical to the start of Trial Operations</p> <p>The critical path to the deterministic date for the start of Stage 3 Passenger Service is through the implementation of signalling software ELR110. This is planned by CRL for Christmas 2021 and is closely linked with and dependent upon major NR signalling works over the same period. CRL is co-ordinating with NR on the planned works, but a critical point is approaching when commitment from NR is required, to ensure there is no impact upon ELR110 commissioning and the start of Stage 3 Passenger Service.</p>	<p>In line with the Project Representative's comments in the Period regarding the upcoming October 2021 Blockade, planning for the Blockade's commissioning is progressing well. Weekend testing continues to make progress with transition testing and █ train alarm testing, and the auto reverse soak testing is now complete. There are some issues with the TVS testing at Canary Wharf and to manage this, a mitigation plan is being developed. Across Stations, Canary Wharf has passed its T-7 review and Bond Street remains on schedule to reach SC2 milestone on █ in readiness for the start of Trial Operations.</p> <p>On 15 September 2021, Network Rail confirmed as planned that the proposed Stage T works scheduled for the Christmas period have been declared 'GO'. As a result, Siemens can proceed with the revised track database for the ELR110 software upgrade with confidence.</p>
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Appendix – CRL Response to Period 5 PRep Report

<p>Commercial and Risk</p>	<p>CRL’s draft Period 5 AFCDC is reported as £15,940m, which is a £1m increase from Period 4. This is also £151m higher than the current funding package. CRL management has endorsed this AFCDC, which is now aligned with DCS v1.2₃; however, the figure excludes emerging Station and Indirect cost pressures, and opportunities from the Cost-to-Go Workshops.</p> <p>As CRL continues to develop the detailed plans from the Cost-to-Go Workshops, the impact of the stations target demobilisation dates on the AFCs is yet to be included. CRL intends to demobilise the Tier 1 contractors no later than [REDACTED] from station SC3 ROGS, and for all to be demobilised no later than the end of [REDACTED]. The Routeway section has made better progress, with the resulting overall reduction to its AFC now allocated to a Chief Operations Officer (COO) reserve, provisionally amounting to [REDACTED]. This reserve will fund works required for completion after the start of Passenger Service, to be undertaken by the alternative delivery mechanism.</p> <p>CRL remains challenged to out-turn within the £825m funding package, requiring delivery against deterministic dates, realisation of scope savings and retirement or elimination all of its risks. It continues to progress plans to realise</p>	<p>Following on from a specific conversation between CRL and the Project Representative on 15 September 2021, CRL disagrees with the Project Representative’s comment regarding the exclusion of cost pressures. The Period 5 AFCDC which now represents the DCS 1.2 baseline refresh cost, fully captures all costs associated with delivering the DCS 1.2 schedule including Stations, Indirects and Routeway; no cost pressures were omitted. The only items excluded were associated with upside opportunities.</p> <p>The impact of Stations target demobilisation dates was included to the extent possible, however, some Stations require further detailed work to fully understand the impact and it was not considered prudent to include this until fully verified. These amounts would be in the unrecognised opportunities noted. The reductions to the Routeway AFCs were a combination of savings and transfers. It is important for the Project Representative to note that the COO Reserve is not solely for works required for completion after the start of Stage 3 Passenger Service.</p> <p>It should be noted that CRL and the Project Representative have previously engaged in specific conversation on this point. Whilst to complete the Programme within the £825m funding package is proving challenging, CRL has</p>
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Appendix – CRL Response to Period 5 PRep Report

	<p>these ambitions, although there is potential for further cost pressures from the last two stations to finish. However, CRL’s current probabilistic assessment indicates a P0 to out-turn under [REDACTED], with a P95 to out-turn at [REDACTED]. With its current periodic spend rate of approximately [REDACTED], we expect the current funding limit to be exhausted by around the end of [REDACTED]. However, we expect this spend rate to reduce appreciably following demobilisation of the Tier 1 contractors, and after the start of Trial Operations, when CRL’s re-organisation takes effect early in 2022.</p> <p>Despite CRL having identified a number of opportunities to reduce the probability and extent of cost overspend, we consider that the timeframes required to execute the actions and interventions and realise the anticipated cost benefits may be too short.</p>	<p>stated since December 2020 that the cost to complete the Programme could be up to £1.1bn. The £15,789m available funding was lower than the DCS 1.1 P50 AFDCD of [REDACTED]. The Programme maintains that the single biggest opportunity to staying within the £825m is to meet the deterministic schedule. There are further opportunities alongside this that can be delivered, however, to return to within the £825m, there would not be a requirement to retire or eliminate all risks.</p> <p>CRL’s response is in line with specific conversation with the Project Representative on 15 September 2021 referenced above. The revised demobilisation dates for the Tier 1 contractors have now been incorporated into the schedule, therefore, CRL expects this to have a positive effect on the run rate and extend the availability of the current funding. There are of course additional interventions that have to be achieved in parallel to provide further reductions to spend, for example, transition to CRL Lite and the implementation of the revised ADM/RWT process.</p>
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Appendix – CRL Response to Period 5 PRep Report

<p>Organisation</p>	<p>CRL has reported a continuous steady decline in its indirect workforce since setting its Workforce Plan in January 2021. At Period 4, the FTE was 995 which is slightly less than forecast, although it is not clear whether this is due to demobilisation or early departures from the Programme. The forecast is expected to rise slightly in Period 5 due to vacancies planned to be filled by Directorates covering Operations, Technical and others. Recruitment for roles is expected to become more difficult due to shorter employment durations. [REDACTED]</p> <p>[REDACTED]</p> <p>CRL is progressing with a new organisation plan and a Transition Working Group has been formed to develop the detail. The principle of a reduced CRL organisation structure, to be effective in January 2022, was endorsed by the CRL Executive, on the assumption that Trial Operations is achieved in November 2022. Meeting this date will provide an opportunity for a significant cost reduction through shrinking its Indirect workforce.</p> <p>Since transition into ROGS, there has been a steady decline in the size of CRL’s workforce. This decline is now expected to accelerate because of the planned demobilisation of the Tier 1 contractors through September and [REDACTED], for completion by the end of [REDACTED].</p>	<p>CRL is now in a position to confirm all resources up to their indicative end dates based on the DCS1.2. This will enable extensions to be done as and when necessary.</p> <p>CRL agrees with the Project Representative’s comments in the Period regarding CRL organisation plan and structure.</p> <p>CRL notes and agrees with the Project Representatives comments in the Period regarding the impact demobilisation of Tier 1 contractors will have on the size of CRL’s workforce.</p>
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Appendix – CRL Response to Period 5 PRep Report

<p>Stage 3 Trial Running, Trial Operations and Passenger Service</p>	<p>The achievement of entry into Trial Operations is expected to trigger the transfer of Design Authority from CRL back to RfLI. This may also necessitate the [REDACTED], where RfLI has not been structured to deal with the current phased transition of the railway and requires additional capability. A [REDACTED] risk provision has been made for this, pending CRL’s review of the organisational structure.</p> <p>The achievement of a 12 TPH steady state performance has again proved challenging. In order to extract the maximum benefit from the time available for Trial Running before ELR100 deployment, the teams have implemented a progressive build-up of service frequency up to 12 TPH, so as not to trigger disruptive faults. As a result, further fault-finding opportunities have been provided and the building of staff confidence has continued. This has delivered a maximum single-day achievement of approximately 4,500 miles, but overall mileage still remains below plan and is unlikely to catch-up. The robustness of the integrated systems cannot be properly evaluated until 12 TPH trials are fully re-implemented.</p> <p>Further software challenges are emerging with ELR110 implementation in December 2021. While this was originally planned as a</p>	<p>The [REDACTED] risk provision was not included in the final position reported in Period 5. Indirects cost was increased to include the cost of CRL resources to support transfer of Design Authority and the risk was removed. Cost provision has now been included in the CRL Workforce Plan and risk removed from the DCS1.2 AFDCD.</p> <p>CRL concurs with the Project Representative’s assessment regarding the status of Trial Running services and the fault-finding opportunities that have emerged as a result.</p> <p>As mentioned above, Network Rail confirmed as planned that the proposed Stage T works scheduled for the Christmas period have been</p>
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Appendix – CRL Response to Period 5 PRep Report

	<p>contingency release, CRL now considers this to be a release of high importance, as it contains significantly more fixes than originally envisaged; some of these fixes are critical and are required before the start of Passenger Service. With the deployment of ELR110 linked to NR signalling works at Christmas 2021, it is crucial that NR delivers its works as planned. CRL will need to evaluate mitigation measures, subject to NR's confirmed schedule.</p> <p>The planned software releases will not fix all of the faults currently being experienced on the railway. CRL expects ELR100 to resolve approximately 60% of delay minutes, with ELR110 a further 6%. These improvements might also not be achieved as current performance might be masking other system faults. Of the 77 Operational Restrictions currently in place, 31 are expected to be removed with the introduction of ELR100. However, there is a risk that more Operational Restrictions will be introduced, both before and after ELR100 has been deployed on site, and we are concerned that too much reliance is being placed upon the anticipated success of this major software upgrade.</p> <p>Maintenance works delivery performance has significantly improved in the last few periods with both strengthened management teams and metrics. This is an encouraging development, as RfLI transitions to undertake all maintenance works once the [REDACTED] contractor has demobilised after the start of Trial Operations. [REDACTED]</p>	<p>declared 'GO'. As a result, Siemens can proceed with the revised track database for the ELR110 software upgrade with confidence.</p> <p>ELR100 signalling software remains key for the reduction in operational restrictions. While there are concerns with the number of operational restrictions, it is an operational judgement on the number and combination of these restrictions the Programme can manage under various operational scenarios. These are reviewed regularly with the Operator and necessary mitigations are being deployed.</p> <p>CRL notes the Project Representative's comments in the Period regarding maintenance activities and active procurement of specialist resources by CRL and RFLI colleagues.</p>
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Appendix – CRL Response to Period 5 PRep Report

	<p>████████████████████ ████████████████████ ██████████ The length of railway possessions will be reduced after the October 2021 Blockade, providing the opportunity for the RfLI maintenance teams to demonstrate, before entry into Trial Operations, that the railway can be maintained within the periods that will be available once Passenger Service has started.</p> <p>Difficulties with the 12 TPH trials have delayed the planned start of 24 TPH to ██████████, only just before entry into Trial Operations. Successful demonstration of 24 TPH is a criterion under the PDA for entry into Trial Operations and is a critical measure for the successful start of Stage 5B operations.</p> <p>The Trial Operations System Description will set the criteria for entry into Trial Operations. It will define the system configuration and functionality (or, if not achievable, the required mitigation measures) that will be in place at the start of Trial Operations. Cross-organisational sign-off was achieved just after the Period 5 reporting cut-off. The Trial Operations countdown process has now started; criteria being tracked include train performance and reliability, although some ambiguity remains with what constitutes acceptable levels of reliability. The Go/No-Go decision milestone for entry into Trial Operations is scheduled for █ November 2021.</p> <p>Completion of assurance delivery related to the TVS is extremely challenging and will require a</p>	<p>CRL does not recognise the obligation stated by the Project Representative regarding the need for CRL to demonstrate successful 24TPH as a criterion under the PDA for entry into Trial Operations. CRL seeks further clarification on this point from the Project Representative.</p> <p>CRL concurs with the Project Representative's comments in the Period regarding the Trial Operations System Description. The countdown to Trial Operations is underway and weekly meetings are making good progress.</p> <p>CRL recognises these challenges. Hence, a dedicated resource for the production and review</p>
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Appendix – CRL Response to Period 5 PRep Report

<p>Stations Commissioning and Handover</p>	<p>collaborative pragmatic approach between all parties. Completion of the TVS SJ is critical for starting Trial Operations and the timescales for processing evidence from the blockade are demanding; CRL will need to make significant performance improvements over previous blockades.</p> <p>Whitechapel achieved BIU transfer on 23 August 2021 as planned. This now completes transfer to the IMs for familiarisation of 7 of the 10 Central Section Stations, with Abbey Wood, Canary Wharf and Bond Street Stations remaining.</p> <p>Each of the 7 transferred stations still has varying amounts of physical works, assurance documentation and Asset Data to be completed. CRL’s focus is to develop detailed execution plans which underpin target demobilisation dates for the Tier 1 contractors, while still completing the works. This will aim to support the principles established from the Cost-to-Go Workshops, which include demobilising the Tier 1 contractors no later than [REDACTED] from SC3 ROGS, with contract close-out within [REDACTED] of demobilisation date; thereafter, CRL expects that dependency on [REDACTED]. These execution plans will need to be swiftly implemented by CRL if the aspirations are to be achieved on time and the identified cost opportunities realised.</p>	<p>of the Safety Justification for TVS is in place. Also, dedicated champions have been appointed to coordinate remaining Dependencies, clarify routes to closure and produce and present risk mitigations to the Structured Engineering Judgement panel to support CRL’s arguments for entry into Trial Operations.</p> <p>Following the handover of Whitechapel station on 23 August 2021, the Project Representative is accurate to state that there are three Stations remaining for handover to the Infrastructure Managers.</p> <p>The Project Representative is correct to point out the varied amount of work activities to be completed across the Stations. Execution plans are in progress that support demobilisation of Tier 1 contractors and reflect the principles established from the series of strategic cost workshops undertaken in July 2021.</p>
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Appendix – CRL Response to Period 5 PRep Report

	<p>Canary Wharf Station has started a countdown process to BIU, which is planned for 4 November 2021. However, there remain significant challenges with achieving this date, related mainly to the number of Acceptance Certificates that need to be completed and the required level of productivity for providing supporting assurance evidence. Achievement of BIU on this date is important, as this station is on the critical path for entry to Trial Operations. To meet the BIU date, the station will be delivered as functional and safe, but it is likely that finishes will need to be completed later by others.</p> <p>CRL remains focussed on achieving SC2 for Bond Street Station on the target date of [REDACTED]. There remains significant physical work, including mechanical and electrical, which CRL is targeting to be completed by [REDACTED]. The associated assurance documentation will then need to be completed, for an operable station to be made ready. Completion of the assurance activities will require shortened review periods and turnaround times, and a pragmatic approach between all organisations involved in the sign-off process.</p> <p>Achievement of SC2 is required for entry into Trial Operations, and any further slippage against this date will put the station back on the critical path. [REDACTED] [REDACTED] [REDACTED] With focus on achieving the SC2 date, attention is still</p>	<p>While CRL agrees with the Project Representative's comments regarding the current challenges encountered at Canary Wharf station, it remains on plan to achieve handover on 4 November 2021 and at the time of writing has passed it T-7 review.</p> <p>There is minimal scope remaining to complete for Bond Street station to achieve its SC2 milestone and consensus between all relevant parties is that CRL is on target to achieve SC2 on [REDACTED] as planned with an agreed pass at [REDACTED]. Stations delivery are targeting to complete all major works at Bond Street station by the [REDACTED] to support a potential Passenger Service opening at Bond Street station on [REDACTED].</p> <p>Final details of the plan are being put into place to support the reduced functionality approach for Revenue Service at Bond Street station. All parties are aligned on the approach and collectively working toward this goal. The Supply chain is equally engaged and supportive.</p>
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Appendix – CRL Response to Period 5 PRep Report

	<p>required to provide a realistic assessment of how the station can be either partially or fully brought into use, and to confirm a date for achieving BIU/SC3. Initial indications suggest a partial opening is being evaluated for ██████████, although this needs to be underpinned by the supply chain.</p> <p>Abbey Wood Station is planned for BIU on a target date of 30 September 2021, and NR remains key to supporting delivery against this date. This station is currently on schedule to meet this date, although not all functionality will be in delivered (e.g. escalators will not be operational).</p> <p>While the Cost to Go Workshops have identified actions leading to potential cost savings, a full and final categorisation of outstanding and deferred scope, for completion before and after Passenger Service has started, has yet to be finalised. This includes scope currently assigned to the Tier 1 contractors. It is still not clear that CRL's management team has fully completed all the scope categorisation and, if not, this may inhibit the planned demobilisation of the Tier 1 contractors. The proposed alternative delivery mechanism (ADM/RWT) for transferring scope to complete after Tier 1 demobilisation continues to be defined and established. Currently, there still seems to be a lack of full and transparent understanding between CRL/RfLI management teams on how the ADM/RWT mechanism will operate, and the speed with which the volume of works can transferred. Without this, there is a</p>	<p>At Abbey Wood station, the strategy agreed with all stakeholders is based on Network Rail's commitment to complete required works, with the new target date as stated by the Project Representative as 30 September 2021.</p> <p>There are no plans to delay the demobilisation of the Tier 1 contractors and there are post demobilisation plans in place to support any minor works required by the Tier 1 contractors. Completion of any minor minimal works will be managed via a small cabin- type office or 'man in a van' approach.</p> <p>The categorisation of the existing scope into 'Tier 1s or RWT' has been completed and categorisation of new scope is under constant review as it emerges.</p> <p>There is a clear process for the transfer of scope identified as 'non-Tier 1s' and this process continues to work through the details. Also, there is a defined routing and governance for works allocation within TfL. It should be noted by the Project Representative that there is no single unit to mobilise post-Tier 1 demobilisation.</p>
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Appendix – CRL Response to Period 5 PRep Report

Assurance	<p>risk that the Tier 1 contractors may be required to stay on the Programme for longer, defeating the objectives of the Cost-to-Go Workshops. Similarly, there is a risk that the ADM may not be able to mobilise quickly enough to fill the void after Tier 1 demobilisation, to complete remaining scope prior to start of Passenger Service.</p> <p>Assurance delivery is a critical workstream leading to Trial Operations and is acknowledged as a concern by the PSSG₆. This is because a significant number of Dependencies need to be closed for Canary Wharf Station before Trial Operations, and due to the challenges in the timely provision of evidence related to the TVS upgrade works.</p> <p>The current rate of closure is unlikely to result in all necessary Dependencies being closed in time, and this poses a risk to the completion of the CESAC and safety assurance process ahead of Trial Operations. CRL's schedule logic has been updated to reflect two separate CESAC submissions to be developed, one for Trial Operations and the other for entry into Passenger Service. This will help to achieve the milestone for Trial Operations but will require assurance resources for longer than anticipated.</p>	<p>Transfers are ongoing and there is an agreed scope for post Revenue Service that has been agreed by the Infrastructure Managers.</p> <p>Assurance delivery is not only concerned with Canary Wharf station which currently has 25 open Dependencies, there are also 40 open Communication and Control Dependencies and 21 open Dependencies for the Signalling System. Additionally, approximately ten are expected for TVS. The majority can be mitigated for Trial Operations, however, a small number cannot and must have validation works completed and closure evidence available at the end of the October Blockade.</p> <p>As mentioned previously, the CESAC and Safety Justifications rely on closure evidence or agreed mitigations from the Structured Engineering Judgement Panel to form the basis for acceptance. The Judgement Panel issues minutes and approved forms for each Dependency, signed by the Chief Engineer. These forms and minutes along with the CESAC and Safety Justifications will support entry into Trial Operations and beyond.</p>
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Appendix – CRL Response to Period 5 PRep Report

<p>Future Stages</p>	<p>We remain concerned that there continues to be slow progress in processing documentary evidence from the June/July 2021 Blockade. This is currently hindering the assurance process, and there will be little time after the October 2021 Blockade for completing assurance activities ahead of Trial Operations. Documentary sign-off is also a potential challenge, with resources on leave and an apparent inability of RfLI delegates to act in positions of authority. It is therefore important that productivity is improved, otherwise there will be an impact upon the start of Trial Operations.</p> <p>The [REDACTED] contract has been de-scoped for Stages 4 and 5, with contract close targeted for [REDACTED]. The [REDACTED] and [REDACTED] management teams are to be combined to offer efficiencies and cost savings, with [REDACTED] becoming the Principal Contractor to support RfLI from January 2022.</p> <p>Delivery by [REDACTED] of further major signalling software releases ELR200 and ELR210 will facilitate the opening of Stages 5B and 5C. CRL has allowed in the schedule for additional software pre-commissioning, but it has yet to secure the necessary possession windows with stakeholders. With the timetable bid for Stage 5C due in [REDACTED], there is potential risk to Stage 5C opening. This risk will be realised if Stage 3 opening occurs close to its P50 date of May 2022, which will be after the Stage 5C</p>	<p>CRL agrees with the Project Representative's comments. As a mitigation in the absence of assurance evidence from previous Blockade works, CRL is proceeding with Structured Engineering Judgements to formally agree and record mitigations to support assurance cases.</p> <p>CRL and Siemens will explore possible efficiencies from combining [REDACTED] and [REDACTED], however, this is yet to be agreed. The Project Representative is accurate to state that Siemens will become the Principal Contractor to support RfLI from January 2022.</p> <p>CRL notes the Project Representative's comments regarding the signalling software deployment for Stages after Stage 3 Revenue Service and the knock-on effect of any potential delays.</p>
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Appendix – CRL Response to Period 5 PRep Report

	timetable bid deadline of [REDACTED]. As a result, there will be a lack of timetable running for reliability data to support the bid and Stage 5C might then be delayed to [REDACTED].	
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Crossrail Project Representative

Crossrail Joint Sponsor Team

Sponsor Summary

Project Status Report 154

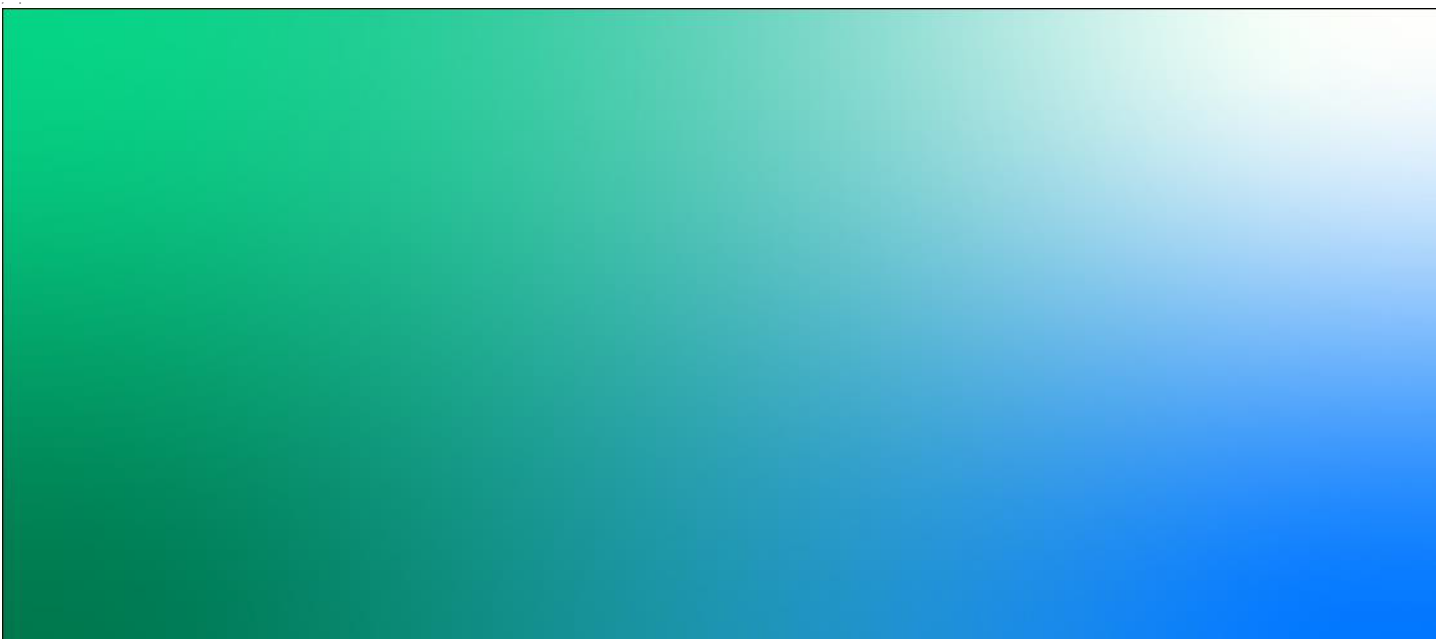
Period 5 | FY2021/22

24 July 2021 – 20 August 2021

Official – Sensitive Commercial

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17 September 2021



Sponsor Summary PSR 154

Project No: B2387600
Document Title: Sponsor Summary for PSR 154
Document No.: B2387600/154/1.8
Date: 17 September 2021
Client Name: Crossrail Joint Sponsor Team
Client No: RM 3730
Project Manager: [REDACTED]
Author: PRep Team

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Note: This report relies on the information set out in CRL's Period 5 reports augmented by more current information received by PRep during the course of our routine discussions with CRL since the Period close on 20 August 2021. Note that information emerging after the close of Period 5 is subject to formal confirmation by CRL in its Period 5 reports. This report is supplemented by our weekly reports to JST and regular meetings with JST staff.

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
1.	13/9/2021	PSR 154 Period 5 FY 2021-22 Sponsor Summary v1.6 ~ Draft	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2.	17/9/2021	PSR 154 Period 5 FY 2021-22 Sponsor Summary v1.8 ~ Final	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Sponsor Summary

1. Observations

In the period, CRL completed the transfer of Whitechapel Station to the IM. With 7 stations now transferred, this represents a significant achievement within tight timescales. A Programme first was also achieved with the Farringdon Station Tier 1 contractor demobilised at the end of August 2021. Further Tier 1 demobilisation is forecast at Tottenham Court Road and Woolwich Stations by the end of September 2021, and at Liverpool Street and Paddington Stations by the end of [REDACTED].

Further ELR100 software pre-commissioning was completed successfully, building upon previous testing, ahead of full site deployment in the October 2021 Blockade. RfLI now appears to have control of the maintenance of its assets and their compliance. 12 TPH trials have continued despite ongoing faults, with managed progressive build-up of the daily timetable allowing stable service patterns to be established.

An updated Trial Running Plan (version J7), agreed by CRL and all its stakeholders, now reflects the known constraints and loss of testing from the previous plan. The countdown to Trial Operations has started, with weekly meetings to monitor activities, criteria and readiness status for entry.

1.1 Headline Concerns

Further pre-commissioning testing and Yellow Plant testing has been undertaken, which is indicating some positive signs ahead of full site deployment of ELR100 in the October 2021 Blockade. However, 77 Operational Restrictions are currently in place for the trial running at 12 TPH. This is considered by RfLI and MTREL to be at the limit of what can be safely managed, and acceptance of any increase proposed by CRL (e.g. arising from the implementation of ELR100) will prove difficult. An initial 5 day trial for Auto-Reverse in early September 2021 will support the production of the final assurance case for this functionality. While this is required to support Stage 5 operations, there is currently no viable alternative for this functionality. A stable 12 TPH service is also required to enable the start of 24 TPH trials, which is now targeted for [REDACTED]; this has been postponed from August 2021, putting at risk the deterministic date for the start of Trial Operations of [REDACTED] November 2021. Generally, there are a number of indicators that point to good progress in the period, but reliability growth remains below expected levels, and signalling software and train performance remain a risk; current indicators (such as MTIN) remain well below target levels, despite train software updates.

An update to the Trial Running Staging Plan (version J7) has been implemented. However, CRL needs to satisfy itself that approximately 24 test cases for System Testing with a Train (STT) have all been accounted for and possession times considered. DCS v1.2 now forms the basis for performance monitoring for Period 5 to completion of the Programme. The new baseline has not yet been assured by CRL's LOD2. The detailed underpinning plan for Bond Street Station beyond SC2 configuration stage to SC3R is currently not included in DCS v1.2. It is expected that CRL will report the cost-to-go aligned with DCS v1.2, in Period 6.

The current Dependency closure rate¹ indicates that there will be approximately 60 open Dependencies at the time of Trial Operations, with the likelihood that further Safety Justification (SJ) Dependencies will be added for Canary Wharf and Bond Street Stations. Mitigations will be required to improve on the current date for Tunnel Ventilation System (TVS) SJ sign-off, which is now forecast

¹ Crossrail Weekly Dashboard Period 6 Week 1 FY 2021/22.

only 2 days before the deterministic date for Trial Operations. CRL and RfLI are changing to adopt a two-stage approach to safety assurance delivery, the CESAC and subsequent TORAC, to address the risk of non-approval associated with open Dependencies at the time of entry to Trial Operations. RfLI's sign-off of its own SJ documentation has slowed during August 2021, and it is not clear whether this is due to holidays or to more fundamental resource availability issues; this performance must improve. CRL is also indicating a 'flat-lining' in the closure of the EOWs for Routeway, which might be due to a poor data processing rate through CRL's management systems. A step-change in productivity will be required if delays in managing TVS and ELR100 test outputs from the October 2021 Blockade are not to slow the overall assurance process. Completion of assurance delivery is a threat to the start of Trial Operations on [REDACTED] November 2021, with more open Dependencies than anticipated and the continuing need for a just-in-time approach.

Canary Wharf and Bond Street Stations are subject to management focus to achieve their respective SC3R and SC2 configurations against planned dates. With Canary Wharf Station now on the critical path, acceptance of StEJ proposals to support assurance, the completion of asset data delivery and timely decision-making for implementation of 'Maintenance on Behalf of Others' (MoBo), must be prioritised. While CRL remains confident of achieving the Bond Street SC2 configuration in [REDACTED], the detailed plans for delivery and completion beyond this date are subject to finalisation and management endorsement.

CRL is implementing plans for demobilising Tier 1 contractors for 7 stations before the end of 2021. Some physical scope remains to be completed ahead of Trial Operations and Passenger Service [REDACTED]

[REDACTED] There is a risk that the alternative delivery mechanism will not be in place quickly enough to complete outstanding works necessary for the start of Passenger Service. The final allocation of scope for completion before and after the start of Passenger Service needs to be completed, to finalise the costing and AFCDC.

The Programme faces challenging changes in the next few periods, as CRL implements a transition to a new organisation structure with a significantly reduced headcount for the start of 2022. Maintaining high staff morale while driving hard for Trial Operations may prove difficult, and will require tactful employee communication and engagement. In turn, RfLI must ensure that it has an organisation structure and resources in place in sufficient time to take on the major transfer of roles and responsibilities, without impact upon progress towards, and transition into, Passenger Service.

While CRL continues to make steady progress, challenges remain with completing known scope within current target dates and there is a risk that new scope will emerge from systems testing which has yet to be carried out. Our view continues to be that it will not be possible for CRL to deliver full Trial Operations on the deterministic date of [REDACTED] November 2021, and we believe that this will be confirmed once the outcomes from the blockade, which is a significant 'enabler' for Trial Operations, are fully understood in early November 2021. The forecast P50 date for the start of Trial Operations has moved from [REDACTED] to [REDACTED], largely due to a change in the acceptance threshold of open Dependencies, which allows entry into Trial Operations with some Dependencies not yet closed. The Stage 3 Passenger Service opening date remains stable at [REDACTED] May 2022², within the latter part of the declared opening window of the first half of 2022.

² CRL Executive Programme Performance Review Part B held on 11 August 2021.

2.2 Commercial and Risk

CRL's draft Period 5 AFDCD is reported as £15,940m, which is a £1m increase from Period 4. This is also £151m higher than the current funding package. CRL management has endorsed this AFDCD, which is now aligned with DCS v1.2³; however, the figure excludes emerging Station and Indirect cost pressures, and opportunities from the Cost-to-Go Workshops.

As CRL continues to develop the detailed plans from the Cost-to-Go Workshops, the impact of the stations target demobilisation dates on the AFCs is yet to be included. CRL intends to demobilise the Tier 1 contractors no later than [REDACTED] from station SC3 ROGS, and for all to be demobilised no later than the end of [REDACTED]. The Routeway section has made better progress, with the resulting overall reduction to its AFC now allocated to a Chief Operations Officer (COO) reserve, provisionally amounting to [REDACTED]. This reserve will fund works required for completion after the start of Passenger Service, to be undertaken by the alternative delivery mechanism.

CRL remains challenged to out-turn within the £825m funding package, requiring delivery against deterministic dates, realisation of scope savings and retirement or elimination all of its risks. It continues to progress plans to realise these ambitions, although there is potential for further cost pressures from the last two stations to finish. However, CRL's current probabilistic assessment indicates a PO to out-turn under [REDACTED], with a P95 to out-turn at [REDACTED]. With its current periodic spend rate of approximately [REDACTED], we expect the current funding limit to be exhausted by around the end of [REDACTED]. However, we expect this spend rate to reduce appreciably following demobilisation of the Tier 1 contractors, and after the start of Trial Operations, when CRL's re-organisation takes effect early in 2022.

Despite CRL having identified a number of opportunities to reduce the probability and extent of cost overspend, we consider that the timeframes required to execute the actions and interventions and realise the anticipated cost benefits may be too short.

2.3 Organisation

CRL has reported⁴ a continuous steady decline in its indirect workforce since setting its Workforce Plan in January 2021. At Period 4, the FTE was 995 which is slightly less than forecast, although it is not clear whether this is due to demobilisation or early departures from the Programme. The forecast is expected to rise slightly in Period 5 due to vacancies planned to be filled by Directorates covering Operations, Technical and others. Recruitment for roles is expected to become more difficult due to shorter employment durations. [REDACTED]

CRL is progressing with a new organisation plan and a Transition Working Group has been formed to develop the detail. The principle of a reduced CRL organisation structure, to be effective in January 2022, was endorsed by the CRL Executive, on the assumption that Trial Operations is achieved in November 2022. Meeting this date will provide an opportunity for a significant cost reduction through shrinking its Indirect workforce.

Since transition into ROGS, there has been a steady decline in the size of CRL's workforce. This decline is now expected to accelerate because of the planned demobilisation of the Tier 1 contractors through September [REDACTED], for completion by the end of [REDACTED].

³ CRL Executive Programme Performance Review held on 8 September 2021.

⁴ CRL Executive Group Meeting held on 24 August 2021.

The achievement of entry into Trial Operations is expected to trigger the transfer of Design Authority from CRL back to RfLI. This may also necessitate the [REDACTED], where RfLI has not been structured to deal with the current phased transition of the railway and requires additional capability. A [REDACTED] risk provision has been made for this, pending CRL's review of the organisational structure.

2.4 Stage 3 Trial Running, Trial Operations and Passenger Service

The achievement of a 12 TPH steady state performance has again proved challenging. In order to extract the maximum benefit from the time available for Trial Running before ELR100 deployment, the teams have implemented a progressive build-up of service frequency up to 12 TPH, so as not to trigger disruptive faults. As a result, further fault-finding opportunities have been provided and the building of staff confidence has continued. This has delivered a maximum single-day achievement of approximately 4,500 miles, but overall mileage still remains below plan and is unlikely to catch-up. The robustness of the integrated systems cannot be properly evaluated until 12 TPH trials are fully re-implemented.

Further software challenges are emerging with ELR110 implementation in December 2021. While this was originally planned as a contingency release, CRL now considers this to be a release of high importance, as it contains significantly more fixes than originally envisaged; some of these fixes are critical and are required before the start of Passenger Service. With the deployment of ELR110 linked to NR signalling works at Christmas 2021, it is crucial that NR delivers its works as planned. CRL will need to evaluate mitigation measures, subject to NR's confirmed schedule.

The planned software releases will not fix all of the faults currently being experienced on the railway. CRL expects ELR100 to resolve approximately 60% of delay minutes, with ELR110 a further 6%⁵. These improvements might also not be achieved as current performance might be masking other system faults. Of the 77 Operational Restrictions currently in place, 31 are expected to be removed with the introduction of ELR100. However, there is a risk that more Operational Restrictions will be introduced, both before and after ELR100 has been deployed on site, and we are concerned that too much reliance is being placed upon the anticipated success of this major software upgrade.

Maintenance works delivery performance has significantly improved in the last few periods with both strengthened management teams and metrics. This is an encouraging development, as RfLI transitions to undertake all maintenance works once the [REDACTED] contractor has demobilised after the start of Trial Operations. [REDACTED]

[REDACTED]. The length of railway possessions will be reduced after the October 2021 Blockade, providing the opportunity for the RfLI maintenance teams to demonstrate, before entry into Trial Operations, that the railway can be maintained within the periods that will be available once Passenger Service has started.

Difficulties with the 12 TPH trials have delayed the planned start of 24 TPH to [REDACTED], only just before entry into Trial Operations. Successful demonstration of 24 TPH is a criterion under the PDA for entry into Trial Operations, and is a critical measure for the successful start of Stage 5B operations.

The Trial Operations System Description will set the criteria for entry into Trial Operations. It will define the system configuration and functionality (or, if not achievable, the required mitigation measures) that will be in place at the start of Trial Operations. Cross-organisational sign-off was achieved just after the Period 5 reporting cut-off. The Trial Operations countdown process has now

⁵ Passenger Service Strategy Group meeting held on 18 August 2021.

started; criteria being tracked include train performance and reliability, although some ambiguity remains with what constitutes acceptable levels of reliability. The Go/No-Go decision milestone for entry into Trial Operations is scheduled for ■ November 2021.

Completion of assurance delivery related to the TVS is extremely challenging and will require a collaborative pragmatic approach between all parties. Completion of the TVS SJ is critical for starting Trial Operations and the timescales for processing evidence from the blockade are demanding; CRL will need to make significant performance improvements over previous blockades.

2.5 Stations Commissioning and Handover

Whitechapel achieved BIU transfer on 23 August 2021 as planned. This now completes transfer to the IMs for familiarisation of 7 of the 10 Central Section Stations, with Abbey Wood, Canary Wharf and Bond Street Stations remaining.

Each of the 7 transferred stations still has varying amounts of physical works, assurance documentation and Asset Data to be completed. CRL's focus is to develop detailed execution plans which underpin target demobilisation dates for the Tier 1 contractors, while still completing the works. This will aim to support the principles established from the Cost-to-Go Workshops, which include demobilising the Tier 1 contractors no later than ■ from SC3 ROGS, with contract close-out within ■ of demobilisation date; thereafter, CRL expects that dependency on ■. These execution plans will need to be swiftly implemented by CRL if the aspirations are to be achieved on time and the identified cost opportunities realised.

Canary Wharf Station has started a countdown process to BIU, which is planned for 4 November 2021. However, there remain significant challenges with achieving this date, related mainly to the number of Acceptance Certificates that need to be completed and the required level of productivity for providing supporting assurance evidence. Achievement of BIU on this date is important, as this station is on the critical path for entry to Trial Operations. To meet the BIU date, the station will be delivered as functional and safe, but it is likely that finishes will need to be completed later by others.

CRL remains focussed on achieving SC2 for Bond Street Station on the target date of ■. There remains significant physical work, including mechanical and electrical, which CRL is targeting to be completed by ■. The associated assurance documentation will then need to be completed, for an operable station to be made ready. Completion of the assurance activities will require shortened review periods and turnaround times, and a pragmatic approach between all organisations involved in the sign-off process. Achievement of SC2 is required for entry into Trial Operations, and any further slippage against this date will put the station back on the critical path.

■ With focus on achieving the SC2 date, attention is still required to provide a realistic assessment of how the station can be either partially or fully brought into use, and to confirm a date for achieving BIU/SC3. Initial indications suggest a partial opening is being evaluated for ■, although this needs to be underpinned by the supply chain.

Abbey Wood Station is planned for BIU on a target date of 30 September 2021, and NR remains key to supporting delivery against this date. This station is currently on schedule to meet this date, although not all functionality will be in delivered (e.g. escalators will not be operational).

While the Cost to Go Workshops have identified actions leading to potential cost savings, a full and final categorisation of outstanding and deferred scope, for completion before and after Passenger Service has started, has yet to be finalised. This includes scope currently assigned to the Tier 1 contractors. It is still not clear that CRL's management team has fully completed all the scope

categorisation and, if not, this may inhibit the planned demobilisation of the Tier 1 contractors. The proposed alternative delivery mechanism (ADM/RWT) for transferring scope to complete after Tier 1 demobilisation continues to be defined and established. Currently, there still seems to be a lack of full and transparent understanding between CRL/RfLI management teams on how the ADM/RWT mechanism will operate, and the speed with which the volume of works can be transferred. Without this, there is a risk that the Tier 1 contractors may be required to stay on the Programme for longer, defeating the objectives of the Cost-to-Go Workshops. Similarly, there is a risk that the ADM may not be able to mobilise quickly enough to fill the void after Tier 1 demobilisation, to complete remaining scope prior to start of Passenger Service.

2.6 Assurance

Assurance delivery is a critical workstream leading to Trial Operations, and is acknowledged as a concern by the PSSG⁶. This is because a significant number of Dependencies need to be closed for Canary Wharf Station before Trial Operations, and due to the challenges in the timely provision of evidence related to the TVS upgrade works.

The current rate of closure is unlikely to result in all necessary Dependencies being closed in time, and this poses a risk to the completion of the CESAC and safety assurance process ahead of Trial Operations. CRL's schedule logic has been updated to reflect two separate CESAC submissions to be developed, one for Trial Operations and the other for entry into Passenger Service. This will help to achieve the milestone for Trial Operations, but will require assurance resources for longer than anticipated.

We remain concerned that there continues to be slow progress in processing documentary evidence from the June/July 2021 Blockade. This is currently hindering the assurance process, and there will be little time after the October 2021 Blockade for completing assurance activities ahead of Trial Operations. Documentary sign-off is also a potential challenge, with resources on leave and an apparent inability of RfLI delegates to act in positions of authority. It is therefore important that productivity is improved, otherwise there will be an impact upon the start of Trial Operations.

2.7 Future Stages

The [REDACTED] contract has been de-scoped for Stages 4 and 5, with contract close targeted for [REDACTED]. The [REDACTED] and [REDACTED] management teams are to be combined to offer efficiencies and cost savings, with [REDACTED] becoming the Principal Contractor to support RfLI from January 2022.

Delivery by [REDACTED] of further major signalling software releases ELR200 and ELR210 will facilitate the opening of Stages 5B and 5C. CRL has allowed in the schedule for additional software pre-commissioning, but it has yet to secure the necessary possession windows with stakeholders. With the timetable bid for Stage 5C due in [REDACTED], there is potential risk to Stage 5C opening. This risk will be realised if Stage 3 opening occurs close to its P50 date of May 2022, which will be after the Stage 5C timetable bid deadline of [REDACTED]. As a result, there will be a lack of timetable running for reliability data to support the bid and Stage 5C might then be delayed to [REDACTED].

⁶ Passenger Service Steering Group meeting held on 20 August 2021.

⁷ Integrated Programme Review Part B held on 1 September 2021.