



## **Crossrail Project Representative**

Crossrail Joint Sponsor Team

**Sponsor Summary**

**Project Status Report 137**

**Period 1 FY2020-21**

**5 April 2020 – 2 May 2020**

Document No. B2387600/137/1.7

29 May 2020



**Official ~ Sensitive Commercial**

## Sponsor Summary PSR 137

Project no: B2387600  
 Document title: Sponsor Summary for PSR 137  
 Document No.: B2387600/137/1.7  
 Date: 29 May 2020  
 Client name: Crossrail Joint Sponsor Team  
 Client no: RM 3730  
 Author: XXXXXXXXXX  
 File name: PSR 137 Period 1 FY 2020-21 Sponsor Summary v1.7  
 PSR 137 Period 1 FY 2020-21 Sponsor Summary v1.7

Jacobs U.K. Limited  
 2<sup>nd</sup> Floor Cottons Centre  
 Cottons Lane  
 London SE1 2QG  
 England  
 Phone: +44 (0)203 980 2000  
[www.jacobs.com](http://www.jacobs.com)

© Copyright 2015 Jacobs U.K. Limited. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright.

Disclaimer: This report has been prepared by Jacobs UK Ltd (Jacobs) pursuant to its contract (the Contract) entitled "Crossrail Project Representative reference number RM 3730" and dated 28 April 2015 with the Department for Transport (DfT) and Transport for London (TfL), DfT and TfL being the Clients. This report is prepared on behalf of, and for the exclusive use of the Clients and is subject to, and issued in accordance with, the provisions of the Contract. Jacobs neither has nor accepts any liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

Note: This report relies on the information set out in CRL's Period 1 reports augmented by more current information received by PRep during the course of our routine discussions with CRL since the Period close on 2 May 2020. Note that information emerging after the close of Period 1 is subject to formal confirmation by CRL in its Period 1 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	22 May 2020	PSR 137 Period 1 FY 2020-21 Sponsor Summary v1.2 ~ Draft	<span style="background-color: black; color: black;">XXXXXXXXXX</span>	<span style="background-color: black; color: black;">XXXXXXXXXX</span>	<span style="background-color: black; color: black;">XXXXXXXXXX</span>
2	26 May 2020	PSR 137 Period 1 FY 2020-21 Sponsor Summary v1.3 ~ Draft	<span style="background-color: black; color: black;">XXXXXXXXXX</span>	<span style="background-color: black; color: black;">XXXXXXXXXX</span>	<span style="background-color: black; color: black;">XXXXXXXXXX</span>
3	27 May 2020	PSR 137 Period 1 FY 2020-21 Sponsor Summary v1.5 ~ Draft	<span style="background-color: black; color: black;">XXXXXXXXXX</span>	<span style="background-color: black; color: black;">XXXXXXXXXX</span>	<span style="background-color: black; color: black;">XXXXXXXXXX</span>
4	29 May 2020	PSR 137 Period 1 FY 2020-21 Sponsor Summary v1.7 ~ Final	<span style="background-color: black; color: black;">XXXXXXXXXX</span>	<span style="background-color: black; color: black;">XXXXXXXXXX</span>	<span style="background-color: black; color: black;">XXXXXXXXXX</span>

## Sponsor Summary

### Coronavirus (Covid-19)

The Programme has remained in a Safe Stop since 24 March 2020, as a result of the Covid-19 pandemic. During the period, the majority of CRL's workforce has continued to work remotely and the organisation has been successful in transitioning to the virtual world, with productivity mainly impacted by IT issues.

CRL has sought to continue with some momentum in the programme through its Niche Works. The works, managed through the daily Silver Response Team calls, have been categorised to reflect small non-intrusive and light intrusive works to support the assurance documentation and certification process. Niche Works commenced on 20 April 2020, increasing site resources from the initially small team of circa 280 provided for Care & Custody, Maintenance and Security. The Niche Works have gained momentum slowly as Tier 1, 2 and 3 contractors mobilise to undertake these works in a controlled environment. [REDACTED] has been slower than CRL may have anticipated. In some cases, [REDACTED]

While the list of initial approved Niche Works is heavily focused on Shafts (in particular at Fisher Street Shaft and Limmo Shaft) to support specific assurance requirements, and includes some Station works, the list will be further developed through the IDTs. Initial indications show a steady completion of almost 50 of the 150 tasks mobilised since starting. The pace of completion may be linked to restrictive working, as all works are being undertaken in accordance with PHE guidelines and CRL's guidelines for Niche Works. It would seem requirements for Social Distancing during the site works, is having a greater impact than anticipated. Total resources mobilised to date for Care & Custody, Maintenance, Security and Niche Works are in excess of 1,000.

### Health & Safety Performance

In Period 1, there were no Lost Time Cases (LTC) or RIDDOR incidents. The HPNM AFR has fallen and there has been a slight recovery in health and safety performance as measured by the Health & Safety Performance Index (HSPI). The HSPI score has increased to 2.72. The RIDDOR AFR rate has decreased this period, as has the number of Lost Time Incident cases (LTI). Overall, the safety KPIs reported in Period 1 all reflect the reduced level of activity on sites across the programme.

The HPNM rate has again fallen in the period. There have been no significant injuries reported, though there were 3 minor Level 3/4 incidents at C610, Paddington and Whitechapel Stations<sup>1</sup>.

H&S KPI	Period 9	Period 10	Period 11	Period 12	Period 13	Period 1
HSPI	2.63	2.59	2.76	2.78	2.66	2.72
RIDDOR AFR	0.09	0.09	0.07	0.10	0.09	0.08
HPNM	0.34	0.37	0.32	0.32	0.27	0.26
LTI	0.17	0.17	0.14	0.17	0.15	0.14

Figure 1 - 1 ~ Health and Safety Performance COS

<sup>1</sup> Programme Review - Chief Projects Officer Summary dated 7 May 2020. Report as at: Period 1 2020/21. PSR 137 Period 1 FY 2020-21 Sponsor Summary v1.7- Final

CRL is monitoring and evaluating the Health and Well Being of its resources. This is indicating an average score of 3.8, which is represented on a Wellbeing Index of 1 as “Very Unhappy” and 5 as “Very Happy”.

## Underlying Concerns and Observations

With the programme currently in a re-planning phase and about to be reset through the Recovery Plan, we consider that it is important and an appropriate time to highlight the underlying issues, which have been observed over several periods with no significant change.

**Schedule:** CRL has failed to achieve a programme that has achievable milestones and dependable forecast dates but built around overly optimistic production rates and schedule durations.

**Cost:** The cost-to-go has been determined using programme schedule as a driver, as opposed to budget driving both scope and schedule. Therefore, as the programme duration increases, so the cost to complete increases. This is coupled with the concern [REDACTED]

**Organisation Culture:** Given the scope and value of the works remaining, a review of the organisation with a focus on operations might realise benefits, such as minimising bureaucracy, enabling enhanced communication and connectivity up and down the organisation, as well as additional efficiencies.

We consider these fundamental issues, that are affecting programme performance, need to be addressed robustly while finalising the Recovery Plan.

## Recovery Plan, [REDACTED] and Supply Chain

With the Government restrictions on public life due to Covid-19 to be reviewed on a regular basis, CRL has continued to develop its [REDACTED] Recovery Plan. [REDACTED]

[REDACTED] The recovery framework and plan are built around nine modules including; Niche Works and Dynamic Testing, Blockade, TR2/Reliability Growth, Assurance, Transition to ROGS, Stations (SC1 and Close-Out Strategy), Team Crossrail, Trial Operations and Beyond and Commercial Strategy. These modules will support the bottom-up development of a new Delivery Control Schedule, DCS v2.0.

It is CRL’s intention to develop the strategy framework to a level of detail sufficient for presentation at the May 2020 Board Meeting, with the details finalised including the schedule and the commercial strategy, for approval at the June 2020 Board Meeting. This timetable seems to lack a sense of urgency, given that ‘disaster recovery’ might be expected to be carried out expediently and decisively. There is a risk that, by the time the end of June 2020 is reached, any advantage/opportunity may be lost.

[REDACTED]

[REDACTED]

[REDACTED] CRL should avoid planning using aspirational targets, and should demonstrate how it intends to address underlying performance issues afflicting current productivity challenges, before relying on dates. CRL's Period 13 PAR was very clear on the current [REDACTED] [REDACTED] (pre- Covid-19), being not likely [REDACTED] [REDACTED]. [REDACTED]

[REDACTED] Going forward, as actions start to be implemented, it will be crucial that their effectiveness is monitored and, if required, plans adjusted accordingly.

A Covid-19 Silver Stations Recovery team has been established to continue to improve the Station delivery schedule. This will be developed and integrated with the Routeway Recovery Strategy for presentation to CRL Board in June 2020.

On 27 May 2020, we received the output [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED]

[REDACTED]

[REDACTED] A QSRA exercise is expected to be undertaken to understand the potential further slippage (e.g. P50 & P80 confidence levels) if the prevailing performance and emerging technical risks are not sufficiently mitigated.

<sup>2</sup> Crossrail April Board Output Covid-19 Sensitivity Dials and Developing Mitigation Plans, 4 May 2020 Draft v6.0.

<sup>3</sup> Recovery Programme Framework – Schedule Development, 15 May 2020 Draft 1.1.

PSR 137 Period 1 FY 2020-21 Sponsor Summary v1.7- Final

In the Period, CRL has continued to pro-actively engage with its supply chain [REDACTED]; this is to enable progression of Niche Works and a safe restart. While progress has been made to [REDACTED], the process is still ongoing at time of reporting and is now expected to complete before the end of May 2020. Specialist supply chain resources are being utilised for Niche Works, where appropriate.

## Assurance Certification and Paperwork

As we reported previously, the Assurance workstream is seen by CRL as an opportunity to catch-up on the large amount of outstanding critical assurance and safety documentation, necessary for Trial Running and Handover. We understand that this workstream is on the Critical Path, and the magnitude of this task is growing with time and is requiring a significant amount of management effort and support. It would appear that there is confusion on the process and a disconnect between Senior Management expectations and at the Project Manager level of delivery. Multiple sequential reviews from two organisations are being undertaken, in which it is evident that many review comments are superfluous and not aligned to addressing the safe operation of the railway. The Shafts and Portals O&M documentation (information necessary for the IMs to maintain the railway) is illustrative of this, where, productivity rates to meet handover dates are challenging. While this is an immediate challenge for the Shafts and Portals, there is an indication that a larger problem is pending for the more complicated Stations. While assurance documentation is 'hard-linked' to Handover, the fundamental requirement is for the railway to operate safely.

With the assurance work considered by CRL and IMs as critical to achieving Trial Running, significant improvements in productivity, particularly around O&M documentation, will need to be realised, if further protracted delivery is to be avoided. Impact on other areas of the Programme, such as Routeway assets<sup>4</sup> for example, has seen Handover dates move from between 30 to 50 days from the 2019/20 Period 13 forecast.

## Transition to ROGS

### Readiness Capability

The Elizabeth Line Readiness Group (ELRG)<sup>5</sup> has a significant role to play in shaping the delivery of the Elizabeth Line, which includes [REDACTED], scope reduction, cost and assessment of benefits and impacts.

In the period, focus has been on update on approach to restart Dynamic Testing, Niche Working, the Shafts and Portals critical activities for handover, plan to finalise the DCS, review on station EOWs, plan and status on Infrastructure Readiness and development of the Recovery Plan. Handover dates for Shafts and Portals committed to by the CRL Board have already seen further delay, despite significant management effort and singular focus of the CRL Programme Team.

The concept of Handover Lite was proposed by CRL to apply to Routeway and Shafts, to allow CRL to achieve Trial Running as soon as possible, without compromising safety. To date, there has not been acceptance of the proposal by the IDTs for Handover Lite. With increasing pressure on completion of all handover documentation for the Shafts and Portals, to meet agreed dates, significant management effort is being taken up, and resources are stretched through multiple duplicating meetings. Inefficiencies in the process, such as the doubling of review effort and the volume of review comments, is only serving to prolong the process. We are concerned by CRL and RfLI's focussed attention to delivery of the Portals and Shafts, that other areas of the Programme may suffer, such as the Stations.

<sup>4</sup> e.g. Energy, Tunnel Safety Systems.

<sup>5</sup> Elizabeth Line Readiness Group Meeting No. 3 held on 23 April 2020.  
PSR 137 Period 1 FY 2020-21 Sponsor Summary v1.7- Final

The Handover Lite principle defers, rather than avoids, work, and extends completion of the paperwork beyond the handover dates. This will necessitate a prolonged continuation of Tier 1 contractors, including multiple organisations and resources, in a process that is not delivering efficiently.

CRL, together with RfLI, continues to develop the infrastructure and operational readiness plan, with a forecast for finalisation for presentation to the CRL May Board. While some resources are being considered and assessed for redeployment to support on minor works, some resources such as Signalling Operations staff have had a pause in training, while recruitment for maintenance resources continues. The purpose of the programme of work is to ensure that CRL and RfLI are organised safely to operate under a ROGS environment through transition from construction to an operating railway. To support the transition, nine initiatives identified in the plan are being monitored, these include: Asset Data, Handover Strategy, Capability Transition/Assessment, CRL organisation to supplement RfLI, CRL transition to ROGS, Technical Standards, Competent Maintenance Resources, Commercial procurement/accountabilities and Joint communications plan. Performance and reporting to TRMB is being monitored against [REDACTED], as DCS v2.0 is under development; TRMB does not have sight of the developing schedule.

### **Integrated Delivery Teams (IDT), Element Outstanding Works List (EOWL) Production and ADM**

In Period 12, we noted that the implementation of the IDTs had lost momentum. In this period, the Station IDTs have worked more effectively during Safe Stop, with daily conference calls and video meetings to co-ordinate inputs for Niche Works documentation and to monitor outputs.

Review of the EOWLs has continued, with a second iteration to further challenge the requirements for Trial Running and to fully identify the scope of works for the planned blockade and incorporation into the Recovery Plan. A significant number of EOWLs have been taken out of the Stations to allow for Trial Running, with completion of these now pushed out to a later date.

The ADM will be implemented by the Residual Works Team (RWT), which has been established specifically to manage the delivery of the ADM works. The scope remains as intended, which is to [REDACTED] uncomplicated works [REDACTED], to be delivered by a more agile/cost effective delivery route with smaller overheads. This will allow [REDACTED] focus on critical items needed for the opening of the railway.

The aspiration is that as much work as possible is [REDACTED] and to be completed during Passenger Service. Due to the status and progress of the works on the Routeway, Shafts and Portals, it was not intended to utilise the RWT for this scope. It is envisaged that the majority of the works will be carried out after Trial Operations, we are not clear how the programmed work for the RWT is being incorporated into the Recovery Plan and DCS v2.0.

### **High Level Schedule Summary**

CRL DCS Cardinal Milestone progress update for Period 1 is showing a [REDACTED] [REDACTED]<sup>6</sup>. The progress update takes account of the Covid-19 impact, where some of the remaining works started in mid-May 2020 [REDACTED]. The Critical Path to Trial Running start is through the completion of D25 noise mitigations on Shafts, the Tunnel Ventilation System; Bond Street Station mechanical and electrical works, and Bond Street Station SC1 completion.

<sup>6</sup> CRL DCS Cardinal Milestones Report Period 1 20 – 18 May 2020.

It is noted that the Period 1 update identifies [REDACTED] different [REDACTED] than that proposed in CRL's Recovery Plan<sup>7</sup>. [REDACTED]

CRL is in process of undertaking a peer review of [REDACTED] with executive members from a diverse range of industries. We understand this will feed into the development process for DCS v2.0 before finalisation and Board approval. We would consider key inputs to success of this review to be the brief for the peer review, the knowledge of the Programme by the reviewing body, time allowance for the review, the unique circumstances of Covid-19, its impact and lessons from the wider construction industry.

In developing DCS v2.0, we consider it is important that CRL clarifies what it intends to do differently and the measures it will take to increase the level of stability in its forecast dates. This will help provide confidence on achievability of the dates for the new DCS and conclusion of the works. A constraint outside CRL's control, will be the rate that the IMs can receive the remaining new assets. This will be a function of their available resource levels and the degree of flexibility that their organisations are prepared to adopt to bring the new railway safely into Passenger Service.

### CRL 3 Lines of Defence

CRL's Assurance Team in its report <sup>8</sup> observed that CRL's progress with Niche Works is being frustrated [REDACTED] and the short-term nature of tasks. Key Shafts and Portals Handover dates have seen further delay, despite significant focused effort by CRL.

CRL's Assurance Team is recommending:

- that in the development of the new Recovery Plan, lessons from previous planned -v- actual performance, including the most recent Shafts and Portals initiative, are addressed. This must include the engagement of all parts of the CRL organisation, including the 11 Functional Heads and key stakeholders, and their sign-off as part of the DCS v2.0 approval process.
- a renewed focus on improving the quality of handover information from the supply chain. Lessons must be learned from the most recent assets, as future assets have more complex integrated systems. RfL needs an acceptable minimum of asset knowledge to operate a safe, maintainable, reliable railway and avoid delays to revenue service.

CRL has recognised in its report that future assets have more complex integrated systems than the most recent asset handovers, and that RfL needs an acceptable minimum of asset knowledge to operate a safe maintainable and reliable railway. Accordingly, within its strategy, CRL is looking to improve the quality of handover information from the supply chain.

### 1st Line of Defence

The 1<sup>st</sup> Line of Defence is predicated by certain functions identified by CRL in its Period 1 PAR, which all perform a degree of assurance, each with their own indicators of performance. By exception, the key areas of concern are:

- Technical Assurance – validation requirements and assurance product trends indicate a large shortfall of evidence if current rates are sustained, either resulting in a delay to reaching handover or an increased pressure on IMs and their handover teams.

<sup>7</sup> 05-3321 Recovery Programme – 18 May 2020.

<sup>8</sup> Periodic Assurance Review Report 1, draft for the CRL Executive Committee.  
PSR 137 Period 1 FY 2020-21 Sponsor Summary v1.7- Final



- Cost Management and Finance – both the AFCDC and Indirect Costs are reported at 'green' status, which is at odds from our observations at the Period 1 AFC and Programme reviews, where significant cost pressures were being reported.
- Schedule – key milestones continue to be missed or rescheduled. The [REDACTED] [REDACTED] has slipped from [REDACTED] in Period 13 to [REDACTED] in Period 1.
- Risk – Risk Exposure is not significantly reducing with the risk management process actively embedded in projects. Consequently, adequate Programme level engagement has yet to be achieved.

## 2nd Line of Defence

### Targeted Assurance Reviews

At Period 1, CRL is reporting six assurance reviews that are presently in various states of progress. CRAF2 assessments are complete for C610, C695, C340 and C620, while C360, C520, C435 and C336 which were due for Period 13, and expected in Period 1 remain outstanding, but we have no report from CRL for their rescheduling. Three TARs continue to progress as planned: Approvals and Authorisation Top Down, Elizabeth Line RCC and Back-Up Control Facility and Infrastructure Manager Interfaces. Two further TARs continue to be planned within the next three periods. for Romford RCC (Deep Dive) and Schedule Productivity, but with no scheduled commencement date.

### Period Assurance Reviews

Where previous CRL PARs provided caution in respect of productivity and the attainment of key milestones, the CRL Period 1 PAR is reporting a change of emphasis.

The pre- Covid-19 assurance assessment in Period 13 was reporting low productivity at 34% and Trial Running potentially [REDACTED]. Because of the uncertainty and operating constraints of the Covid-19 lockdown, CRL assurance is reporting that the forecast [REDACTED] including those for Trial Running and Passenger Service, are considered as under-review.

In respect of productivity, CRL is adopting a short-term optimisation strategy that involves an 8-week rolling lookahead plan focusing upon maximising productivity. In addition, CRL is seeking improvements to the quality of handover, commissioning and safety compliance information. This includes the key priority of handover of remaining Shafts and Portals, in line with CRL Board Commitment Dates.

## 3rd Line of Defence

TfL internal audit continues to be suspended and staff furloughed due to the Covid-19 lockdown. Presently, due to the uncertainties of the easing of lockdown restrictions, TfL cannot confirm the dates or commit to an audit schedule. It will reassess and reschedule its audit plan following the lifting of restrictions and the reinstatement of furloughed staff.

## Cost, Commercial & Risk

In Period 1, CRL has maintained Period 13 schedule position for those dates that lie outside an 8-week lookahead period, [REDACTED] given the state of maturity and subject to CRL Board acceptance. CRL also considers it impractical for project teams to forecast beyond an 8-week lookahead, due to the unpredictable nature of the pandemic and related Public Health England guidance.

We concur that it would be unreasonable to expect a reliable cost forecast without an accepted Recovery Plan, underpinned by a validated [REDACTED]. This would need to be based on reliable and informed substantiation for scope, a resourced schedule using reliable productivity levels and risk mitigations and interventions identified.

The P50 AFDCD for Period 1 therefore remains at £15,420m. This is £457m above Sponsors Funding of £14,963m. This AFDCD is based on project AFCs forecast to CRL's delayed mitigated [REDACTED] and a Schedule Risk allowance of a [REDACTED]. However, the Period 13 AFDCD P50 prolongation risk is not aligned to the Period 13 QSRA, which is based on an unmitigated [REDACTED] consequently, it is our opinion that the Period 13 AFDCD unmitigated risk allowance remains understated.

The AFDCD still remains dependent on the achievement of key schedule dates, which continue to slip and are not underpinned by the current productivity rates.

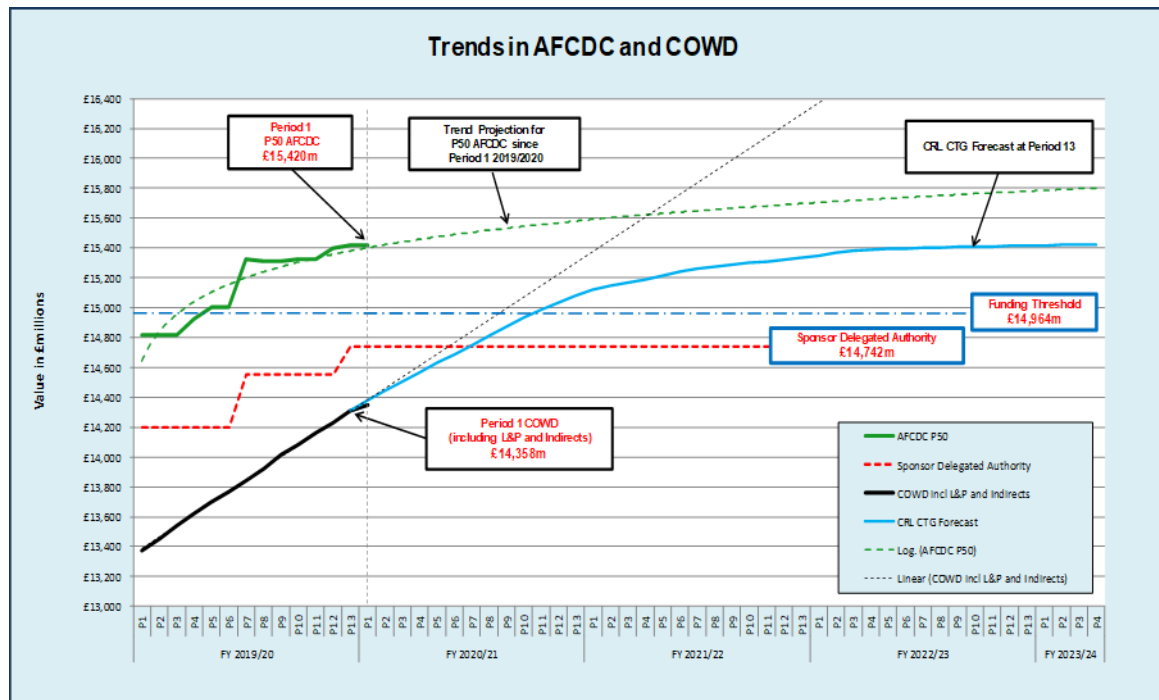


Figure 1 - 3 ~ AFDCD Headroom to Sponsor Delegated Authority

## AFC Reviews

The projects' presentations were based on the principles of 'riding orders' issued from the CRL Executive. These set out a consistent set of cost and risk parameters and assumptions, upon which all projects were asked to develop their forecasts. The key assumption being the [REDACTED] start of Trial Running [REDACTED]. Consequently, there is a risk that the costs [REDACTED] may not be accounted for in the Period 1 AFDCD.

## Commercial

CRL has confirmed that its Disputes Register is up to date and allowance for disputes is included in the Period 1 AFDCD. CRL has made provision for around [REDACTED] in the QCRA for commercial claims at P50. CRL has yet to complete its post Covid-19 risk assessment, but one of the areas that it will be exploring is whether this might open up the potential for further claims.

## Indirect Costs

Period 1 forecast of Indirect Costs remains unchanged from Period 13 at [REDACTED], with [REDACTED] reported as CTG. At Period 1, the indirect CTG is [REDACTED] of the overall CTG plus risk, which is consistent with programmes of similar magnitude<sup>9</sup>. CRL continues to review and assess its delivery strategy and staffing plans, with a view to reduce costs by up to [REDACTED]; the Recovery Plan is expected to include this information. We will be afforded sight of these plans by CRL following completion of its due diligence, due in June 2020.

## Schedule Risk

The Programme Risk allowance for AFDCD represents a P50 schedule date. The mitigated and unmitigated dates are deterministic and not P50. We are concerned that the base data used to generate allowances on which to apply risk modelling to generate a P50 assessment, is unrealistic. We have carried out an initial review of the various permutations relating to the CRL Period 13 DCS, [REDACTED] and QSRA and will use this analysis in our review of the CRL Recovery Plan and [REDACTED] cost estimates.

## Cost Risk

Since Period 8, COWD has increased by [REDACTED] compared to a reduction in CTG plus Risk of [REDACTED]. It appears, that the current rate of COWD spend over the past 6 periods continues to follow the trend to be more than the corresponding rate of reduction for CTG plus Risk. Moreover, and of significant concern, the sum of CTG and Risk has only reduced by [REDACTED] in the last four periods against a spend of [REDACTED]. This is a consequence of cost pressures resulting from prolongation and productivity issues, that we expect to be addressed in CRLs Recovery Plan.

## Stage 2B Operational Readiness

The APIS was issued by the ORR on 7 May 2020<sup>10</sup>. It does not appear to contain any unforeseen onerous conditions, so RfL believes that approvals by HALARP and MTR-SVP can be achieved without major difficulties. Assuming this is the case, the first FLU passenger service to Heathrow is planned for [REDACTED].

<sup>9</sup> Separate PRep assessment of major infrastructure programme management costs

<sup>10</sup> In Period 1 2019/20, the APIS was forecast to be issued by 16 September 2019. This represents a delay of almost 8 months.

At present, no dates have been set for increasing the service to 2, then 4 TPH. We expect this to be resolved once the performance of the FLU train is assessed and the impact of Covid-19 upon Heathrow Airport flight operations has eased.

As we stated in our last report, all RfL passenger operations on the GWML are now being operated by FLUs. Train performance has been poor, with an MTIN measurement of 1,215 miles for Period 1<sup>11</sup>; in comparison, RLUs achieved 6,100 miles, which itself is poor. The target MTIN for FLUs achieve at present is 20,000 miles. Fortunately, this has not resulted in poor service performance due to the current abnormal timetable (e.g. fewer trains on the network), caused by the impact of Covid-19. However, train performance must improve, both to operate successfully on the GWML when normal service is resumed, and to support a reliable Stage 3 service.

## Stage 3

Niche Works has slowly gained momentum; however, critical O&M document productivity has declined since virtual working has been implemented during the Safe Stop and this is a key concern for all the remaining assurance works.

CRL's and RfL's key priority during Period 1 has been to progress the handover of the remaining 4 Shafts and 2 Portals, in line with the recently committed CRL Board dates. CRL Tiger Teams have worked alongside the IDTs and the IM (RfL) to agree pragmatic, joint plans to help speed-up the handover of the remaining assets. The physical works are, for the most part, complete. It is the documentation that is proving difficult to finalise. Irrespective of Covid-19 delays, we believe that the Period 1 DCS forecasts suggest a continued slippage in the pending Handover dates for the remaining Shafts and Portals. These elements are on the Critical Path for achieving the start of Trial Running. The forecast dates for the Handover of the next 4 Shafts (Fisher Street and Limmo) and Portals (North Woolwich Portal and Plumstead) have become 'immovable' and are crucial to demonstrate CRL's credibility and ability to deliver. We are concerned that so much attention is being put on their delivery, by CRL and RfL, that other aspects of the programme may suffer such as the Stations, and other outstanding deliverables for Victoria Dock Portal and Mile End Shaft, assets that have already been handed over to RfL. CRL has identified what it regards as "must have" measures to be agreed for "immediate" enactment by its Executive Management. These include reallocation of resources to support priorities, production of Sprint Plans with owners and turnaround dates required of documentation, O&M Manuals to be considered sufficient at Code 2 etc. This reflects the considerable pressure that is now being applied to both the IDT and IM teams to achieve the desired Handovers.

The development of the recovery plan has focussed on prioritising the essential requirements for reaching Trial Running. However, we understand that this plan still does not yet include consideration of Station re-mobilisation. These actions are being taken alongside ongoing consideration of resuming the Programme in a more radically different and more economical way, through the ADM, Early Station Transfer (LU) and Handover Lite<sup>12</sup> (RfL), as a part of the [REDACTED]

The ongoing development of LU's Early Station Transfer (EST) is progressing well; whereas the RfL development of Handover Lite does not appear to be gaining as much traction. We note that both initiatives, while relieving the pressure on any Trial Running, [REDACTED] simply defer the required date for the completion of the full suite of documentation until final Handover. The overall burden of documentation does not, therefore, reduce. Continued delays in submission, and bottlenecks with the review and sign-off of assurance documentation, are evidence that the assurance process remains under considerable pressure.

<sup>11</sup> MTREL Period 1 Concession Report.

<sup>12</sup> Handover Lite considers the potential for a radical reduction in the volume of assurance documentation required by the IM (RfL).

While all the LU Stations, except Bond Street, have completed their SC1 Ready evidence pack submissions and have received RAB(C) approval, we remain concerned that CRL's resources will inevitably become focused on Routeway, Shafts and Portals and therefore have insufficient time and capacity to deal with the LU Stations. We will continue to monitor how CRL and LU manage this risk.

CRL has recognised that some of [REDACTED] are not well acquainted with Cyber Security regulations<sup>13</sup> and that they are not equipped with the resources or the understanding to deliver the Cyber Security assurance that is required. The [REDACTED] need to engage with suitably experienced specialists to help produce and collate their Cyber Security assurance evidence<sup>14</sup>. CRL has [REDACTED] the technical capability required. The lessons learnt from Custom House have been shared with the IDTs; however, we believe the risk of further delays remains and that similar accommodating arrangements with the IM (RfL) will be required for the approaching Portal and Shaft handovers.

CRL continues to address factors contributing to the ongoing difficulties which include issues such as EMC, 25kV disconnectors and fire alarm sounders; the contractors' rate of submission and subsequent RfLI sign-off, for assurance certification and some project-wide issues arising from the concurrent review of O&M Manuals and assurance documentation. [REDACTED]

[REDACTED]. These continued slippages have presented a gradually increasing longer-term risk to the start of Trial Running and Trial Operations.

We have previously expressed our concern at the continued slippages that had occurred in the forecast SC3 dates for the Stations and the Handover dates for the remaining Shafts and Portals; these slippages have continued. The inevitable consequential disruptive impacts that Covid-19 will have had on the SSP programme will have to be measured, and revised forecast completion dates established.

## Approvals, Assurance and Handover

RAB(C), RAB(C) Sub-Group, Dynamic Testing Safety Review Panel (DTSRP) and the Test & Commissioning Configuration Review Panel (TCCRP) continue to meet using remote conferencing technology.

RAB(C) considered again, the Element Acceptance Case (EAC) for Royal Oak Portal<sup>15</sup>, on behalf of RfLI. The Panel had been unable to support the first submission because of outstanding dependencies; unfortunately, not all of these had been satisfactorily addressed at the time of the second meeting, but the EAC was finally endorsed by Chairman's Action.

CRL provided a further update to RAB(C) on the Signalling ESJ<sup>16</sup>, advising on document development progress and taking the opportunity to give early feedback on recent testing anomalies (i.e. the incorrect enabling of train doors on the 'wrong side' under extremely rare operational circumstances).

CRL has produced an updated RAB(C) Submissions Schedule, based on [REDACTED] Trial Running [REDACTED]. The Panel highlighted the following points:

<sup>13</sup> Crossrail is required to comply with the NIS Regs 2018 (Network Information Systems) as an Operator of Essential Services.

<sup>14</sup> Recommendation from CRL's Cyber Security Report dated 9 April 2020.

<sup>15</sup> RAB(C) meeting held on 20 April 2020.

<sup>16</sup> RAB(C) meeting held on 22 April 2020.

- The anticipated bow-wave of submissions to support Trial Running will occur in June and July 2020;
- Assurance for each of the Control and Communications sub-systems will be provided in the Railway Systems Communications SJ, rather than in individual ESJs;
- The Submission Schedule will need to be aligned with the Trial Running Assurance Strategy, which has yet to be submitted; RAB(C) plans to endorse the Schedule at the same time as the Strategy.

Whilst [REDACTED] is subject to finalisation of CRL's Recovery Plan, it is noted that RAB(C) has a significant workload ahead.

Steady progress has been maintained in the period with the acceptance of Routeway. These will generally have open dependencies or other issues that make the acceptance a Code 2 rather than a Code 1, but this will allow the safety assurance workstream to progress towards Trial Running.

There are delays emerging where test results are required to complete assurance documentation. That is one of the priorities of Niche Works, but that workstream has not been as productive as planned, so there is a risk that assurance evidence will slow.

The magnitude of the overall task is highlighted by the assurance products required for full Element Completion. The Shafts and Portals products are showing slippage from the Period 13 forecast and the anticipated surge in Routeway products acceptance has now moved from April 2020 in Period 12, to July 2020 in this period.

However, the difficulties with Shaft and Portal handovers are exposing the deep-rooted problems in the delivery of handover materials. The T-Minus process is clear, but delivery of the assurance products in line with the process is proving very challenging and requires an excessive level of effort. Given the relative simplicity of the Shafts and Portals, we can anticipate much harder challenges with the larger and more complex Stations.

CRL is aware of the difficulties and the challenge to meet handover dates<sup>17</sup>. The key points from CRLs report indicate that the volume of assurance documentation remaining compared to the recent approval rates does not inspire confidence the dates will be met, with particular reference to ESJs and O&M Manuals. The acceptance rate for Systemwide O&M Manuals does not support [REDACTED] Trial Running [REDACTED] and the current rate appears unlikely to support any [REDACTED] without a major intervention.

Our Period 13 report described initiatives that are underway to assist delivery of products required by the T-Minus process. These remain necessary, but are not yet embedded into the process as seen by current progress of Shaft and Portal Handover. A more radical assessment of Handover delivery may need to be considered, to include:

- Taking a realistic approach to assurance delivery in the revised DCS, basing durations upon actual performance, rather than unrealistic stretch targets.
- Significantly reducing the number of O&M Manuals and other Handover documentation required for Trial Running and even passenger service, based upon a risk assessment process.
- Assessing whether transferring responsibilities and accountabilities between RfL and CRL will streamline the review process.

---

<sup>17</sup> Crossrail Handover Team Period Report Period 1 2020/2021.  
PSR 137 Period 1 FY 2020-21 Sponsor Summary v1.7- Final

## Rail Systems & Dynamic Testing

Up to the time of Safe Stop, the CRL Mega Plan 2 provided the basis for planning and tracking progress of the completion of SSP and Routeway delivery, Dynamic Testing, and the concurrent Maintenance and Reliability workstreams. That Plan has now effectively been abandoned because of Covid-19 and a new version is being developed, that will align with the CRL Recovery Plan.

There has been no Dynamic Testing on the Central Section since the imposition of Safe Stop. However, limited off-site testing has been able to continue at Melton and on the Crossrail Integration Facility (CIF) at Chippenham. These facilities are routinely used to carry out testing of software for early identification of issues, well before deployment to the Central Section. That advantage remains, with the successful adaption of working practices allowing their continued use within Covid-19 restriction guidelines. A particular success has been the modification of the CIF to allow remote witnessing of testing, reducing the need for staff to visit the facility.

As part of CRL's wider initiatives to re-start activities on site across the Programme, preparations were made for the resumption of limited Dynamic Testing. Despite all readiness checks being successfully completed, including the downloading of the latest software configuration to Rolling Stock and wayside equipment, the scheduled start did not take place. CRL is seeking support from ASLEF for the working arrangements in the train cab, which had been devised by MTRC and BT, to ensure compliance with Covid-19 safe working guidelines. The resumption of limited Dynamic Testing is effectively paused until a positive outcome is determined.

As a result, building evidence of current reliability has not been possible in this Period due to the hiatus in Dynamic Testing in the COS. This is unlikely to change to any great degree until System Integration Dynamic Testing (SIDT) begins.

## Trial Running and Reliability Growth

CRL's commitment to the development of a fully assured configuration incorporating CBTC TR2 for the start of Trial Running, was influenced by the [REDACTED] start of Trial Running; it will also be a more robust and reliable configuration than Y0.510. CRL has now produced a plan which demonstrates that a fully assured TR2 configuration can be delivered in time to meet the latest CRL [REDACTED] Trial Running [REDACTED]. However, this relies upon guaranteed minimum access to the Central Section for testing, and a tightly scheduled sequence of assurance review and approval activities in [REDACTED]. At the time of issue of this report, CRL had yet to decide what is the optimum combination of testing and construction to best suit the wider Programme delivery needs. The lack of a commitment to a plan, which has a clear sequence and combination of testing and construction activities, is preventing input and downstream commitment being sought from contractors and stakeholders. We are concerned that this has the potential to introduce further delay and doubt, at a time when the establishment and communication of a robust plan is fundamental to the Programme.

CRL's current plan is to enter Trial Running with the Y0.540 software configuration, which is a planned 'merged fleet' enhancement of the Y0.510 configuration currently under test. CRL has recently committed to deliver Y0.603 for Trial Running<sup>18</sup>. This includes version TR2 of Siemens signalling software and provides significant reliability improvements. This and other later planned upgrades should provide up to 95% PPM for a 12 TPH service<sup>19</sup>. However, when Stage 4 opens, the performance in the Central Section will need to increase further to compensate for the expected lower performance that can be expected on the Surface Sections. The service in the

<sup>18</sup> Y0.540 will be completed and provide a 'fall-back' configuration.

<sup>19</sup> TRAIL modelling results presented to Performance Steering Group, 7 May 2020.

Central Section will also increase from 12 to 24 TPH. Further software releases will be required to increase performance. This has been recognised, but illustrates that Stage 3 represents an interim step for train control software development.

## Stage 4 Summary

Planning for Stage 4A has continued to progress this period, with the Liverpool Street platform extension works contract now awarded. This is a crucial asset to the success of the Stage. Unfortunately, other risks to Stage 4A have increased during the Period. These are primarily the proximity of finish dates of key projects (GEML Traction Power Upgrade Programme and Rolling Stock Correct Side Door Enabling (CSDE)) to Stage 4A Opening. A further consideration is that the impact of any working restrictions arising from Covid-19 are not fully predicted at this point in time.

The key consideration for Stage 4 Opening will be the timetable bidding process that will begin in [REDACTED], completing in [REDACTED]. CRL was originally expecting to be partway through Trial Operations at that time, but CRL's Recovery Plan is now forecasting [REDACTED]. We have previously described the importance of demonstrating that the railway is reliable during this period, especially across the transitions between the Central Section and NR. This is an important consideration for RfL's Reliability Board.

## Stage 5B Opening

The six stations associated with Stage 5B were brought back into operation by 11 May 2020. NR and CRL project teams are continuing to work with the Contractors to understand how their re-baselined programmes will be constructed.

The key consideration for Stage 5B Opening 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 period, especially across the transitions between the Central Section and NR. Stage 3 operations were originally expected to have started at the time of submission, but we now expect from CRL's Recovery Plan that Trial Running could be performed during this period. This is an important consideration for RfL's Reliability Board to resolve.

## Key Areas of Concern

The Crossrail Programme remains in a phase of re-planning to determine a Recovery Plan for a safe restart and to overcome the impact of Covid-19 pandemic. Momentum in the period has been initiated through the start of Niche Works to support the production of assurance documentation. We remain concerned at the slippage of handover dates for the Shafts and Portals as a consequence of delays in the assurance process; this is despite intense management focus on these in the period, as well as a restart in Dynamic Testing. [REDACTED] Trial Running [REDACTED] is to still to be finalised, based on the development and outcome of the Recovery Plan.

Based on our Period 1 status report, we consider the following points require further action or explanation to Sponsors, by the CRL Leadership Team:

1. What are the measures being taken in the Recovery Plan to manage and improve schedule development and commercial strategy, including any organisational changes required to deliver that improvement?
2. How will CRL drive efficiencies into its Assurance processes, to mitigate impact on [REDACTED] [REDACTED] Trial Running and cost overrun?
3. What is CRL's engagement with stakeholders and the supply chain, to ensure shared ownership and commitment to its recovery plan and schedule [REDACTED]