

Agenda

Meeting: Elizabeth Line Committee

Date: Thursday 18 March 2021

Time: 1.30pm

Place: Teams Virtual Meeting

Members

Heidi Alexander (Chair)
Anne McMeel (Vice-Chair)
Sarah Atkins

Kathryn Cearns OBE (Department for
Transport Observer)
Prof Greg Clark CBE
Dr Nelson Ogunshakin OBE
Mark Phillips

Copies of the papers and any attachments are available on [tfl.gov.uk How We Are Governed](https://tfl.gov.uk/How-We-Are-Governed).

To maintain social distancing in the current circumstances, the meeting will be held by videoconference or teleconference. The meeting remains open to the public, except for where exempt information is being discussed as noted on the agenda, as it will be webcast live on the [TfL YouTube channel](#).

A guide for the press and public on attending and reporting meetings of local government bodies, including the use of film, photography, social media and other means is available on www.london.gov.uk/sites/default/files/Openness-in-Meetings.pdf.

Further Information

If you have questions, would like further information about the meeting or require special facilities please contact: Sue Riley; sueriley@tfl.gov.uk; Funmi Amusu; FunmiAmusu@crossrail.tfl.gov.uk .

For media enquiries please contact the TfL Press Office; telephone: 0343 222 4141; email: PressOffice@tfl.gov.uk

Howard Carter, General Counsel
Wednesday 10 March 2021

**Agenda
Elizabeth Line Committee
Thursday 18 March 2021**

1 Apologies for Absence and Chair's Announcements

2 Declarations of Interest

General Counsel

Members are reminded that any interests in a matter under discussion must be declared at the start of the meeting, or at the commencement of the item of business.

Members must not take any part in any discussion or decision on such a matter and, depending on the nature of the interest, may be asked to leave the room during the discussion.

3 Minutes of the Meeting Held on 29 January 2021 (Pages 1 - 8)

General Counsel

The Committee is asked to approve the minutes of the meeting of the Committee held on 29 January 2021 and authorise the Chair to sign them.

**4 Matters Arising, Actions List and Use of Delegated Authority
(Pages 9 - 12)**

General Counsel

The Committee is asked to note the updated actions list and the use of delegated authority.

5 Safety Update (Pages 13 - 16)

Managing Director, London Underground and TfL Engineering and Chief Executive Officer, Crossrail

The Committee is asked to note the paper.

6 Project Status Update (Pages 17 - 22)

Chief Executive Officer, Crossrail

The Committee is asked to note the paper and the supplementary information on Part 2 of the agenda.

7 Elizabeth Line Readiness (Pages 23 - 24)

Managing Director, London Underground and TfL Engineering

The Committee is asked to note the paper.

8 Finance Update (Pages 25 - 26)

Chief Finance Officer, Crossrail and Divisional Finance Director, London Underground

The Committee is asked to note the paper and the supplementary information on Part 2 of the agenda.

9 Elizabeth Line Risk Management (Pages 27 - 30)

Chief Finance Officer, Crossrail and Divisional Finance Director, London Underground

The Committee is asked to note the paper and the supplementary information on Part 2 of the agenda.

10 Project Representative Report (Pages 31 - 32)

Chief Executive Officer, Crossrail

The Committee is asked to note the paper and the supplementary information on Part 2 of the agenda.

11 Crossrail Programme Assurance Update (Pages 33 - 58)

Chief Finance Officer, Crossrail and Divisional Finance Director, London Underground

The Committee is asked to note the paper.

12 Members' Suggestions for Future Discussion Items (Pages 59 - 62)

General Counsel

The Committee is asked to note the forward plan and is invited to raise any suggestions for future discussion items for the forward plan and for informal briefings.

13 Any Other Business the Chair Considers Urgent

The Chair will state the reason for urgency of any item taken.

14 Date of Next Meeting

Thursday 20 May 2021 at 10.00am.

15 Exclusion of Press and Public

The Committee is recommended to agree to exclude the press and public from the meeting, in accordance with paragraph 3 of Schedule 12A to the Local Government Act 1972 (as amended), in order to consider the following items of business.

Agenda Part 2

16 Project Status Update (Pages 63 - 74)

Exempt supplemental information relating to the item on Part 1.

17 Finance Update (Pages 75 - 78)

Exempt supplemental information relating to the item on Part 1.

18 Elizabeth Line Risk Management (Pages 79 - 86)

Exempt supplemental information relating to the item on Part 1.

19 Project Representative Report (Pages 87 - 194)

Exempt supplemental information relating to the item on Part 1.

Transport for London

Minutes of the Elizabeth Line Committee

Teams Virtual Meeting 9.30am, Friday 29 January 2021

Members

Heidi Alexander (Chair)
Anne McMeel (Vice-Chair)
Sarah Atkins (non-voting Member)
Professor Greg Clark CBE (for part)
Dr Nelson Ogunshakin OBE
Mark Phillips

Government Representative

Kathryn Cearns OBE

Executive Committee

Andy Byford	Commissioner
Howard Carter	General Counsel
Andy Lord	Managing Director, London Underground and TfL Engineering
Mark Wild	Chief Executive Officer, Crossrail

Staff

Maureen Kirk	Senior Internal Audit Manager
Rachel McLean	Chief Finance Officer, Crossrail and Divisional Finance Director, London Underground
Alison Munro	Chair of the Independent Investment Programme Advisory Group
Hannah Quince	Chief of Staff, Crossrail
Howard Smith	Chief Operating Officer, Crossrail
Stuart Westgate	Head of Programme Assurance, Crossrail
Funmi Amusu	Head of Secretariat, Crossrail
Sue Riley	Secretariat Officer

01/01/21 Apologies for Absence and Chair's Announcements

The Chair welcomed Members to the second meeting of the Committee. The meeting was broadcast live on YouTube, except for the discussion of the information on Part 2 of the agenda, which was exempt from publication.

There were no apologies for absence. Professor Greg Clark CBE had indicated that he would need to leave the meeting early.

TfL upheld a priority focus on safety. The Chair highlighted that there was a specific agenda item on safety which would be the first item considered at the meeting and invited Members to raise any safety issues either under the specific agenda item or with the appropriate member of the Executive Committee after the meeting.

The National Audit Office was undertaking further work in relation to the Crossrail project, following their previous work in 2019. The work commenced in January 2021, was due to be published in the summer and Members would be kept updated on progress.

02/01/21 Declarations of Interests

Members on the TfL Board confirmed that their declarations of interests, as published on tfl.gov.uk, were up to date. Members, Sarah Atkins and Kathryn Cearns OBE confirmed there were no additional interests that related specifically to items on the agenda.

03/01/21 Minutes of the Meeting of the Committee Held on 26 November 2020

The Committee approved the minutes of the meeting held on 26 November 2020 as a correct record. The minutes would be provided to the Chair for signature at a future date.

04/01/21 Matters Arising, Actions List and Use of Delegated Authority

Howard Carter introduced the paper.

The Department for Transport and High Speed 2 had been made aware of the issue and potential impact of the timing of staff moving between the Crossrail and High Speed 2 projects (Minute 05/11/20).

The Crossrail Programme Partner Incentive Scheme paper would be finalised and circulated for a decision by Chair's Action after the meeting (Minute 08/11/20).

The Committee noted the actions list.

05/01/21 Safety Update

Mark Wild introduced the paper, which provided an update on safety on the Crossrail project, TfL Rail (MTR EL) and the Infrastructure Manager, Rail for London (Infrastructure) Limited.

There was a marked improvement in safety performance in 2020, with 27 working weeks without any reportable or lost time injury accidents or High Potential Near Miss events, compared to 11 working weeks in 2019.

Current health and safety performance remained stable and there were no significant safety incidents during the periods covered by the report, although there were some minor passenger injury accidents and slips, trips and falls.

There had been one reportable accident and five High Potential Near Miss events. All incidents had been investigated and lessons learnt were shared by the principal contractors through the Safety and Health Leadership Team (SHELT) and the Crossrail Learning Forum.

SHELT was being reconfigured to allow for more robust dialogue and challenge at its meetings.

Productivity remained unaffected despite the limited number of operatives on sites and restrictions on movements between sites. The coronavirus infection rates were low and robust plans remained in place to keep the sites secure.

The priorities for 2021 included ensuring continued compliance with the rules for keeping sites Covid-secure; a refocus on frontline safety leadership; and training staff for a safe and secure transition to trial running. Stations would be separated from the routeway during trial running, however, power to run the stations emanated from within the routeway and isolations would be required to carry out works and the safety risks would need to be monitored closely.

The Committee noted the paper.

06/01/21 Project Status Update

Andy Byford introduced the item and the supplementary information on Part 2 of the agenda. He highlighted the good progress towards the next critical path of trial running. The minutes of the Elizabeth Line Delivery Group meetings were now published on the TfL website.

Mark Wild and Andy Lord presented the paper, which provided an update on the status of the Crossrail project. There were two critical paths to achieving the opening window of the first half of 2022: the transition to trial running, an intense safety critical moment that required collaboration and would progress the reliability growth of the trains; and ensuring that most of the stations were ready for trial running (except Paddington station, which achieved Staged Completion 3 in December 2020 and Bond Street station, which was being progressed to achieve Staged Completion 2 by summer 2021). The additional resources brought in to augment the work on the stations were now well embedded and London Underground continued to provide engineering resource to assist with the assurance process.

Work was ongoing to mitigate the impact of Brexit and possible travel restrictions due to the coronavirus pandemic on obtaining specialist resources from outside the United Kingdom.

The train software for trial running was ready and, after the commencement of trial running, it was key to ensure the continued and timely evolution of the software. Siemens and Bombardier Transportation were prioritising this work by committing additional resources to ensuring the reliability of the software.

There was good engagement with the Office of Rail and Road on the plans to commence trial running.

All 10 shafts and portals had been fully handed over to London Underground, which was a significant milestone. Farringdon station was expected to be handed over on time and plans for preparing the station from a customer service perspective were being activated.

TfL Rail services continued to deliver a very high performance, with full length nine car trains re-introduced on the network from Heathrow to Reading in December 2020. Software drops were progressing and testing had yielded positive results.

Systems Integration Dynamic Testing (SIDT), which was key to establishing any integration issues, re-commenced after stopping in December 2020. Operatives were getting live operations experience, familiarisation and understanding of the railway through SIDT.

Despite the restrictions of the coronavirus pandemic, training of staff in preparation for trial running remained on track. Most of the training was being conducted online and the Tunnelling and Underground Construction Academy had been reconfigured for Covid-safe physical training.

Network Rail continued to make progress with infrastructure upgrades on the west and east sections and there was close collaboration on remaining flexible with train timetable changes.

The Chair asked that the minutes from the Elizabeth Line Delivery Group meetings be circulated to Committee Members. **[Action: Secretariat]**

The Committee noted the paper and the exempt supplementary information on Part 2 of the agenda.

07/01/21 Elizabeth Line Readiness

Andy Lord introduced the update on the performance of the TfL Rail operational service and the status of the readiness of the Infrastructure Managers for the operations and maintenance of the railway after handover from Crossrail.

An update on the plans for handover from trial running to trial operations would be provided at a future meeting of the Committee. **[Action: Andy Lord]**

More information on non-operational Information Technology processes and how these were being integrated into TfL would be provided to the Committee. **[Action: Andy Lord]**

The Committee noted the paper.

08/01/21 Finance Update

Rachel McLean introduced the paper and the supplementary information on Part 2 of the agenda. The paper provided an update on financial performance on the Crossrail project. In December 2020, a funding and financing agreement was reached between TfL, the Greater London Authority and the Government, providing £825m of

additional funding for the project.

The additional funding came with obligations relating to the remaining funding shortfall, efficiencies and options for Bond Street station and the programme remained on track to meet these obligations. New and tighter financial controls were being implemented in line with the 9 December 2020 TfL Board approval.

The Committee noted the paper and the exempt supplementary information on Part 2 of the agenda.

09/01/21 Elizabeth Line Risk Management

Rachel McLean introduced the paper and the supplementary information on Part 2 of the agenda. The paper provided an update on the risk management approach in Crossrail, assurance over the risk management methods on the project and highlighted areas of focus. There was an integrated approach between TfL and Crossrail for managing and reviewing critical risks and regular forums for joint dialogue, reporting on and escalating risks.

An informal briefing on the cost and risk contingency positions would be arranged for Committee Members. **[Action: Rachel McLean/ Rob Halstead/ Secretariat]**

The Committee noted the paper and the exempt supplementary information on Part 2 of the agenda.

10/01/21 Project Representative Report

Mark Wild introduced the paper and the supplementary information on Part 2 of the agenda. The paper presented the periodic reports from the Project Representative (P-Rep) on the Crossrail project for periods 7 and 8 and the management responses to these reports. In line with the commitments made by the Mayor for greater transparency on the Crossrail project, copies of the reports were available on the TfL website, with the commercially sensitive material redacted.

Areas highlighted by the P-Rep were in relation to: the relevant technical resources on the project; whether the Delivery Control Schedule was fully comprehensive; progress with the alternative delivery model for residual works; management of optimism bias, particularly as near term goals like trial running were approaching; an adequate focus on risk beyond the probabilistic; and the assurance of documentation. All these areas were being addressed by Crossrail.

The Committee requested that the most up to date P-Rep report and the management response be reported together at future meetings.

[Action: Mark Wild/ Hannah Quince]

The Committee noted the paper and the exempt supplementary information on Part 2 of the agenda.

11/01/21 Crossrail Programme Assurance

Rachel McLean introduced the paper and the supplementary information on Part 2 of the agenda. The paper provided an update on progress with Crossrail Programme Assurance activity.

The schedule and cost remained under pressure but were on track to be delivered as planned. There had been progress with SIDT and stations integration had commenced, however, there were concerns relating to the completion and performance of the Delivery Control Schedule. There was a drive to commence trial running and trade-offs were being considered to achieve this.

An Infrastructure Projects Authority review of Crossrail took place between 16-18 November 2020.

The Committee noted the paper and the exempt supplementary information on Part 2 of the agenda.

12/01/21 TfL Audit and Assurance

Howard Carter presented the paper, which provided an overview of the second and third line audit assurance activity in relation to the Elizabeth line during Quarter 3 of 2020/21. All audit activity had been carried out in accordance with the agreed audit plan.

As agreed at the last meeting, the Independent Investment Programme Advisory Group (IIPAG) would also carry out third line of assurance activity on the project and had set up a Sub-Group to oversee the Crossrail assurance activities. Work was in progress to appoint a chair and representatives to the Sub-Group. The Chair of the Committee was being provided with suggestions for appointments to the IIPAG Sub-Group for approval. **[Action: Chair]**

The Committee approved the Terms of Reference for the IIPAG Sub-Group and noted the paper.

13/01/21 Members' Suggestions for Future Discussion Items

Howard Carter introduced the item and the Committee's forward plan. Suggested future agenda items captured during the meeting would be included on the forward plan. **[Action: Secretariat]**

The Committee noted the forward plan.

14/01/21 Any Other Business the Chair Considers Urgent

There was no other urgent business.

15/01/21 Date of Next Meeting

The next scheduled meeting of the Committee would be held on Thursday 18 March 2021 at 1.30pm.

16/01/21 Exclusion of the Press and Public

The Committee agreed to exclude the press and public from the meeting, in accordance with paragraph 3 of Schedule 12A to the Local Government Act 1972 (as amended), when it considered the exempt information in relation to the items on the: Project Status Update; Finance Update; Elizabeth Line Risk Management; Project Representative Report; and Crossrail Programme Assurance.

The meeting closed at 12.04pm.

Chair: _____

Date: _____

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Elizabeth Line Committee



Date: 18 March 2021

Item: Matters Arising, Actions List and Chair's Action

This paper will be considered in public

1 Summary

- 1.1 This paper informs the Committee of progress against actions agreed at previous meetings and any use of delegated authority via Chair's Action since the last meeting on 29 January 2021.
- 1.2 There has been one use of Chair's Action since the last meeting, in relation to the Crossrail Programme Partner Incentive Scheme.
- 1.3 Appendix 1 sets out the progress against actions agreed at previous meetings.

2 Recommendation

- 2.1 **The Committee is asked to note the Actions List and the use of Chair's Action.**

3 Use of Chair's Action

- 2.2 Under Standing Order 114, in situations of urgency, the Board delegates to each of the Chair and the Chairs of any Committee or Panel the exercise of any functions of TfL on its behalf, including the appointment of Members to Committees and Panels. Any use of Chair's Action is reported to the next ordinary meeting.

Crossrail Programme Partner Incentive Scheme

- 2.3 At its meeting on 26 November 2020, the Committee considered a paper proposing revisions to the incentive scheme in the Crossrail Programme Partner (PP) Services Contract, replacing it with a new incentive scheme that would better support the delivery and close-out of the Crossrail project. At that meeting, the Committee requested more detail on the proposals.
- 2.4 The delay of the opening of the central section of the railway (Stage 3) and the costs and schedule have since moved further away from those anticipated at the time the Key Performance Indicators (KPIs) were agreed, which means that the KPIs set out in the PP Services Contract no longer align with Crossrail's corporate objectives.
- 2.5 On 22 February 2021, the Chair of the Committee, following consultation with Members, approved revisions to the incentive scheme in the Crossrail PP Services Contract to align with Crossrail's corporate objectives and will be recorded in a Supplemental Agreement to the PP contract.
- 2.6 The use of Chair's Action was considered appropriate as a decision to enter into the agreement was required before the date of the next meeting of the Committee on 18

March 2021. The decision was critical to ensure that a new incentive scheme better supports the delivery and close-out of the Crossrail project, with immediate implementation.

- 2.7 The public paper has been published on [tfl.gov.uk](https://www.tfl.gov.uk). The information in the appendix referred to in the paper remains exempt from publication by paragraph 3 and 5 of Schedule 12A of the Local Government Act 1972 in that it contains information relating to the business affairs of TfL and is legally privileged.

List of appendices to this report:

Appendix 1: Actions List

List of Background Papers:

Minutes of previous meetings of the Elizabeth Line Committee

Contact Officer: Howard Carter, General Counsel
Email: HowardCarter@tfl.gov.uk

Elizabeth Line Committee Actions from 29 January 2021 (reported to 18 March 2021 meeting)

Minute No.	Item/ Description	Action By	Target Date	Status/ Note
06/01/21	Project Status Update The minutes from the Elizabeth Line Delivery Group meetings to be circulated directly to Committee Members.	Secretariat	Following the meeting.	Minutes are being circulated as requested. Complete.
07/01/21	Elizabeth Line Readiness Provide an update on handover to trial operations to a future meeting of the Committee. Provide more information to the Committee on non-operational Information Technology processes and how these are being integrated into TfL.	Andy Lord Andy Lord	20 May 2021 meeting. 20 May 2021 meeting.	Scheduled on the forward plan. Scheduled on the forward plan.
09/01/21	Elizabeth Line Risk Management Arrange an informal briefing on the cost and risk contingency positions for Committee Members.	Rachel McLean/ Rob Halstead/ Secretariat	Following the meeting.	Session was held on 18 February 2021. Complete.
10/01/21	Project Representative (P-Rep)Report The most up to date P-Rep report and the management response to be reported together at future meetings.	Mark Wild/ Hannah Quince	18 March 2021 meeting.	Reflected in report on agenda. Complete.
12/01/21	TfL Audit and Assurance The Chair of the Committee being provided with suggestions for appointments to the IIPAG Sub-Group, for approval.	Howard Carter	Following the meeting.	Details provided and approved by the Chair following the meeting. Complete.

Actions from previous meetings:-

Elizabeth Line Committee Actions from 26 November 2020

Minute No.	Item/ Description	Action By	Target Date	Status/ Note
08/11/20	Crossrail Programme Partner Incentive Further information on the background to the proposals to be circulated and a decision to be taken by Chair's Action and reported to the next meeting of the Committee.	Mark Wild/ Hannah Quince/ Secretariat	Following the meeting.	Chair's Action circulated and reported to this meeting. Complete.

Elizabeth Line Committee



Date: 18 March 2021

Item: Safety Update

This paper will be considered in public.

1 Summary

1.1 This paper provides an update on safety.

2 Recommendation

2.1 The Committee is asked to note the paper.

3 Safety Update

3.1 This paper includes a performance update for the Crossrail Programme and infrastructure manager, Rail for London (Infrastructure) Limited (RfL(I)) for Periods 10 and 11.

3.2 The accident performance has remained stable; there has, however, been an increase in the number of High Potential Near Miss (HPNM) incidents since Period 11.

3.3 Accident Performance in Period 10:

- (a) there were no reportable or lost time accidents on Crossrail; and
- (b) there were no RfL(I) employee and contractor accidents.

3.4 Accident Performance in Period 11:

- (a) there were no reportable or lost time accidents on Crossrail; and
- (b) there was one RfL(I) employee accident and no contractor accidents.

An employee was injured when assisting to unload a vehicle whilst not adopting suitable manual handling techniques. They returned to work following an assessment.

3.5 There were three HPNM events in Period 11 on Crossrail, which are summarised below.

- (a) During Dynamic Testing (DT), a test train began travelling westwards out of Plumstead Siding One that had been given the wrong movement authority. The error was realised, and the train stopped ahead of points set against it. No damage or injuries occurred. Several process reminders and improvements were implemented following the investigation. These included

enhancements to the communications protocols, training for staff and amendments to the Short Notice Change procedure.

- (b) At the reception road of the Plumstead head shunt area, the leading trailer of a train derailed at the points which were set against the slow speed move. The route had not been checked by the Yard Master or Shunter ahead of the move. The investigation considered process improvements, competence and behaviours, implementing corrective measures.
 - (c) At the Bond Street project, operatives were stopped by a supervisor while using a reciprocating saw in an unsafe manner to cut Heras fence panels. The unsafe act was reported and investigated by the Project Team. Just and Fair Culture analysis was carried out and action was taken. This is a recognised process which analyses behaviour against the root cause of an incident and steers the outcome of the investigation. The supervisory response has been commended by Crossrail Limited.
- 3.6 Since the last report to the Committee, the Accident Frequency Rate (AFR) has increased from 0.10 to 0.11. The Lost Time Index has increased from 0.15 to 0.16. The HPNM rate has increased to 0.26, although it had reduced to 0.20 which was the lowest rate for two years. The frequency rates are calculated over a rolling 13 periods.
- 3.7 Crossrail has successfully launched the Entry into Trial Running Health and Safety Campaign. This is an extensive briefing campaign being disseminated across the whole programme, including the supply chain, stakeholders and infrastructure managers. The objective is to ensure everyone understands the changes to the rules and ways of working as RfL(I) become the infrastructure manager and stations, such as Farringdon, are handover to London Underground. The campaign briefings will continue up to Trial Running.
- 3.8 Over recent weeks, there have been multiple workshops and meetings with the supply chain to provide clarity regarding the way in which construction work will continue and be planned and delivered safely beyond Trial Running under the infrastructure managers' control. A series of rehearsals and desktop exercises are underway to verify people understand how to execute their roles and responsibilities and that procedures are delivering desired safe outcomes.
- 3.9 Trial Running plans have also been evaluated by the Silver Response Team to ensure suitable coronavirus pandemic mitigation measures will continue to be implemented. This has confirmed that arrangements, such as those at the critical Route Control Centre, are sufficient to protect all staff who are required to enable a seamless transfer from Crossrail to RfL(I).
- 3.10 In Period 12, the Gold Command reviewed the suspension of all non-essential visits to projects. With risk assessment and strict controls, a very small number of Executive and Senior Leaders will be coordinated to return to conduct safety engagement visits. The trigger for these visits has been support for the projects progressing towards entry into Trial Running and a desire to maintain the overall safety performance and pursuit of Target Zero.
- 3.11 The achievement of the Trial Running milestone will then require the Crossrail project team to realign on the next major objective of Trial Operations, followed by

moving into passenger service. For this phase of the project, a new oversight body, the Passenger Service Mobilisation Board (PSMB), will take the place of the current Trial Running Mobilisation Board (TRMB). This will be an evolution of the current governance, incorporating lessons learned in the preparation for Trial Running and reassigning many of the Trial Running readiness team to similar positions in the Trial Operations readiness team. The PSMB will be co-sponsored by Crossrail's delivery and operations functions and will include all relevant stakeholders to create an environment for making safe decisions to set priorities, deconflict interfaces, and allocate resources.

- 3.12 The preparation of the Terms of Reference for the PSMB and the organisational transition into the Trial Operations readiness team are being planned in parallel with the run-up to Trial Running, such that the PSMB can stand up as an immediate replacement for the TRMB post entry into Trial Running. Detailed planning work has been done by the routeway delivery team to outline the safe evolution stages of the configuration of the railway in full compliance with Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS). Similar detailed planning is being done by the stations delivery team to refresh their Delivery Control Schedule to detail the safe execution of all the remaining construction and assurance activities. These two infrastructure efforts will be concurrent with several other workstreams including the Trial Running demonstration activities, the maturing of reliability, the operational readiness by RfL(I) and London Underground for accepting station assets, and preparation and resourcing for Trial Operations. The PSMB will have oversight of all these workstreams and will manage risk among them to align for successful achievement of Trial Operations.

List of Appendices:

None

List of Background Papers:

None

Contact Officer: Mark Wild, Crossrail Chief Executive
Email: MarkWild@tfl.gov.uk

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Elizabeth Line Committee



Date: 18 March 2021

Item: Project Status Update

This paper will be considered in public

1 Summary

1.1 This paper provides an update on the implementation of the new governance arrangements and on the status of the Crossrail project.

1.2 A paper is included on the Part 2 agenda which contains supplementary information that is exempt from publication by virtue of paragraph 3 of Schedule 12A of the Local Government Act 1972 in that it contains information relating to the business affairs of TfL. Any discussion of that exempt information must take place after the press and public have been excluded from this meeting.

2 Recommendation

2.1 **The Committee is asked to note the paper and the supplementary paper on Part 2 of the agenda.**

3 Implementation of governance arrangements

3.1 Since the responsibility for the Crossrail project moved to sit directly with TfL in October 2020, we have implemented the new governance arrangements; the Committee has met twice and we have set up the Elizabeth Line Delivery Group (ELDG). The new arrangements have simplified responsibilities and ensured that decision making is fully aligned during the critical final phases of the programme as the operational testing is undertaken and the remaining parts of the railway are completed and transferred to our operational teams.

3.2 With the Commissioner accountable for achieving Crossrail's completion and delivering the high-level objectives of the project through to project close-out, he has been able to mobilise support from across the organisation. Along with Chief Executive Officer, Crossrail and Managing Director London Underground and TfL Engineering, they have been able to make the necessary decisions with the aim of bringing the project into safe passenger service as quickly as possible. The Commissioner has used ELDG as a forum to get direct updates from the project team and find solutions to any problems or blockages. As chair, he insists on an action-oriented meeting to focus on the pathway to opening the railway. The new arrangements have increased connectivity between the Crossrail project and TfL teams, including Rail for London and London Underground.

3.3 We are currently in the planning stages for the next phase of the transition programme to enable the effective transition of people and back office processes. It provides a further opportunity to streamline and remove duplication and where

work is transitioning to TfL gives us the opportunity to remove excess costs. The transition plans will be shared with the committee at a future meeting.

4 Crossrail Update

- 4.1 Crossrail Limited is in the complex final stages of the delivery of the Elizabeth line. Work continues across the project at pace and it is still anticipated that the line will open for passenger services in the first half of 2022.
- 4.2 Trial Running is vital to unlocking the pathway to passenger service. It involves multiple trains operating in the central operating section to demonstrate that the railway is capable of reliably meeting the capacity and other requirements, whilst the final works to the stations are completed.
- 4.3 It is currently anticipated that the project will enter Trial Running in Spring 2021. The following paragraphs set out what activities will take place during this phase, and what criteria need to be met before the project moves into the next phase of Trial Operations.
- 4.4 The initial phase of Trial Running will see a limited number of trains in operation on the central operating section to allow the infrastructure manager, Rail for London (Infrastructure) Limited to undertake a number of activities to achieve full readiness. The number of trains will gradually increase before further activities such as timetable operation, timetable demonstrations and integration testing can be undertaken.
- 4.5 Outstanding works have been scheduled into the programme and will take place during the Trial Running period. These works include a combination of project maintenance, snagging and enhancements and some testing and commissioning activity.
- 4.6 There will also be four software configurations that will take place during this time and two periods of time where the programme will be suspended to facilitate the testing and commissioning of signalling and control systems software updates.
- 4.7 To exit Trial Running and to commence Trial Operations the following criteria needs to be met:
 - (a) all tests and trials have been successfully completed;
 - (b) the agreed level of reliability has been achieved;
 - (c) the agreed minimum operating requirements have been demonstrated and there are no major operational restrictions;
 - (d) there is an agreed acceptable level of minor outstanding works along with agreed corrective action plans; and
 - (e) stations will have been handed over to the Infrastructure Managers although there may be certain stations at Substantial Completion 2 (SC2) configuration state.

- 4.8 Entering Trial Running will mark the project's key transition from construction to an operational railway. This is the point at which the Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS) apply for the first time in the Central Operating Section. In support of these changes an extensive Health and Safety campaign was launched in February with the aim of briefing every person involved on the detail of what it is that they need to know for their roles and responsibilities at the transition to ROGS and the start of Trial Running. A large team has been involved in preparing materials, engaging with the supply chain and rolling out the campaign for the entire programme.
- 4.9 With the project now entering the final countdown for entry into Trial Running, progress is being made in completing the outstanding works. There is now a full complement of central section stations ready to support Trial Running after both Tottenham Court Road and Paddington stations achieved this milestone in February 2021.
- 4.10 Reliability continues to be built and mileage accumulated through System Integration Dynamic Testing (SIDT) of the central operating section. The upgraded software has been uploaded and it is the software that will be used in Trial Running. During the testing there have not be any significant issues identified that cannot be incorporated into future software updates, however, it is only in Trial Running that the system will be tested with a full service frequency running in the central section.
- 4.11 There remains a huge focus and effort across the programme to progress the necessary assurance documentation and to close out the outstanding assurance work (dependencies) required for entry into Trial Running. The completion of this work is essential for the vital safety and assurance documentation to achieve 'accepted' status. There is significant work involved and it is not without challenge, but there is an agile, daily management process in place between the technical and delivery teams. The status of closure is formally reviewed in our readiness for Trial Running meetings – operated on a T-Minus basis – with clear requirements for required confidence in the closure programme for dependencies, and when actual closure is necessary. Entry into Trial Running is vital but must be completed diligently and to the highest safety standards.
- 4.12 Completion of this assurance work culminating in the acceptance of the Safety Justification assurance documents for each asset will enable the handover of the routeway assets to TfL when the railway transitions to an environment governed by the ROGS.
- 4.13 A number of activities are being implemented to support the transition from a construction programme to an operational railway including the training of the supply chain on operating under the new rules, provision of documentation to the operator and closing of the safety assurance of infrastructure with independent assurance panel and key duty holders.
- 4.14 Work has commenced to refine and further strengthen the Delivery Control Schedule (DCS) which constitutes the Crossrail delivery plan we are managing to and reporting against. This review will build upon the existing logic, enabling more granular information to be incorporated for upcoming phases reflecting on work that has been undertaken to further define the conditions required for effective

delivery of Trial Running as well as successful transition into Trial Operations and Revenue Service. It will also provide an opportunity to consider lessons learnt in the build up to Trial Running, strengthening previous planning assumptions on assurance processes. This will not be a full re-baseline of the schedule but instead a targeted refinement of components of the schedule where further information is now available. This review will also provide the opportunity to further assure the critical path and delivery of key dates for the remainder of the programme, providing the platform for robust performance tracking over the coming months. The review is not driven by the need to mitigate programme performance issues.

- 4.15 The review of the DCS will take place in Spring. The DCS1.1 will remain the management and reporting baseline until such time as a refreshed DCS has been approved.
- 4.16 Once Trial Running begins, a period of time is required to prove capability of the Elizabeth line before it can open for passenger service. This includes a final phase known as Trial Operations, which involves over 150 scenarios to ensure the safe, appropriate and effective response of the infrastructure and maintenance teams along with key partners, in particular London Underground, the operator MTR and Network Rail. These exercises will include a number of large scale events in which volunteers will help validate the emergency evacuation processes in our trains, tunnels, shafts and stations. This provides an opportunity for the railway operators and emergency services to hone their responses to scenarios resulting in major service disruption or incidents, such as loss of signalling and power or passenger evacuations. Plans are being developed to ensure that all relevant scenarios can be run while coronavirus pandemic mitigation measures continue to be implemented.
- 4.17 The stations need to achieve a number of additional, interim states of completion in order to support Trial Operations and entry into revenue service. These works continue, notably with five stations having achieved their Staged Completion 3 (SC3) state which represents the substantial completion of construction works, enabling the final complex systems integration and assurance activities.
- 4.18 The handover and integration of nine major stations is critical to the delivery of the Elizabeth line and the stations completion team has been further augmented with leadership changes and additional specialist technical resources. Whilst on average TfL typically commissions and brings into use one large station a year, for the Elizabeth line they will have to receive nine stations over the same period of time.
- 4.19 Custom House, the first of our central section stations to be handed over to TfL, is in the final stages of testing and will shortly be fully integrated into the network. This will be a significant achievement for the project and for the collaborative commissioning team (Plateau 2), which has been supporting the station. The Plateau 2 team has been created to bring the same level of integrated planning and management to the station systems works as it has for the signalling and train software. It aims to remove the barriers associated with contract portioning and multi-stakeholder interfaces.

- 4.20 Earlier this month, Farringdon station joined Custom House in being handed over to TfL, following the successful completion of testing and integration work. Working with the stations completion team, the experience and knowledge gained of the process from Farringdon station will be implemented and applied to the remaining stations.
- 4.21 Tottenham Court Road and Paddington stations have recently achieved the T-12 milestone. This means that the stations are considered to be 12 weeks away from being ready for handover to TfL. Work at the stations is now primarily focused on the extensive testing and commissioning of systems ahead of the Elizabeth line opening. Reaching this important milestone allows the contractor to commence demobilisation across the site and enables Crossrail Ltd to commence the process of handing the station over to TfL.
- 4.22 Network Rail's major upgrade works to surface stations on the eastern and western section of the railway continue to progress, with step-free access being prioritised where possible. Acton Main Line and West Ealing will become step-free by Spring this year and will be followed by Ealing Broadway, Southall, Hayes and Harlington, West Drayton, Romford and Ilford in intervals over the next 12 months.

List of Appendices:

Exempt supplemental information is contained in a paper on Part 2 of the agenda.

List of Background Papers:

None

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Elizabeth Line Committee



Date: 18 March 2021

Item: Elizabeth Line Readiness

This paper will be considered in public

1 Summary

- 1.1 This paper provides an update on the performance of the TfL Rail operational service and the status of the readiness of the Infrastructure Managers for the operations and maintenance of the railway after handover from Crossrail.

2 Recommendation

- 2.1 The Committee is asked to note the paper.

3 Performance of Operational Service

- 3.1 TfL Rail services continue to deliver excellent performance with 95.7 per cent of trains meeting their reliability target in period 11, the four-week period between 10 January to 6 February 2021. The most significant service impacting failures related to infrastructure issues on the Western service. Overall our performance long term trend continues to improve and now at 95.8 per cent, is the highest since TfL Rail took over operations.
- 3.2 The full length nine-car trains introduced in December 2020 to the Reading route continue to perform well. The software update to address failures within the on-train European Train Control System signalling system has been delivered and will be rolled out across the train fleet during March 2021.

4 Central Section Reliability

- 4.1 As reported previously, we successfully commenced Systems Integration Dynamic Testing (SIDT) on 3 December 2020, since then we have seen mileage increase by 25,000 miles bringing the cumulative total SIDT mileage to over 58,000 miles.
- 4.2 SIDT is enabling our colleagues to continue to gain experience managing the train operations from the Route Control Centre as part of the ongoing preparations for entry into trial running under the Railways and Other Guided Transport Systems (Safety) Regulations 2006.

5 Operational Readiness

- 5.1 We are very pleased to report that we have taken over responsibility for Farringdon station, the first central London station to be transferred from Crossrail – this is a significant milestone. The station has completed extensive testing and

commissioning of systems in advance of Trial Operations later this year. This is the second station we have taken ownership of, with the first being Custom House during 2020. As Tottenham Court Road and Paddington stations move towards handover we are working with our colleagues across Crossrail to embed the lessons learnt from Farringdon, with focus on ensuring robust asset data is available.

- 5.2 Training for Incident Response, Service and Traffic Managers continue with the Refresh, Update and new training requirements being finalised following confirmation of the Trial Running (TR) configuration. The training plan for the Route Control Centre has also been agreed, a positive step towards readiness for entry into TR.
- 5.3 Maintenance training is nearly complete with the remaining element relating to competence assessment following a period of mentoring. The assessment plan is scheduled to align with TR to maximise the retention of skills as the system goes live.
- 5.4 Although good progress is being made, the impact of the coronavirus pandemic is still being felt with absence of specialist trainers, trainees and availability to training facilities. There has been a number of positive Covid-19 cases at the tunnelling academy which has increased the pressure on training but we do remain on track. To mitigate the risk of coronavirus, we have commenced lateral flow coronavirus testing at Route Control Centre and our training academy to bring an additional level of confidence for our colleagues.

6 Residual Works Programme

- 6.1 Work continues agreeing the most efficient way to deliver the residual works for the post revenue service scope. Discussions to finalise scope, organisational and commercial arrangements to enable this are progressing.

List of Appendices:

None

List of Background Papers:

None

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Elizabeth Line Committee



Date: 18 March 2021

Item: Finance Update

This paper will be considered in public

1 Summary

- 1.1 This paper provides an update on the financial performance at Period 11 2020/21.
- 1.2 A paper is included on the Part 2 agenda which contains supplementary information that is exempt from publication by virtue of paragraph 3 of Schedule 12A of the Local Government Act 1972 in that it contains information relating to the business affairs of TfL and other parties. Any discussion of that exempt information must take place after the press and public have been excluded from the meeting.

2 Recommendation

- 2.1 **The Committee is asked to note the paper and the supplementary information on Part 2 of the agenda.**

3 Funding

- 3.1 In December 2020, a funding and financing agreement was reached between TfL, the Greater London Authority (GLA) and the Government providing £825m of additional funding for the Crossrail Programme.
- 3.2 The additional funding came with obligations relating to the remaining funding shortfall, efficiencies and options for Bond Street station. The programme remains on track to meet these obligations. In February 2021, a joint review was held between Crossrail, TfL, GLA, Department for Transport and HM Treasury. A further review will be held in April 2021.
- 3.3 Following the Board's approval of Programme and Project Authority, Crossrail has drawn down the first tranche of Programme and Project Authority for the costs through to Trial Running. Further drawdowns of Programme and Project Authority have been approved since January 2021, in line with planned commitments.
- 3.4 To accompany the drawdown of Programme and Project Authority, new and tighter financial controls have been implemented in line with the December 2020 Board approval. This new financial and change control process is aligned with the Financial Commitment and Oversight Group controls embedded across TfL. The commitment approval limits are currently set at £125k above which approval will be requested from the Commissioner through the Elizabeth Line Delivery Group.

4 Financial Performance

- 4.1 Spend in Period 11 was £49m and is £623m in the year to date. The period spend was £15m below the Delivery Control Schedule 1.1 (DCS1.1) Budget and is £56m below the DCS1.1 Budget in the year to date.
- 4.2 The number of Full Time Equivalent employees are 850, down 27 since the latest approved January Workforce Plan.
- 4.3 The current Anticipated Final Crossrail Direct Cost (AFCDC) is unchanged from previous periods, and a programme of work is in place to confirm residual scope and cost after Trial Running.
- 4.4 The P50 AFCDC is currently £96m above the additional funding of £825m, which is consistent with previous periods. At higher levels of probability, the estimate of up to £1.1bn additional funding is also consistent with previous estimates.
- 4.5 New risks and opportunities are broadly in balance and Crossrail continues to work towards securing additional opportunities which could assist with reducing the AFC towards the £825m additional funding position.

List of appendices to this report:

Exempt supplemental information is contained in a paper on Part 2 of the agenda.

List of Background Papers:

None

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Elizabeth Line Committee



Date: 18 March 2021

Item: Elizabeth Line Risk Management

This paper will be considered in public

1 Summary

- 1.1 This paper provides an update on the risk management activity in Crossrail.
- 1.2 A paper is included on the Part 2 agenda which contains supplementary information that is exempt from publication by virtue of paragraph 3 of Schedule 12A of the Local Government Act 1972 in that it contains information that is commercially sensitive. Any discussion of that exempt information must take place after the press and public have been excluded from this meeting.

2 Recommendation

- 2.1 **The Committee is asked to note the paper and the supplementary information in Part 2 of the agenda.**

3 Risk Management Update

- 3.1 As outlined in a previous paper to the Committee, Crossrail manages risk at several discrete levels, in order to structure the large volume of risk information and ensure that all levels of management are engaged in managing risk as the appropriate level.
- 3.2 This paper provides an update on risk management progress in three main areas:
 - (a) Level 1 Programme Risks and Interventions;
 - (b) joint management between Crossrail and TfL of shared risk and interventions; and
 - (c) summary of change in cost and risk analysis.

4 Level 1 Programme Risks and Interventions

- 4.1 The Level 1 Programme Risks summarise the significant macro risks that face the programme. Each risk is owned and managed by an Accountable Executive, who have developed intervention plans are in place for each. The risks are reviewed and discussed at the Executive Periodic Programme Review in week 3 of the periodic cycle and at the Executive Group meeting in week 1.
- 4.2 A process is in place for monitoring the risk and progress against interventions at the regular Executive Group meetings throughout the period, culminating in a

report of performance which is shared with the Elizabeth Line Delivery Group, chaired by the Commissioner.

4.3 The Level 1 Programme Risks are summarised as:

- (a) our low resilience to dealing with 'unknown' and 'emerging' issues results in the programme prolonging and/or the Anticipated Final Crossrail Direct Cost (AFCDC) increasing;
- (b) the programme may not have the organisation, resources and capability in place to deliver each of the remaining phases of the programme including having access to the expert resources, capability and capacity at the right time;
- (c) the known interventions required in the Tunnel Ventilation System integration take longer than the time allowance in the Delivery Control Schedule;
- (d) Siemens and Bombardier Transportation software convergence and quality leaves missing functions and/or has low reliability;
- (e) station productivity is lower than expected, resulting in extended duration of readiness countdown (nominally 12 week 'T-12') cycles;
- (f) the stage works programme during Trial Running prolongs either due to productivity or incomplete test scope;
- (g) the effort of safety assurance volume and process prolongs the programme with iterative work cycles;
- (h) overall system reliability is lower than required to commence revenue service; and
- (i) the complexity of the railway and relative maturity of operators/maintainers prolongs the entry to Trial Operations and/or results in poor performance during revenue service impacting reputation and delays stage 4 and 5.

5 Areas of risk and intervention under joint management between Crossrail and TfL

5.1 The Elizabeth Line risk landscape was updated in December 2020 and January 2021, in order to identify those risks associated with introduction of the railway into operation which are owned and managed by each of the key stakeholders.

5.2 An output of that process was the set of risks relating to the area between construction, transfer and maintenance of assets and then transition to operation which are shared between both organisations.

5.3 The key shared areas of risk are identified as:

- (a) health and safety process and people management at the point at which The Railways and Other Guided Transport Systems (Safety) Regulations 2006 apply;

- (b) achieving functional exit from Trial Running/entry into Trial Operations;
 - (c) performance and reliability growth to be ready for customer service;
 - (d) people and organisational readiness for transition through staged railway;
 - (e) residual work management; and
 - (f) financial control and optimising the financial outcome across revenue, capital expenditure and operating expenditure.
- 5.4 The joint leadership team of Crossrail and TfL is progressing a regular and collaborative dialogue on these shared areas of risk to identify joint interventions which will mitigate adverse impact on the opening of the railway.

6 Summary of Change in Cost and Risk Analysis

- 6.1 On 18 February 2021, the Committee conducted a deep dive review on risk management that updated on the status at of all cost and risk provisions included in the AFCDC at Period 10.
- 6.2 Since then, a number of changes have been made in the cost forecast, resulting in all assessments being updated. All cost movements and associated updates to centrally held cost and risk provisions have been reviewed in detail by the Executive Group and a series of interventions, described in the Finance Update paper that is on the agenda for this meeting, have been initiated.

List of appendices to this report:

A paper containing exempt supplementary information is included on Part 2 of the agenda

Background Papers

None

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Elizabeth Line Committee



Date: 18 March 2021

Item: Project Representative Report

This paper will be considered in public

1 Summary

- 1.1 This paper provides an update on the periodic reports from the Project Representative (P-Rep) on Crossrail for Periods 9, 10 and 11. The P-Rep report for Period 11 has been received but there has not been enough time since its receipt and the publication of this paper for the report to be considered and a management response agreed. As provided for under section 100B(4)(b) of the Local Government Act 1972, the Chair has agreed to the late submission of the P11 report and management response to enable Members to consider the most up to date information. The exempt appendix will be sent to Members ahead of the meeting and a public redacted copy will also be published.
- 1.2 A paper is included on the Part 2 agenda which contains supplementary information that is exempt from publication by virtue of paragraph 3 of Schedule 12A of the Local Government Act 1972 in that it contains information relating to the business affairs of TfL. Any discussion of that exempt information must take place after the press and public have been excluded from this meeting.

2 Recommendation

- 2.1 **The Committee is asked to note the report and the supplementary paper on Part 2 of the agenda.**

3 Project Representative

- 3.1 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.
- 3.2 In line with the commitments made by the Mayor for greater transparency of the Crossrail project, the most recent P-Rep reports are included as part of the regular update to the Committee and are available on our website¹.
- 3.3 As with all the P-Rep reports, 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. Unredacted versions of the P-Rep reports have been included in the paper on Part 2 of the agenda.
- 3.4 In the Period 10 report, the P-Rep highlighted the following key areas of concern:

¹ <https://tfl.gov.uk/corporate/publications-and-reports/crossrail-project-updates>

- (a) How is Crossrail accounting for, and reporting on, emerging additional scope?
 - (b) How can Crossrail demonstrate its interventions are delivering timely resolution of risks to minimise exposure?
 - (c) How will completion of the Programme be reflected in the Delivery Control Schedule and Anticipated Final Crossrail Direct Cost, including all resource requirements, realistic delivery assumptions, lessons learnt and Crossrail's close-out strategy?
- 3.5 The P-Rep observations are shared with Crossrail and are discussed in detail by Crossrail, P-Rep and the Commissioner at the regular meetings of the Elizabeth Line Delivery Group. Crossrail also produces a written response to the P-Rep report that is included with the P-Rep reports on our website (with an unredacted version being included in the paper on Part 2 of the agenda).

List of Appendices:

Exempt supplemental information is contained in a paper on Part 2 of the agenda.

List of Background Papers:

None

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Elizabeth Line Committee



Date: 18 March 2021

Item: Crossrail Programme Assurance Update

This paper will be considered in public

1 Summary

- 1.1 This paper reports on progress with Programme Assurance activity across the Crossrail Three Lines of Defence (3LoD) Integrated Assurance Framework (IAF) discussing: confidence of delivery, adequacy of assurance coverage and exceptional risks requiring escalation.

2 Recommendation

- 2.1 **The Committee is asked to note this paper.**

3 Background

- 3.1 The Crossrail IAF was established in June 2019 based on a 3LoD model comprising:

- (a) Line 1 – Crossrail management controls functions;
- (b) Line 2 – Crossrail’s Project Programme Assurance (PPA) team; and
- (c) Line 3 – TfL Internal Audit and (as of January 2020) a sub-group of the Independent Investment Programme Advisory Group (IIPAG-Crossrail Limited (CRL)).

- 3.2 Reporting of Crossrail management controls (Line 1) is subject of separate papers under agenda items 5 – 10 of this meeting of the Committee.

- 3.3 This paper reports specifically on Line 2 (PPA), Line 3 Internal Audit and Line 3 IIPAG-CRL assurance progress.

4 Line 2 Assurance

- 4.1 Based upon our Period 11 assessment, it is the opinion of the Line 2 Assurance that the schedule and cost for completing Crossrail are under significant pressure but the publicised opening timeframe of mid-2022 currently remains intact. Our assessment of schedule, cost and other assurance concerns are set out below.

Schedule Progress

- 4.2 The programme is on track to achieve the prioritised up-coming key milestone of Trial Running commencement. Prioritisation of Trial Running is highly beneficial

as it will be a key indicator of the maturity and readiness of the infrastructure for commencement of Passenger Service.

- 4.3 An unintended consequence of the prioritisation of Trial Running is the deferral of lower priority activity which, in turn, has the potential to cause consequential delay to later target milestones such as Trial Operations and Revenue Service but, on balance, based upon current progress, the risk-factored target dates for these events remain intact.
- 4.4 The schedule for stations completion is seeing mixed progress. The stations are planned to be ready in sequence in time for commencement of Trial Operations but a number of the later stations are at risk of impacting the earliest date for Trial Operations commencement in Autumn 2021.

Cost Pressures

- 4.5 Cost pressure is evident from a number of key indicators but current Line 1 reporting indicates that Crossrail is holding to budget. While sources of additional cost have been identified, these additional costs may yet be mitigated by other factors.

Assurance Concerns

- 4.6 Delivery Control Schedule (DCS) Assurance – The progressed DCS baseline (DCS 1.1) which is the current basis of planning and progress reporting is not yet fully representative of all the work to be done. The programme has indicated that a new baseline (DCS 1.2) will be created by the end of April 2021 to capture the absent detail and refresh the schedule for completion.
- 4.7 Trial Running Readiness Intervention – Progress with technical assurance and operational readiness is running behind. Line 2 have recommended two avenues of intervention in pursuit of earliest possible commencement of Trial Running: i) joint Crossrail/Rail for London (Infrastructure) Limited (RfL(I), the infrastructure manager) intervention is urgently required to hold the target commencement date; and ii) such intervention plans must be well communicated to all across the delivery, assurance and operator community.
- 4.8 Cross Organisational Alignment – Effectiveness of progress is now being dominated by the degree of mutual understanding and alignment between CRL and RfL(I) counterparts. We strongly recommend further effort is invested in aligning objectives, understanding of the status of the works and promoting collaborative behaviours between leadership and teams across all Elizabeth Line delivery organisations in order to secure key up-coming objectives.

5 Line 3 (TfL Internal Audit) Assurance

- 5.1 The Crossrail Internal Audit Plan for 2020/21 was approved by the Crossrail Audit and Assurance Committee in March 2020 and formed part of the TfL Integrated Assurance Plan approved by the TfL Audit and Assurance Committee. Some minor changes to the Crossrail Internal Audit Plan were reported to both the Crossrail and TfL Audit and Assurance Committees in September 2020. The

current plan was presented to the Committee at its last meeting on 29 January 2021.

- 5.2 Line 3 (TfL Internal Audit) meet periodically with Crossrail Assurance, the Project Representative and the Crossrail risk team to share assurance information and ensure that assurance activity is coordinated and duplication of effort is avoided.
- 5.3 The Line 3 (TfL Internal Audit) Assurance plan is delivering a programme of 14 audits in the current financial year.
- 5.4 Progress up to the completion of Period 11 has seen the completion of six audits to date, five audits are in the reporting phase, due to report in the next period and two audits which are in the planning phase to be completed before the end of Period 13.
- 5.5 Two audits which had originally been planned for the current financial year have in one case been deferred to the next year to better align with the latest planned Crossrail schedule milestone dates and another which was cancelled due to being superseded by events.
- 5.6 Details of the audit reports issued during Quarter 3 are included in Appendix 1. Work in progress at the end of Quarter 3 is set out in Appendix 2. Audits planned to start during Quarter 4 are set out in Appendix 3.

Audit Delivery

- 5.7 During the last quarter, Line 3 (TfL Internal Audit) issued two memoranda (memos) and three audit reports, all of which were concluded as “requires improvement”. The two memos related to the Crossrail Complaints Commissioner Accounts for 2018/19 (delayed due to furlough of the auditee) and 2019/20, which are annual audits. The three reports were for audits carried forward from the 2019/20 plan and delayed due to furlough. Summarised findings were presented at the last meeting of the Committee.

Management Actions

- 5.8 Currently there are six actions overdue but no actions overdue by more than 60 days.

Changes to the Plan

- 5.9 Line 3 (TfL Internal Audit) regularly review and update the plan throughout the year, in liaison with management, to reflect changing business priorities. There were no changes to the plan in Quarter 3.

6 Line 3 (IIPAG-CRL) Assurance

- 6.1 The Terms of Reference for the IIPAG Crossrail Sub-Group were agreed at by the Committee on 29 January 2021. The Sub-Group has been established and is now active, as of week commencing 22 February 2021. T.C Chew has been appointed as Chair of the Group, supported by Keith Winder. The Sub-Group will report to

Alison Munro, Chair of IIPAG, and Kenny Laird will retain a 'watching brief', given his involvement to date in Crossrail assurance matters.

Progress to Date

- 6.2 Prior to formal start-up, the Sub-Group met informally on a number of occasions, and a number of interviews have been conducted with key personnel, to help the Sub-Group understand current key issues and concerns, and what other assurance is underway or planned.

Immediate Priorities

- 6.3 The discussions noted above are informing the Sub-Group's thinking around its forward work plan. This is still work in progress but initial areas which have been identified for early review by the Sub-Group are:
- (a) migration to Trial Running – RFLI's readiness and capability to take up its key 'System Operator' role, including any temporary arrangements to mitigate any shortfall in RFLI's organisational capability;
 - (b) the challenge of completing outstanding works once Trial Running commences (as the Central operating Section will be a "live" railway), including how the required expert possession planning will be achieved, and the risks associated with delayed work and the winding down of construction contracts;
 - (c) working with CRL's external experts on the critical requirements and readiness for entry to Trial Operations; and
 - (d) the Sub-Group intends to conduct a number of senior-level interviews within Crossrail (project), RFLI, and MTR Crossrail (train operator) to gain a high-level perspective on the degree of project completion and the readiness to commence both Trial Running and Trial Operations.

Review of LOD1 and LOD2

- 6.4 The Sub-Group's report on the effectiveness of LOD1 and LOD2 is attached as Appendix 4. It has been discussed with officials and no objections raised to its recommendations.

7 Infrastructure Projects Authority (IPA) Critical Friend Review

- 7.1 The Infrastructure and Projects Authority is the Government's centre of expertise for infrastructure and major projects reporting to the Cabinet Office and HM Treasury. The IPA conducts regular independent reviews of selected major UK projects.
- 7.2 In November 2020, the IPA conducted a follow-up Critical Friend Review of Crossrail and made seven recommendations. Details of the recommendations are included in Appendix 5.

- 7.3 Of the seven recommendations, five relate to the effectiveness works delivery of the Crossrail project and are currently being addressed as part of the Crossrail's delivery programme.
- 7.4 Two recommendations relate to the breadth of Crossrail's 3LoD assurance framework following the transition to TfL governance and are currently under review by TfL. Progress with these actions will reported at the next meeting of the Committee.

8 Integrated Audit and Assurance Plan (IAAP)

- 8.1 The 3LoD IAF maintains an integrated plan of assurance activity coordinated through the Crossrail Programme Assurance Group (CPAG) forum. A summary of planned assurance activities is summarised in Appendix 6.

List of Appendices:

- Appendix 1 – Line 3 (TfL Internal Audit) Reports issued in Quarter 3
Appendix 2 – Line 3 (TfL Internal Audit) Work in progress at the end of Quarter 3
Appendix 3 – Line 3 (TfL Internal Audit) Work due to start in Quarter 4
Appendix 4 – IIPAG Crossrail Sub-Group Report on adequacy of the first and second lines of defence
Appendix 5 – IPA Critical Friend Review Recommendations Summary
Appendix 6 – 3LoD Assurance Forward Look

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Appendix 1 – Line 3 (TfL Internal Audit) Reports issued in Quarter 3

Enterprise risk	Directorate	Audit title	Summary of Findings	Conclusion	H	M	L
FC3- Crossrail may not be able to demonstrate sufficient commercial and/ or financial control.	Crossrail	Consents Compliance Governance	<ul style="list-style-type: none"> Consents registers were not up to date Serious Incident Event Review (SIER) reports were not completed in a timely manner 	Requires Improvement	2	0	1
		Crossrail Complaints Commissioner Accounts 18/19	<ul style="list-style-type: none"> Accounts of the Crossrail Complaints Commissioner, in all material aspects, accurately reflect the receipts and payments during the financial period ended 31 March 2019 In addition, in all material aspects, the accounts comply with the Accounts Directions issued on behalf of the Crossrail High Level Forum This review and report were delayed due to the Covid 19 pandemic 	Memo	0	0	0
		Crossrail Complaints Commissioner Accounts 19/20	<ul style="list-style-type: none"> Accounts of the Crossrail Complaints Commissioner, in all material aspects, accurately reflect the receipts and payments during the financial period ended 31 March 2020 In addition, in all material aspects, the accounts comply with the Accounts Directions issued on behalf of the Crossrail High Level Forum 	Memo	0	0	0
OC3- Crossrail fails to retain key competence and leadership to complete the programme.	Crossrail	Culture Change	<ul style="list-style-type: none"> Crossrail is operating without an agreed framework for assessing, managing and monitoring organisational culture. Values statements should be expanded to provide guidance around expected behaviours and best practice at the corporate, directorate and project levels. 	Requires Improvement	2	2	0
FC3 - Crossrail may not be able to demonstrate sufficient commercial and/ or financial control		Adequacy of the Supply Chain Assurance Framework	<ul style="list-style-type: none"> Terms of reference and RACI matrices for the Vis Board meetings have not been defined Forecast due dates for actions were not being updated and they were not being discussed in order of severity. 	Requires Improvement	2	2	0

Appendix 2 – Line 3 (TfL Internal Audit) Work in progress at the end of Quarter 3

Grouped by Enterprise Risk

- Six audits were in progress at the end of Q3

Enterprise risk	Audit title	Objective	Current status
OC1 Crossrail and TfL may fail to deliver on the transition plan to complete the programme.	Governance and Organisational Effectiveness	To provide assurance over the adequacy and effectiveness of arrangements designed to ensure timely project delivery	Reporting
	Transfer of CRL programme to TfL	To provide assurance on the effectiveness of controls around the transfer of the Crossrail programme to TfL	In Planning
FC3-Crossrail may not be able to demonstrate sufficient commercial and/or financial control.	Risk Management	To provide assurance over adequacy and effectiveness of risk management in Crossrail.	In Progress
	Management of Staff costs	To provide assurance that the Contractual Appointments process is being approached and managed in a transparent and effective manner.	In Progress
HS4 Safety performance could be impacted by changing from the Crossrail programme rules to the IM operational rules.	CRL HSE framework	To provide assurance over the adequacy and effectiveness of the HSE framework	In Planning
SC4 -Volume of residual works may impact operation and safety of the railway (ADM)	Alternative Delivery Model Strategy	To provide assurance that the alternative delivery model strategy is adequate	In Planning

Appendix 3 – Line 3 (TfL Internal Audit) Work due to start in Quarter 4

Grouped by Directorate

- There are 4 audits planned to start during the quarter 4

Enterprise risk	Directorate	Audit title	Objective	Planned Period
Opening of the Elizabeth Line	Crossrail	Management of AFC	To provide assurance over the effectiveness of controls for the management of Anticipated Final Cost (AFC)	P12
		Management of Indirect Costs	To provide assurance that the Crossrail organisation is managing indirect costs in line with Programme requirements	P11
		Readiness for Trial Running	To provide assurance over the operational readiness of the operators to commence Trial Running	P12
		Demobilisation of Tier 1 contractors	To provide assurance that the controls around Tier 1 contractor demobilisation are adequate and effective.	P12

INDEPENDENT INVESTMENT PROGRAMME ADVISORY GROUP

CROSSRAIL

REPORT ON THE ADEQUACY OF THE FIRST AND SECOND LINES OF DEFENCE

Version: Final for TfL Elizabeth Line Committee

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1. Executive Summary

This report considers first the assurance of the programme for completing the railway, and then the assurance that the railway itself will be safe and operable. The report focusses on the imminent milestone of entry into Trial Running, and on assurance preparedness for the remaining phases of the programme.

Regarding programme assurance, it is not controversial to conclude that the first and second lines of defence, (LOD1 and LOD2) have not yet assured a realistic and deliverable programme for the completion of the railway. The programme's focus today is understandably on getting into Trial Running rather than planning for the next phases. I have recommended that the third line of defence revisits the effectiveness of LOD1 and LOD2's programme assurance as the next version of the Delivery Control Schedule is developed later this year.

With regard to assurance of the railway itself, I have tried to judge the extent to which the assurance process is under control, how effectively it manages complexity, the quality of the technical and safety judgements that are being made, and whether assurance is being undermined by programmatic pressure.

LOD1 assurance of the railway is extremely complicated and bordering on the complex. The control environment is not entirely stable, as changes to the assurance process are made in order to keep the programme on track. However, the risks this brings are significantly mitigated by the soundness of the data and information on which assurance judgements are being made and, crucially, on the experience and continuity of a small number of key professionals in both CRL and RfL.

The incomplete state of technical and safety assurance at this point makes when to enter into Trial Running a finely balanced risk judgement, rather than a purely objective procedural decision. I have recommended that the assurance process should culminate in a summit level LOD1 assurance event, in which executives engage formally with key LOD1 staff prior to concluding whether to enter Trial Running or to take more time.

Beyond the decision on Trial Running, I have recommended that care is taken not to impede the completion of assurance activities by demobilising too quickly, and to beware of unplanned turnover in key positions. The planning for assurance of the railway beyond entry into Trial Running is relatively immature and soon needs to become a major focus.

LOD2 is in good shape but is focussed predominantly on CRL and its interfaces. I have recommended that the scope of the second line should quickly be extended to the whole end to end Elizabeth Line railway.

In order to carry out this review I found it necessary to write a short plain-man's guide to the assurance of the railway. I have included this description in an appendix in case it provides a guide for the perplexed.

I would like to thank all those in LOD1 and LOD2 for giving me their time and for being so open and constructive. They have my best wishes for the next phase of the programme.

2. Introduction

Assurance of Crossrail can usefully be considered under two headings: Assurance of the Programme, and Assurance of the Railway.

Assurance of the Programme covers all aspects from safety performance and control of scope to commercial and legal considerations. However, at this late stage of the project, the main focus is on the planned schedule and cost to complete. The key consideration is whether the baseline and periodic forecasts are realistic and take sufficient account of risk.

Assurance of the Railway on the other hand is about ensuring that it will be safe, operable and maintainable, and that it will perform at the required level. Earlier in the programme this concerned requirements and design. Now it is focussed on completion of construction, testing and handover of the railway, and the operational readiness of the duty holders to run an integrated service.

As in many projects, Crossrail has deployed a 'Three Lines of Defence' Assurance Model. The First Line of Defence (LOD1) is a collective endeavour delivered by all those who own and manage the programme, which for Crossrail means the project managers and technical professionals in all the organisations involved, and the managers, executives and boards to whom they report.

The role of the Second Line of Defence (LOD2) is firstly to independently assure the adequacy of LOD1, and secondly to provide an informed view, independent of the programme, of the realism of the programme's cost and schedule forecasts, and whether programme risk has been appropriately assessed and allowed for.¹

In terms of impact on successful delivery, LOD1 is the most important. If the first line is working well, then inadequacies in the second line may not matter. However, no amount of LOD2 assurance will compensate for poor ownership and control in the first line. All they can do is shout.

The purpose of this report is to assess the adequacy of LOD1 and LOD2 as the programme moves for the first time directly under TfL control.

3. Findings

a. Assurance of the Programme

As is well known, the Crossrail Programme has struggled for some years to land on an agreed, fully assured baseline, and leadership's attention has been devoted to driving delivery while assessing the extent of outstanding work. The Programme's latest schedule, Delivery Control Schedule 1.1 (DCS1.1) was baselined in Summer 2020. Since then, delivery has consistently been reported to be behind the DCS1.1 baseline, and an updated schedule DCS1.2 is planned for end April 2021.

¹ The Third Line of Defence (LOD3) for the Crossrail Programme has been carried out from a number of perspectives including TfL Internal Audit, an external Project Representative, and an expert panel. LOD3 is currently in flux as a sub-group of TfL's Independent Investment Programme Advisory Group is being formed.

The position of the programme is not atypical for a large project in its final stages. There is an inevitable tension between the desire for a realistic baseline schedule, with adequate allowance for remaining risk and uncertainty, and the need to hold to milestone commitments on a schedule that becomes progressively less achievable. It is well understood across the programme and its stakeholders that the DCS requires significant further work in order to establish a detailed plan that is underpinned by supply chain commitments and resource constraints and is informed by a sufficient understanding of risk. In the absence of that plan, however, it is hard to draw conclusions about LOD1 beyond saying that it has not yet developed a realistically deliverable schedule. As for LOD2, it is fair to say that the stress in DCS1.1 has been escalated consistently since it was baselined in the summer of 2020.

The right time to make a better assessment of the adequacy of LOD1 and LOD2, from a Programme Assurance point of view, is as DCS1.2 is finalised and assured.

Recommendation 1: The third line of defence should revisit the adequacy of LOD1 and LOD2's assurance of the Programme as part of its own LOD3 assurance of DCS1.2.

b. Assurance of the Railway – LOD1

The programme has been undertaking Dynamic Testing in the Central Operating Section since early 2019. Before the railway is completed, there are a number of intermediate transition points that have to be assured. At each of these points LOD1 must assure that the railway will be safe, operable, maintainable and ready to reach the railway performance criteria for the next stage. These transition points are:

- Entry into Trial Running in the Central Operating Section. The purpose of the Trial Running period is to demonstrate that the railway can meet the required levels of performance under various modes of operation. This is a key moment in the project because it is the point at which the Central Operating Section becomes an operating part of the national rail network. It ceases to be managed by CRL as a construction site under the *Construction Regulations*, and becomes an operating railway within the *Rail for London (RfL) Safety Management System* under the *Railways and Other Guided Transport Systems Regulations (ROGS)*.
- Entry into Trial Operations in the Central Operating Section. The purpose of Trial Operations is to demonstrate that the railway is capable of being operated in accordance with the requirements and the Operators' safety management systems.
- Readiness for Revenue Service in the Central Operating Section with some stations incomplete (referred to as stage 3a)
- Readiness for Revenue Service in the Central Operating Section with all stations complete (referred to as stage 3R)

Stages 4 and 5 then extend the operation beyond the Central Operating Section ultimately reaching Stage 5b, which is the whole end to end Railway.

This review has focussed on the entry into Trial Running because it is the first and best defined of these points. In my view, the adequacy of LOD1 assurance of the railway can be judged by the

extent to which it is under control; by how effectively it manages complexity; by the quality of the technical and safety judgements that are made; and by whether it is undermined by the pressure to make progress. I have marshalled my findings under these headings.

Control

It was originally intended that, prior to the beginning of Trial Running, substantially all of the Central Operating Section of the railway would have been completed, and that handover reports would have been assembled and assured. However, as it became clear that for many elements of the railway there would be project work outstanding, an exercise was completed in the course of 2020 to identify the minimum evidence required to support the transfer of operational control of routeway assets to RfL.

The decision on whether to enter Trial Running requires assurance of that evidence. Complete and accurate information is essential for effective first line assurance. It is assembled from the RfL Management System, the Crossrail Assurance Reporting Environment, and data from a number of sources including the CRL document management system eB. The number of individual data points is huge, from acceptance certificates, punch lists and spares contracts to risk mitigations, operational workarounds and lists of outstanding training. The information is brought together in the Trial Running Mobilisation Board.

I have heard from many that after considerable effort over the last year data is now well controlled and provides sound accurate information overall. There are two factors that make maintaining this control challenging as the point of entry into Trial Running comes closer. Firstly, progress in some areas has fallen short of what was intended and changes to the required evidence are having to be accommodated. Uncertainties about what is to be handed over remain, and in some cases asset data is poorer than was anticipated. Secondly, the status of the outstanding work changes every day, which makes supporting a protracted readiness decision making process challenging.

Broadly however, my conclusion is that LOD1 assurance of the railway is based on sound information and is in control.

Complexity

The scale of the Crossrail project, its staged completion, and the number of parties involved, make the LOD1 assurance effort intrinsically complicated. The inevitable jargon and boundless number of acronyms makes understanding the assurance endeavour even more difficult. In the appendix I have attempted to describe LOD1 at a simple level in as plain English as possible. I found this essential in order to be able to make an assessment about the adequacy of LOD1.

A number of factors push this complication towards genuine complexity. The main cause is that what is being taken into Trial Running is a different railway than was expected. The routeway will be handed over but the stations will not. Even on the routeway, there is more outstanding work than was anticipated. For a time, CRL will remain the Design Authority while configuration change control will be with RfL. Incomplete work requires temporary risk mitigation and operational workarounds. Time compression leads to sequential decisions becoming concurrent. The logical process through which the Trial Running entry decision will be taken has progressively

changed in order to maintain progress. The introduction of the Structured Engineering Judgment (STEJ) process is a recent example.

Some experienced and credible professionals on the project are comfortable with this complexity. This, they say, is what it is always like at this stage of a large project. Others worry that it has become challenging for decision makers to see the wood for the trees. My view is that the current situation is indeed complex. Few people have a clear picture of the whole assurance landscape. The risk that the decision to enter Trial Running will be sub-optimal due to this complexity is real. In my view, the main mitigator to this risk is the quality and continuity of a handful of key people. Effective LOD1 assurance is relying on incumbents including the Chief Engineer of CRL, RfL Head of Engineering, RfL Head of Infrastructure, TfL Chief Engineer and the Chair of the Railway Assurance Board (Crossrail) being able to see through the complexity.

Judgement

LOD1 assurance prior to entering Trial Running will be built on a huge number of individual judgements made by professionals across CRL, RfL, London Underground, MTR and their supply chains. Some judgements, such as whether an element of construction is or is not complete, or whether a test has or has not been passed, are relatively straightforward. Others, such as judging the mitigations or workarounds required to compensate for work that is not complete, are more challenging.

I have been impressed with the professionals I have interviewed for this review. They have plenty of relevant experience, turnover is low, and I have detected a strong determination to 'do the right thing'. For the more challenging judgements, I am confident that the LOD1 processes, such as the STEJ process, are asking the right questions to allow sound judgements to be made.

There are two aspects of collective judgement I would like to comment further on. The first of these is the challenge of assessing the combined impact of many individual risk judgements. The relationship between cumulative risk and the number of non-standard operational workarounds, for example, is not linear but compound. The second challenge is how to judge the readiness of RfL, because it is a new operational organisation. RfL has taken a sound structured approach to developing its organisational readiness, but it is intrinsically hard to judge readiness of a non-operational organisation for its first operations. The judgement is harder because the railway is less complete than that for which the organisation was designed.

In my experience it is not uncommon for progress towards major decision points in large programmes to gain an irresistible momentum. A condition-based stage-gate can become a dated milestone. The potential for groupthink is real. In the case of the decision to enter Trial Running, neither the physical nor documented status of the railway is as anticipated, and neither the technical nor safety assurance is as complete as was originally envisioned. In my view the decision of whether to enter Trial Running on the current schedule is a finely balanced risk judgement. On the one hand it is valuable to keep the maximum feasible pressure on the schedule, and the programme needs the learning which will be obtained from Trial Running. On the other hand, taking the railway into a new operational organisation with a large amount of

work outstanding may have operational consequences, and completing the remaining physical works may take longer under the constraints of an operational railway.

As assurance processes have evolved in recent months, an adjusted decision-making process has evolved in which interim safety justifications will be assembled into a combined argument that it is safe to proceed. This process, and the assurance that RAB[C] brings to it, looks sound to me. However, my view is that the decision to be taken is more than the culmination of this process. To guard against the risk of this important decision point being passed through momentum, I recommend adding a final step. I think that the accountable leaders need an opportunity to jointly assess the pros and cons of proceeding by taking evidence in person from the key individuals in the LOD1 assurance process.

The purpose of this step is not to second-guess the technical judgements that have been made in LOD1, but to stand back and make an informed and balanced programmatic judgement about whether to enter Trial Running or whether to take more time.

I envision an event at which the accountable leaders (perhaps the COO Elizabeth Line, MD London Underground, MD MTR-EL and CEO Crossrail) should review the assurance evidence and status of the railway with the key LOD1 staff, including the Chief Engineer of CRL, RfL Head of Engineering, Head of Infrastructure and Head of Operations). The Chair of the RAB[C], and the Heads of LOD2 and LOD3 should be in attendance. I think it would be helpful also to have some non-executive representation.

Recommendation 2: TfL should hold a summit level LOD1 assurance event in which executives engage formally with key LOD1 staff prior to deciding to enter Trial Running. There should be some TfL board non-executive presence, and the Chair of RAB[C] and the heads of LOD2 and LOD3 should be in attendance.

Pressure

At critical points in a programme there is a risk that the pressure on the schedule may distort the judgements to be made, either by suppressing accurate communication of status and issues, or by encouraging individuals to tolerate more risk than they would normally accept. Through the review process I have heard multiple examples of excellent leadership behaviour from executives in TfL, London Underground, RfL and CRL in which their determination to make progress has been matched by clear resolve not to compromise on safety. This is a difficult balance to get right, but my view is that the professionals I have spoken to are confident that they will be supported if, in their judgement, something is not sufficiently safe to proceed.

c. Beyond Entry to Trial Running

Considerable LOD1 assurance effort will continue into the Trial Running period. As construction work is completed, the pressure to demobilise the supply chain and reduce the size of CRL will mount. It is common in large projects for final assurance processes to be compromised by the disappearance of project resources, leaving the enduring asset owner to manage as best they can. My view is that demobilisation decisions should be made with full account of the completion of LOD1 assurance activities and that LOD2 advice should be sought throughout.

Recommendation 3: Demobilisation decisions should be informed by the completion of LOD1 assurance progress and take account of advice from LOD2.

The focus on getting the programme into Trial Running has inevitably distracted from preparing for continued assurance during Trial Running, planning for assurance of entry into Trial Operations and assurance of the subsequent steps in completing the railway. In some respects, the next assurance steps will be more straightforward as the railway will be more complete. On the other hand, Trial Operations brings the traveling public into the equation and subsequent milestones will require a much greater involvement of Network Rail.

With the benefit of hindsight, an unrealistic view of likely progress at this point has led to progressive compromise in the assurance approach being necessary. For the future it would be better to make a more realistic assessment of what is actually required at the remaining decision points and then stick to the plan.

Insofar as the programme has been able to accommodate entry into Trial Running being a moving target, it has been due to the retention of longstanding professionals in key LOD1 assurance positions, such as the Chief Engineer of CRL and the RfL Head of Engineering. Had there been recent turnover in these positions, the LOD1 assurance would be more difficult and protracted. Many of these key professionals have been involved in Crossrail for many years, and some will naturally wish to move on to new challenges. Consideration should be given now to how to retain the knowledge and experience required for the rest of the assurance journey.

Recommendation 4: Planning for LOD1 assurance for entry to Trial Operations, and the subsequent decisions through to full, end to end, revenue service, should begin as soon as possible. This should include proactive consideration of the likely compromises that may be required at each stage, and how to retain key LOD1 knowledge and experience.

d. Second Line of Defence – LOD2

For LOD2 to be effective in a large programme requires a high-quality team with a deep understanding of the programme and the ability to make good judgements about which issues and risks to escalate. Its leader needs to have the courage to speak truth to power and, crucially, it needs senior management support, even when its findings are inconvenient or uncomfortable.

In the Crossrail programme LOD2 is provided by a Programme Assurance team which reports into the CRL CFO. I have found the LOD2 team to be highly regarded right across the programme. It is considered objective and independently minded whilst retaining a supportive mindset. The team also makes good use of external expertise, including from the remaining members of what was the Crossrail independent advisory panel. My observation is that the LOD2 team are clear-sighted about the risks and issues in the programme.

Previously, LOD2 undertook Targeted Assurance Reviews against a pre-agreed plan. Over recent months the team has moved closer to a continuous assurance approach. This makes sense as the assembly of assurance evidence reaches a peak of activity, but brings the risk that LOD2 loses independence and becomes enmeshed in the management and coordination of LOD1. The Head of LOD2 is alive to this risk and I have not seen any evidence of it materialising.

Understandably, the LOD 2 assurance through the life of the Crossrail project has been very focussed on CRL and its interfaces. This was appropriate during the construction phase of the railway, but has now become a limitation. While the LOD2 team has an enterprise mindset, it is not well placed to assure RfL, London Underground, MTR-EL and Network Rail. RfL does not have an equivalent LOD2 team. The TfL Project Assurance team which provides LOD2 for London Underground has not been involved. MTR-EL has a Director of Business Readiness who plays a similar role to LOD2, but is not connected with the CRL LOD2. While it is too late to achieve an Elizabeth Line wide LOD2 in time for entry to Trial Running, in my view this should be brought together as soon as practical afterwards.

Recommendation 5: The scope of the LOD2 team should extend to the whole of the Elizabeth Line including RfL, London Underground, MTR-EL and the interfaces with Network Rail.

Jonathan Simcock

Appendix: Description of the First Line of Defence for the Railway

The First Line of Defence (LOD1) for the Crossrail Programme is extremely complicated and is wrapped in layers of jargon and acronyms that are very hard for an outsider to penetrate. This Appendix attempts to describe the first line assurance in plain English. It was written to help the reviewer to understand how LOD1 comes together for the Programme. It covers all the main aspects but is in itself a simplification. Many complexities, exceptions and additions are omitted.

The Scope of Assurance

The overall route of Crossrail is made up of the **Central Operating Section** and the **On-Network Works** to its east and west. This report focusses mainly on the Central Operating Section because it is the main focus of the next phases of the project. I will comment further on the On-Network Works later.

The Central Operating Section is made up of **Elements** such as the routeway civils, portals, shafts, stations, rolling stock and Railway Systems. The Railway Systems Element is divided into a number of **Chapters** such as track, energy, and signalling equipment. Each Element or Chapter has been delivered under one or more Contracts with the supply chain.

Deliverers and Operators

Organisations can be considered as playing distinct roles as either deliverers or operators. Some organisations, in particular Network Rail, play both roles.

Deliverers

Deliverers have to assure what they handover. This includes checking the physical delivery and construction as well as documentation such as as-built drawings, operating and maintenance procedures, and evidence of successful testing.

In simple terms, the delivery organisations are:

- **CRL** which is delivering most of the Central Operating Section
- **Network Rail** which has delivered the On-Network Works
- **Bombardier Transportation** which has delivered the Class 345 rolling stock.

This report concentrates mainly on **CRL** because the Central Operating Section is the focus of the next phases of the project. As far as **Bombardier Transportation** is concerned, the Class 345 rolling stock is already in operation on parts of the Network Rail network and in Dynamic Testing in the Central Operating Section. This means that, although there will be more drops of software in the future and assurance evidence for the rolling stock will be included in the remaining assurance processes, the rolling stock itself should need relatively little further assurance. I will comment briefly on **Network Rail** as deliverer of the On-Network Works later.

The situation in practice is more complicated than described here. For example, Network Rail is delivering Abbey Wood station within the Central Operating Section, and Bombardier Transportation is delivering Old Oak Common Depot as well as the rolling stock.

Operators

Operators are the organisations who receive elements of the railway from the Deliverers and must be ready to operate them as duty holders. In simple terms the operating organisations are:

- Rail for London (**RfL**) which accepts the railway and rolling stock as the Infrastructure Manager² for the Central Operating Section
- **Network Rail**, which accepts the On-Network Works as Infrastructure Manager
- **MTR-EL**, which operates the trains as the Railway Undertaking,³ and
- **London Underground**, which accepts and operates most of the stations in the Central Operating Section.

The Operators must assure what they receive from the Deliverers. In some cases, such as the handover of Elements from CRL to RfL, this can happen through joint processes in which both Deliverer and Operator are involved.

In addition, Operators must assure that they are themselves ready to operate what has been delivered. This includes management systems and processes as well as operational and maintenance organisational readiness.

The Assurance Endgame

This section describes the overall assurance destination. The complications of assuring intermediate steps are covered later.

To understand how the assurance of the railway works, it is helpful to describe activity under two headings, Technical Assurance and Safety Assurance, although in practice they are closely related. Once both have been satisfied then, with regulatory approval, the railway can enter service.⁴

Technical Assurance

This side of LOD1 is assuring that the assets of the railway, and all the associated data and documentation, are satisfactorily completed and handed over.

The basic process for the Central Operating Section is relatively straightforward in principle. Contractors handover their engineering deliverables to CRL, and these are assured by the CRL Central Engineering Group against a master list of deliverables. This assurance is recorded in the **Crossrail Assurance Reporting Environment**. When each Element or Chapter is completed an

² Infrastructure Manager is the regulatory term for the entity responsible for maintaining railway infrastructure, control and safety systems.

³ Railway Undertaking is the regulatory term for the entity licenced to provide services for the transport of passengers by rail.

⁴ The regulator, ORR will ultimately determine the Authority to Place into Service (APIS). While LOD1 is also feeding evidence into submissions to ORR, for simplification, I have not described the regulatory processes in this appendix because the regulator is not part of the Three Lines of Defence.

Element Completion Handover Report is compiled by CRL. This is reviewed by the CRL Chief Engineer before being presented to RfL or London Underground. If the receiver is satisfied, an **Element Completion Handover Certificate** is issued.

In parallel there is process for ensuring contractual completion of contracted works through a **Completion Readiness Assessment Framework (CRAF)**. This ensures that everything the Contractor was contractually required to deliver has been delivered and that anything outstanding is tracked. The CRAF process is managed by the CRL Quality team.

These technical assurance processes should ensure that all the delivery work is completed. However, it is not sufficient in itself to assure that the Railway will be safe to operate.

Safety Assurance

The evidence that the railway is safe is brought together into the Crossrail Engineering Safety and Assurance Case (**CESAC**). For the Central Operating Section, the CESAC can be simplistically described as being made up of **Safety Justifications** from CRL and RfL. (A Safety Justification is a documented body of evidence that provides a demonstrable and valid argument that a system is adequately safe.) The **CRL Safety Justification** is made up of separate Safety Justifications for each Element or Chapter, which are in turn supported by the Contractor's **Engineering Safety Justifications**. The **RfL Safety Justification** describes how RfL meets its statutory obligations and how it ensures that the systems are safe and operable, and that staff are competent to use them.

MTR-EL has its own safety assurance process which provides evidence to a **Safety Validation Panel**. MTR-EL also provides evidence on the safety of its management systems into the RfL Safety Justification.

As the various Safety Justifications are completed, they are assured by various professional and safety review panels. The final CESAC is accepted by an independent Crossrail Rail Assurance Board, **RAB[C]**. RAB[C] is independently chaired. RAB[C] members who come from delivery and operations organisations are required to use their independent judgement when acting in the board. RAB[C] is the apex of LOD1 safety assurance for the Central Operating Section.

There is a separate, but related leg of Safety Assurance which is required in order to satisfy regulators of compliance with the Railway Interoperability Regulations. This activity requires development of technical files which are assessed by a Notified Body (**NoBo**) and a Designated Body (**DoBo**) against the relevant standards and rules. Only if the ORR are satisfied with this process will the railway receive an Approval to Place in Service (APIS). Collation of the necessary compliance evidence runs alongside the rest of the Assurance activity and is incorporated into the relevant Safety Justifications.

Finally, for each of CRL, RfL and Bombardier Transportation, an independent Assessment Body (**AsBo**) is required to provide assurance that engineering design safety risks have been shown to be tolerable and reduced to as low as reasonably practical and comply with a mandatory risk-evaluation methodology known as the Common Safety Method (**CSM**). The CSM activity concludes with an all-party **Declaration of Control of Risk (DoCoR)** that is made to the regulator on the basis of the Safety Justifications and the AsBo's Reports.

Intermediate Assurance Points

The assurance described above will not be complete until the whole programme is complete. Meanwhile, there are a number of intermediate transition points that have to be assured. At each of these points LOD1 must assure that the railway will be safe, operable, maintainable and ready to reach the railway performance criteria for the next stage. The only one of these points for which there is detailed planning is entry into **Trial Running** in the Central Operating Section.

This phase is inherently complicated because CRL will still be making changes to a railway that is under RfL's operational control. Furthermore, while the routeway will be handed over, the stations will not.⁵

Technical Assurance

It had originally been intended that all the Central Operating Section Elements would have been handed over prior to Trial Running. However, it was then recognised that while some Elements of the railway (such as Portals, Shafts and some rail systems such as Track and Over Head Line Equipment) may be fully assured for final handover, for many elements there will be work outstanding. The Handover Reports for these elements will therefore not be completed and assured by CRL or accepted by RfL or London Underground.

A **Stage Completion Report** will therefore be produced by CRL, and RfL will assemble acceptance evidence into a **Trial Running Railway Acceptance Case**.

Safety Assurance

Meanwhile, a version of the **CESAC** is being assembled for Trial Running in the Central Operating Section. As for the final CESAC, this is made up of the **Safety Justifications** for the Chapters and Elements, and the RfL Safety Justification for the Trial Running phase.

It was intended that the complete Trial Running version of the CESAC would be accepted by RAB[C] before Trial Running begins. However, the challenge with completing the Chapter Safety Justifications is that each has documentary links with many others. This means that RAB[C] can only **endorse** a Safety Justification by making a preliminary judgement but cannot actually **accept** it until all the related Safety Justifications are also complete. These links are called **Dependencies**. It has been judged that waiting to get into Trial Running until all these Dependencies have been completed is not necessary. Consequently, it has been agreed that the CRL Chief Engineer and RfL Head of Engineering will, for each Safety Justification, make a Structured Engineering Judgement (**STEJ**) about the acceptability of moving into Trial Running. This means that Trial Running will begin without RAB[C] accepting the CESAC, but rather on the basis of endorsed Safety Justifications and the Structured Engineering Judgements. RAB[C] have accepted this way forward so long as the outstanding Dependencies are unambiguous and have a risk mitigation plan.

Network Rail

⁵ The Station Completion level required for Trial Running is referred to as SC1. The level required for handover to RfL or London Underground is SC3.

Most of Network Rail's delivery is complete. Outstanding are completion of enhancements at a number of stations and elements of the telecommunications scope.

It has been a longstanding agreement, known as the *Agreed Assurance Assumption*, that Network Rail will self-assure its own delivery (of the On-Network Works) and its operational readiness (as Infrastructure Manager). Network Rail has a long-standing assurance processes which determine how it obtains engineering assurance in accordance with its Safety Management System. This assurance framework has not been considered in any depth in this review.

In isolated cases, Network Rail is delivering what will become RfL assets. These include assets at Abbey Wood station and CCTV cameras. Notwithstanding their self-assurance of delivery, Network Rail has to submit evidence of safety into the CESAC.

Assurance of the interfaces between the Central Operating Section and the On-Network Works is the responsibility of CRL, and interface Safety Justifications are included in the CESAC and RAB[C] processes described above.

Appendix 5 – IPA Critical Friend Review Recommendations Progress Summary

	There is a risk that.....	IPA Recommendation	Critical / Essential / Recommended	Classification	Comments - LoD2 Update CRL PROGRESS
1	the Lines of Defence are not identifying all the tasks that need to be done to achieve the target opening date for revenue service.	LoD1 to ensure there is a precise definition, agreed by CRL delivery and RFLI, of the evidence and handover information required to achieve the minimum configuration for trial running and trial operations.	Critical (do now)	3. Programme and Project Management	<ol style="list-style-type: none"> Has CRL fully captured and communicated the scope required for TR and TO? YES for TR, but requires further detailed analysis for TO Is it measurable? Yes through TA metrics.
		CRL and RFLI Programme Directors to ensure a resource loaded schedule is produced showing the delivery of all the documents and acceptance dates required to support handover.	Essential by 31/1/2021	3. Programme and Project Management	<ol style="list-style-type: none"> Does the CRL schedule (DCS and subsidiary control documents) reflect all CRL and RFLI activity? DCS 1.2 is opportunity to address this; in progress. Is the CRL schedule resource loaded? DCS 1.2 is opportunity to address this. NOT YET
3	the burgeoning number of Dependencies relating to Safety Justifications, and inter-dependencies such as station integration and commissioning, result in weak risk identification, tracking and mitigation.	CRL LoD2 to prioritise the capture of risks and dependencies from all parties across all stages, reflecting their impacts in the DCS.	Essential, by 31/1/2021	9. Risk, Issues & Dependency Management	<ol style="list-style-type: none"> Is CRL actively capturing and managing risk at project and programme levels? YES. Effectiveness is maturing but needs to be improved at both project and programme level.
4	the individual Safety Justifications will not support an integrated safety case in time to achieve Trial Operations.	CRL to ensure a clear line of responsibility transfers to the Elizabeth Line Delivery Group for schedule assurance across the whole system, including RFLI and Network Rail (both regions) and infrastructure operations along the entire line of the route (i.e. Shenfield to Reading).	Essential, by 31/12/2020	1. Governance	<p>Notes:</p> <ol style="list-style-type: none"> At a Technical Assurance level, cross IM alignment is being assured through the reverse-pass process. Key question here is whether the delivery schedules across all IMs are fully programme integrated and aligned? CRL propose DCS 1.2 is opportunity to address this going forward.
5	without LoD 3, the LoD 1 and 2 activities might not be robust and could contain gaps.	IIPAG to proceed at pace to strengthen LoD3 with a focus on trial operations and revenue service opening, with more regular use of Expert Panel.	Essential, asap post Elizabeth Line Committee 26/11/2020	1. Governance	<p>✓ IIPAG now in place: First meeting held 12th January, ToR in place</p> <ul style="list-style-type: none"> LoD3 commenced LoD1 / LoD2 review LoD3 to look at TR readiness Key panel appointments yet to be finalised
6	with RFLI and CRL now both governed and controlled by TfL, the assurance regime either becomes compromised or unnecessarily complex.	CRL CFO to take the opportunity to simplify the LoD 1,2,3 assurance process, recognising that RFLI and CRL are under the direct control of TfL.	Recommended, by 1/1/2021	1. Governance	<p>TfL question; LoD1 and LoD2 specific to CRL programme environment. LoD3 simplified. Reporting aligned with TfL assurance providers. TfL may consider a role in assuring LUL capital expenditure following h/o</p> <ol style="list-style-type: none"> Should TfL consider a pan-organisational programme assurance function, covering CRL, RFLI, LU and possibly NR? ...or do we rely on managing the interfaces between them?
7	opportunities to align CRL's and RFLI's cultures, post-integration, are missed.	MDs of CRL and RFLI to begin driving a culture of increasing collaboration and joint working.	Critical (do now)	4. Change Management & transition	<p>From CRL perspective now be superseded; to check w/TfL. Collaboration culture improved significantly – will momentum be maintained when in TR?</p> <ol style="list-style-type: none"> Is this starting to happen anyway ? Are we seeing a closer collaboration between CRL and RFLI ?

Appendix 6 – 3LoD Assurance Forward Look

Period	LoD1 Events	LoD2 - PPA	LoD3 - TFL (IA)	LoD3 - IIPAG (CRL)	Other / External
10	Assurance inputs for Trial Running	Periodic Assurance Review P10 DCS Assurance Update TAR21 Technical Assurance Surveillance TAR25	(Quarterly-based planning) 20 508 Demobilisation of Tier 1 contractors 20 505 Management of Staff costs	Note: IIPAG(CRL) Plan in development, timing provisional / indicative only.	NAO. DFT (tbc) GLA (tbc)
11	Assurance Approvals for Trial Running	Periodic Assurance Review P11 RFLI TR Readiness TAR23 Coordination Support to NAO AUDIT	20 509 Risk Management 20 503 Operational Readiness for trial running	First IIPAG Meeting LoD2 and LoD1 Effectiveness Review Trial Running Readiness Review	
12	T-4 Infra, Ops and Maintenance Ready for Trial Running	Periodic Assurance Review P12 CRL Trial Running Readiness Review TAR25	20 500 Crossrail Complaints Commissioner 19 502 CRL HSE framework 20 510 Transfer of CRL programme to TfL	DCS (Delivery Control Schedule) and periodic reporting (TBC)	
13	Trial Running Commences	Periodic Assurance Review P13 Stations Systems Integration Plan TAR26 Cost Pressures and Root Cause Review TAR 27	20 506 Management of AFC 20 504 Alternative Delivery Model Strategy	(TBC)	
1	Stations SC3 Tranche 1 Complete	Periodic Assurance Review P1 Trial Running Progress Review TAR27	(Quarter 1 plan in development) Operational Readiness for trial operations	(TBC)	
2		Periodic Assurance Review P2		(TBC)	

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Elizabeth Line Committee



Date: 18 March 2021

Item: Members' Suggestions for Future Discussion Items

This paper will be considered in public.

1 Summary

1.1 This paper presents the current forward plan for the Committee and explains how this is put together. Members are invited to suggest additional future discussion items.

2 Recommendation

2.1 **The Committee is asked to note the forward plan and is invited to raise any suggestions for future discussion items.**

3 Forward Plan Development

3.1 The Board and its Committees and Panels have forward plans. The content of the plans arises from a number of sources:

- (a) standing items for each meeting: minutes; matters arising and actions list; and any regular reports, including the Project Representative report;
- (b) regular items which are for review and approval or noting;
- (c) matters reserved for approval or review; and
- (d) items requested by Members: The Chair of the Committee will regularly review the forward plan and may suggest items. Other items will arise out of actions from previous meetings (including meetings of the Board or other Committees and Panels) and any issues suggested under this agenda item.

4 Current Plan

4.1 The current list of standing items is attached at Appendix 1. Like all plans, it is a snapshot in time and items may be added, removed or deferred to a later date.

List of appendices to this report:

Appendix 1 - Elizabeth Line Committee Forward Plan

List of Background Papers:

None

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Membership: Heidi Alexander (Chair), Anne McMeel (Vice-Chair), Professor Greg Clark CBE, Dr Nelson Ogunshakin OBE, Mark Phillips, Sarah Atkins, Kathryn Cairns OBE (Department for Transport Representative)

Standing Items		
Safety Update	Commissioner	
Project Status Update	Crossrail Chief Executive	
Elizabeth Line Readiness	Commissioner	
Finance Update	Chief Finance Officer, Crossrail	
Project Representative Report	Crossrail Chief Executive	
Crossrail Programme Assurance Update	Chief Finance Officer, Crossrail	
Elizabeth Line Risk Management	Chief Finance Officer, Crossrail	
18 March 2021		
Alternative Delivery Model	Crossrail Chief Executive	(incorporated into Project Status Update report)
20 May 2021		
Organisational Transition Arrangements	Managing Director, London Underground	Member request.
Non-operational Data and Technology	Managing Director, London Underground	Member request.
15 July 2021		
Hand over to Trial Operations	Crossrail Chief Executive Managing Director, London Underground	Member request.

Dates of Future Meetings

20 May 2021

15 July 2021

30 September 2021

25 November 2021

Items to be scheduled:-

Crossrail Complaints Commissioner

National Audit Office Report (when available)

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