

Date: 29 September 2022

Item: Elizabeth Line 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 Elizabeth line since the last report.
- 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 exempt supplementary information in Part 2 of the agenda.**

3 Background

- 3.1 The Elizabeth line Integrated Assurance Framework is based on a Three Lines of Defence model comprising:
 - (a) Line 1 – Management functions of Crossrail Limited (CRL), Rail for London (Infrastructure) Limited (RfL(I)) and key interfaces;
 - (b) Line 2 – Project and Programme Assurance Elizabeth line (PPA-EL); and
 - (c) Line 3 – TfL Internal Audit and a sub-group of the Independent Investment Programme Advisory Group (IIPAG-EL).
- 3.2 This paper reports specifically on Line 2 (PPA-EL), Line 3 (Internal Audit) and Line 3 (IIPAG-EL) assurance progress.
- 3.3 The teams meet periodically with a panel of advisers to ensure that assurance is carried out by the right team, at the right time and to avoid duplication and minimise overlap of effort.

4 Line of Defence 2 (LoD2) Assurance

- 4.1 Since the Elizabeth line entered Revenue Service on 24 May 2022, the service has performed consistently at a good level each day in the Central Operating Section (COS). A Stage 5b minus “Go” decision on 19 July 2022 followed a successful 20 trains per hour (tph) timetable demonstration on 17 July 2022,

providing evidence of a reliable transition across the Great Eastern fringe (at Stratford). The consistent train service reliability provided the necessary confidence to enable the recent public announcement that from 5 September 2022 extended opening hours from Paddington to Abbey Wood would be introduced and, on 6 November 2022, train services will run directly from Reading and Heathrow to Abbey Wood, and from Shenfield to Paddington. In addition, around this time, the last remaining station, Bond Street, will be brought into Revenue Service to join all the other stations.

- 4.2 The train fleet and overall system continue to perform well in the COS. Additional train and signalling software upgrades and other interventions are providing further operational reliability improvements, in advance of the next significant stage of programme delivery, namely Stage 5b minus on 6 November 2022.
- 4.3 Work has continued on a continuous assurance basis with formal reporting via the LoD2 Periodic Assurance Review (PAR) Reports. Of particular focus has been the overall system and fleet reliability and availability, the quality of the service response to issues arising during service operation as well as the status of continued works and people and team readiness across all aspects of the Operation and Maintenance teams, in preparation for Stage 5b minus and beyond.
- 4.4 Since the last meeting of the Committee, LoD2 PAR Reports have provided input to the periodic Integrated Assurance Report to the Elizabeth Line Delivery Group and papers to the Audit and Assurance Committee.
- 4.5 Regarding cost to complete, although potential new cost pressures are being prudently recognised in the Anticipated Final Crossrail Direct Cost (AFCDC) as they arise, the Programme continues to maintain provision and contingency budgets. Following the recent Cost to Go reviews with the Commissioner, actions are ongoing across all areas to identify opportunities to reduce the AFCDC and minimise funding requirements.
- 4.6 The programme for the remaining works to successfully deliver the whole end to end railway is still being developed. The results of the most recent Quantitative Schedule Risk Assessment (QSRA) deterministic dates are as follows. Stage 5b minus is 6 November 2022 (22 tph peak / 16 tph off peak, Shenfield to Paddington, Abbey Wood to Reading and Heathrow) and Stage 5c is May 2023 (24 tph full end-to-end service), dictated by the national railway timetable changes. The key drivers in the risk analysis for Stage 5b minus are timetable reliability and systems reliability. The development of the programme is being led by the Elizabeth line Operations team, with support from CRL for those elements of work it is responsible for. The programme has been stable for the last few periods which has allowed comprehensive QSRA works to be undertaken and provide a good level of confidence in the range of completion dates for each stage.

4.7 The project has continued to make significant progress since the last report, key progress highlights include:

- (a) handover of Canary Wharf station to the Operator (RfL(I));
- (b) continued strong reliability performance since entry into Revenue Service;
- (c) excellent team working and embedding the lessons learnt across the Operations teams, leading to strong service recovery and handling of incidents;
- (d) continued engagement, planning and the implementation of improvement initiatives with Network Rail (NR) Great Western and Great Eastern to prepare for the integration of railways for Stage 5b minus; and
- (e) software upgrades to signalling and fleet software enhancing performance further.

4.8 The maintenance programme has been reviewed and significant improvements implemented to support the enhanced utilisation of resources and the introduction of automation, thereby delivering a more efficient maintenance service. Experience during Revenue Service is helping to shape the improvements required in terms of response and fix times and root cause analysis to support a 22/24 tph service.

4.9 Both fleet and system performance reliability and availability are on a positive trajectory towards meeting the desired performance targets expected for Stage 5b minus, however these are being closely monitored on a weekly basis.

4.10 Following our risk based continuous assurance approach, concerns and recommendations are identified throughout each reporting period. Management responses to those items are provided in the following table and have been provided during Periods 3 and 4 (26 June 22 – 20 August 22).

Periods 3 and 4	LoD2 Concerns	Management Response
P3/1	<p>Stage 5b minus – With clear leadership and governance of the ‘Central Issues List’ (CIL), we recommend also having a focussed review of the resources needed to conduct the detailed technical analysis, ensuring sufficient rigour is applied to closing out the priority issues in a timely manner.</p>	<p>Despite the CIL being an initiative originally delivered out of the reliability team, the idea is that the relevant key issues are recorded centrally and ‘federated’ allowing for each issue to be owned and managed by the accountable owner(s) but ensuring others that need to be aware remain briefed and have access to provide updates where necessary. We have recently moved from a spreadsheet to a SharePoint “database” type function which allows for people client side and suppliers to give updates and provide clarity on dates, software builds, current status and close out etc with a degree of traceability and uniformity.</p>

Periods 3 and 4	LoD2 Concerns	Management Response
		<p>The Head of Reliability has been tasked to lead in programme managing the priority items in the CIL to required delivery dates, from an overarching coordination position (not to own each issue). Some support will be required in the short term to achieve success which will be covered by reprioritising existing resources. Through this process the level of governance and rigour required can be reviewed and initiatives introduced quickly with senior backing to ensure the CIL provides the landscape for visibility and support timely close out of the key priority issues.</p>
P3/2	<p>Fleet Readiness – Further detailed evidence is required from Alstom of their plans to improve fleet reliability over and above the planned software update later in the year. We also need an understanding of the risk/impact if Siemens are unable to provide the 24/7 support cover requested by Alstom.</p>	<p>Alstom’s detailed reliability growth plan was provided and updated in July 2022.</p> <p>Units cannot be returned to service in Stage 5b minus with any communications-based train control (CBTC) operating restrictions (unlike Stage 3 where units with a CBTC restriction can be used on Great Western Main Line-only diagrams while CBTC fault diagnosis is done).</p> <p>Alstom and Siemens have now reached an agreement on the level of Siemens support-which includes extending Siemens’ on-site cover to 24/7. Provision of Siemens’ support to Alstom would enable the prompt diagnosis of suspected CBTC defects, including overnight and at weekends. This should mitigate the potential risk to fleet availability at start of service if the number of units with an undiagnosed / unfixed CBTC defect was to exceed four at any one time.</p>
P3/3	<p>Bond Street – Visibility of the detailed schedule behind the Programme on a Page (POAP) is required, identifying the critical interface testing for heating, ventilation and air conditioning, ‘Fire Cause and Effect’, low voltage power etc. including approvals.</p>	<p>Bond Street’s POAP is the overlay of Delivery Control Schedule (DCS) 1.3 schedule logic, i.e. the deterministic schedule that was reviewed extensively in the first quarter of 2022, and an optimised scenario testing schedule developed by the Tester in Charge. Logic dependencies, again from the DCS1.3, are already shown in the POAP where applicable. The project monitors schedule logic daily and weekly at appropriate levels of detail and ensures this is managed back-to-back with the POAP, including risks and mitigations.</p>

Periods 3 and 4	LoD2 Concerns	Management Response
P3/4	<p>Crossrail Project Demobilising – Concern regarding the agility of RfL(I) / TfL to procure and onboard the right skills to define scope and deliver aspects of remaining works e.g. ELR400 (Signalling software version). Also need to allow for sufficient knowledge transfer from CRL for continuity.</p>	<p>Key works required (e.g. ELR400) to complete the programme are intended to be completed by the CRL programme team.</p>
P3/5	<p>Operations Resourcing – Concerns with regard to the recent attrition of critical operations staff (Traffic Managers and Systems Infrastructure Managers (SIMs)) and the disruption this may have on the team as we approach the transition into Stage 5b minus.</p> <p>Impact assessment to be carried out and contingency plans put in place to address increased response required in a 22 tph operation.</p>	<p>The availability of resources specifically for covering the RfL(I) Control Centre has been a priority focus over the last 12 months and continues to be so. A clear plan exists and is reviewed weekly with the Director of the Elizabeth line. Focus on the whole process of increasing resources from recruitment through to initial competence and turnover, has driven over recruitment against a backdrop of a higher turnover. Current forecasts still project risk until September when the situation gradually starts to improve with increased numbers of competent Traffic Managers. Incident Response Managers and SIMs are considered to be in a satisfactory position.</p>
P3/6	<p>Asset Resilience and Analysis – Requires rigour in the analysis and reporting of issues arising in revenue service to identify trends and ensure there are planned mitigations in place to optimise line-wide perturbation management and recovery when we enter Stage 5b minus.</p>	<p>The COS railway performance and reliability analysis has continued during revenue service, with the activities previously undertaken during testing phases being maintained and enhanced. Service running continues to be observed and discovery of faults (that cause delay or threaten to impact service), with the objective of learning how to avoid future incidents. Root cause analysis undertaken to determine key actions and solutions where practicable, as well as developing processes to identify systemic problem areas to support and feed into the fix cycle. In addition to fault tracking, the embedment of improvement plans is a key initiative to support reliability growth projections. Analysis is reviewed at daily, weekly and periodic forums with dashboards, issue trackers and detailed reports produced</p>

Periods 3 and 4	LoD2 Concerns	Management Response
		for visibility.
P4/1	<p>RfL(I) Resourcing – RfL(I) is not yet resourced for this stage of the programme as it takes on greater responsibility at this critical stage on the run up to Stage 5b minus. In particular, programme and project delivery, digital systems support, and maintenance require further robustness to build confidence and resilience in the team. This only becomes more urgent as CRL resources begin to demobilise and we ramp up to through running.</p>	<p>Plans are in place which are actively managed and are on track to ensure the resources required for timely commencement of Stage 5b minus are in place. Resources required into 2023 are dependent on completion of programme activities and discussions are underway to establish the best value solution and the key resources required to deliver all the remaining essential works and transition into business as usual.</p>
P4/2	<p>Fleet Readiness and Triage – While the reliability of the fleet continues to improve, there are still concerns with regard to Alstom and Siemens management of the triage process. We recommend this process is reviewed with Alstom and Siemens and opportunities sought to improve the operational response and working relationship.</p>	<p>The process and the Siemens support package to Alstom has been reviewed. There are now negotiations between Alstom and Siemens. The contract was set up with Alstom such that they have a direct agreement with Siemens for the supply, and technical support, of on-board CBTC.</p>
P4/3	<p>DCS1.3 – While key milestones have been declared, the previous momentum appears to have stalled while further clarity is sought around work scopes and plans for the later stages.</p>	<p>There is a programme in place for the latter stages, however finalisation of scope will be determined from the system description document which is under development by the assurance team.</p>
P4/4	<p>Great Western Performance – While some good progress has been made and further improvement initiatives are underway, we recommend that RfL(I) and NR develop a mitigation plan should Great Western performance</p>	<p>Work continues to improve the baseline level of performance of the NR Western Route. In collaboration with NR, a Western Route recovery plan has been established aimed at recovery of the route's performance. The headline areas of benefit for the Elizabeth line services relate to Thames Valley Signalling Centre resourcing, which has caused a significant number of cancellations to</p>

Periods 3 and 4	LoD2 Concerns	Management Response
	not meet the required performance level.	Elizabeth line operations and a workstream seeking to improve 25 critical points which impact Elizabeth line operations. These plans are targeted at reducing 60 per cent of signalling delays from November and 40 per cent of points related delay the route experiences by December.
P4/5	<p>Future Signalling Software Deployments – Sufficient time for the application and checks of robust supplier quality assurance processes need to be built into future software upgrade plans. The impact of any secondary quality issues arising during live 22 tph operations would have a significant negative performance impact. It is important that such quality issues are minimised before the software is deployed.</p>	<p>Some of the current actions to mitigate any potential issues include:</p> <ol style="list-style-type: none"> 1. pre-software release review with Siemens Braunschweig Engineering Team; 2. full pre-release regression testing review with Siemens, CRL and RfL(I) to identify if any further regression testing is required; 3. enhanced CRL integration facility testing following release of software and prior to implementation. <p>It is not possible to eliminate all risks in this area but we are continually reflecting on what more we can do.</p>
P4/6	<p>Autoreverse – While progress has been made and an integrated programme has been drafted, construction timescales for fence and closed circuit TV (CCTV) have not yet been verified. The assurance work stream needs to be developed as soon as possible and roles and responsibilities clarified now that CRL will be responsible for this activity.</p>	<p>The feasibility studies undertaken by the proposed contractors were issued for the civil, fencing and signage scope on 12 August 2022. Confirmation of the access to undertake the works is critical. Assurance roles and responsibilities have been confirmed (5 August 2022) with the integrated assurance plan issued on 19 August 2022.</p>

5 Line of Defence 3 (LOD3 -TfL Internal Audit) Assurance

- 5.1 This section covers the Internal Audit activities that were agreed in the Integrated Audit and Assurance schedule shared at the last meeting.
- 5.2 In Period 4 and Period 5 (26 June – 20 August) we issued no reports and have five in progress.

Audit Delivery

- 5.3 Summary information of audits in progress in Period 4 and Period 5 is set out below.
- 5.4 Audits in progress at the end of Period 5 are included as Appendix 1, and work planned to start in Quarter 3 and Quarter 4 of 2022/23 are included as Appendix 2.

Management Actions

- 5.5 The team monitors the implementation of all Internal Audit management actions and confirms whether they have been adequately addressed before closing them. There are no overdue actions at the end of Period 5.

Changes to the Audit Plan

- 5.6 TfL Internal Audit regularly review and update the audit elements of the Integrated Audit and Assurance Audit Plan throughout the year, in liaison with management, to reflect changing business priorities. No changes to the plan have been made to date.

6 Line of Defence 3 (LoD3 - IIPAG-EL) Assurance

- 6.1 The terms of reference of the IIPAG-EL sub-group require the group to provide a 'look ahead' of its proposed areas of interest and work. The areas of interest highlighted as part of the revised Integrated Audit and Assurance Schedule in February 2022 continues to apply. We also support the 'continuous assurance' process established by LoD2. This schedule is maintained and reviewed within the Elizabeth Line Programme Assurance Group which is co-ordinated by LoD2.
- 6.2 Since the introduction of Stage 3b Revenue Service, LoD3 has focused its attention on the preparations for the enhanced service level of Stage 5b minus, and the Stage 5c full 24 tph service. A more comprehensive update is provided in the paper on Part 2 of the agenda.
- 6.3 The overall assessment by LoD3 is that the overall assurance framework has continued to operate effectively over Periods 4 and 5.

List of Appendices:

Appendix 1: Line 3 (TfL Internal Audit) Work in progress at the end of Period 5 2022/23
Appendix 2: Line 3 (TfL Internal Audit) Work due to start in Quarter 3 and Quarter 4
2022/23

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

List of Background Papers:

None

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