

TRANSPORT FOR LONDON

BRIEFING NOTE

Subject: Weekly Mayoral update on Crossrail / Elizabeth line

Date: 26 November 2018

Manifesto commitment(s)	Mayor's Transport Strategy (MTS)
Not applicable	<p>A good public transport experience</p> <p>Proposal 57: The Mayor, through TfL, will work with the DfT to open the Elizabeth line in 2019, with services initially providing 24 trains per hour through central London and increasing in frequency during the 2020s as demand requires.</p>

1 Purpose

- 1.1 Weekly update to the Mayor outlining progress and challenges ahead of the launch of the Elizabeth line.
- 1.2 The Mayor is asked to **NOTE** this briefing.

2 Overall programme

- 2.1 The Crossrail Ltd (CRL) Board received formal confirmation from Sponsors on 2 November that the £350m of short term repayable financing announced on 26 October 2018 is intended to cover CRL's forecasted in-year cash requirement, and will be made available in line with CRL's cash forecasts to ensure that momentum is maintained in delivering the Crossrail programme.
- 2.2 CRL has assured Sponsors that work across the project is continuing and is not being delayed by the additional time being taken to finalise the MOHS. CRL updated the Sponsor Board on MOHS and cost at a meeting on 15 November.
- 2.3 The MOHS, which is due at the end of this week and will be discussed by the CRL Board on 5 December, will include revised target date ranges for delivery of Stage 2 Phase 2, Stages 4 and 5 and potential for a Stage 5a (services running Paddington (high-level) to Reading). ■■■■ dates for critical activities and key milestones will continue to be used to drive contractor performance.
- 2.4 The December MOHS will cover the key activity required to deliver the full end to end railway and it will also consider in greater detail the functionality required for ensuring an Elizabeth line service can commence before the end of 2019. However, further work will be needed to gain:
 - o Complete clarity on stations, shafts and portals Stage Completion dates
 - o Further integration of software configuration dates between BT and Siemens



- Further work to ensure [REDACTED] (communications and control systems) programme is integrated with other contracts as efficiently as possible
 - Additional review of [REDACTED] (systemwide) routeway installation schedule
- 2.5 CRL submitted its formal Semi Annual Construction Report (SACR20) to Sponsors covering the period from 1 April 2018-15 September 2018. At the request of Sponsors, SACR20 reports the cost forecast included in the Remedial Action Plan against the [REDACTED] dates and includes £154m of additional Quantitative Risk Assessment (QRA). The Anticipated Final CRL Direct Cost (AFCDC) reported in SACR20 is £13,831m. Note that this estimate is made against the existing schedule, which CRL is in the process of updating. It also does not consider any findings from the independent KPMG review of project cost, which is still underway.

3 Safety

- 3.1 All sites have continued with their “Finish Safe” campaigns to ensure that all teams are reminded of the paramount importance of conducting all work safely.
- 3.2 Last week there were no reportable incidents, lost time cases or high potential near misses.

4 Weekly progress reporting:

- 4.1 CRL is finalising its weekly dashboard for its Executive, Board and Sponsors. The draft final version is under review by Mark Wild.

Testing and Commissioning

- 4.2 The next testing window will take place from 7-10 December. This will be an important precursor to critical dynamic testing which is due to commence on 13 January 2019.
- 4.3 The independently-chaired readiness group review of entry into 5 day testing / 2 day construction met again on 9 November. The group undertook an eight week countdown review to assess progress against the detailed entry criteria covering train, infrastructure and signalling readiness in advance of starting full dynamic testing in mid-January. Internal readiness meetings continue to be held regularly and the detailed testing plans are being populated. Note that the independent schedule review concluded autumn 2019 opening was compatible with starting 5/2 dynamic testing in January 2019, although the later that 5/2 dynamic testing starts the greater the risk to opening.

Systems integration

- 4.4 The recommendations in the report for CRL by PA Consulting on systems integration are now being taken forward.. PA Consulting has produced an implementation plan for CRL to take forward its recommendations particularly around enhancing programme integration. Some of the other recommendations relate to introducing revised structures, processes, governance and accountabilities. CRL has also commenced reconfiguration of existing staff that will form part of a new systems integration directorate as well as developing recruitment plans for new positions.



5 Train production and testing

- 5.1 A detailed update on progress with Bombardier is provided in Appendix A.

6 Stations

- 6.1 When the new delivery schedule is finalised, it will include Tier 1 Substantial Demobilisation dates (TOSD), revised staged completion and handover dates for the stations. Several of the forecast dates for these items have slipped against the [REDACTED] dates in the remedial action plan presented to Sponsors and are being challenged during finalisation of the MOHS. However, further work will be needed to gain complete clarity on stations, shafts and portals Stage Completion dates.

7 Network Rail (NR) works

Stage 5:

- 7.1 NR is planning to present a paper to the NR/DfT portfolio Board meeting in early December with a request for funding to cover the cost gap for the six western station enhancement works [REDACTED] and cost pressure on other core contract activities [REDACTED]). NR is likely to request the total funding from Control Period 6 which commences 1 April 2019.
- 7.2 Pending progress on the funding issues above, NR has not [REDACTED] [REDACTED] for Package 3 (Southall, Hayes, and West Drayton) last week. The [REDACTED] for Package 2 (Acton, Ealing Broadway and West Ealing) have also [REDACTED].
- 7.3 NR is continuing its enabling works on western stations to assist in maximising use of the Christmas works period by contractors.
- 7.4 Contract award for Ilford and Romford station upgrades is [REDACTED] with some minor value engineering opportunities now included. These station upgrades are fully funded.
- 7.5 NR remains publicly committed to delivering these station upgrades by December 2019. However, stakeholders have been informed that completion of Ilford and Romford station upgrades is now expected in 2020. In addition, deliverability concerns for the approved canopy at Ealing Broadway are being discussed.
- 7.6 In advance of the Mayor's meeting with NR CEO Andrew Haines, CRL is meeting NR seniors on 5 December to stress the importance of delivering the outstanding On Network Works including enhanced stations and power upgrades required for Stage 4 and will impress upon them the importance of awarding Packages 2&3 and a funding allocation from Control Period 6 as well as working with CRL on possession requirements.

8 Approvals for each stage

- 8.1 The schedule of submissions and approvals required will form part of the revised delivery schedule.



- 8.2 The Office of Rail and Road (ORR) has now issued approval for MTR Corporation and Network Rail Infrastructure Ltd to enter into a full track access agreement.
- 8.3 The ORR has accepted Alstom TSO Costain (ATC)'s application for a new exemption to Railways and Other Guided Transport Systems (Safety) Regulations (ROGS). This will enable ATC to continue its activities in the tunnels into 2019 prior to the commencement of trial running and trial operations. The new exemption expires at the end of October 2019.

9 Appendix

- 9.1 **Appendix A:** Joint TfL and Bombardier Weekly Report



Appendix A: Joint TfL and Bombardier Weekly Report

Elizabeth line - Bombardier Weekly Report 26 November 2018

Note No: 35

Key Activities and Issues

- 57 trains have been completed in Derby by Bombardier (BT). TfL has [REDACTED] [REDACTED] pending delivery of further validated software to allow greater use of the units on Network Rail infrastructure, and further reliability improvement of the existing fleet. The actions being taken are summarised below. It was agreed that once BT secure approvals for passenger services on the Great Western route TfL will [REDACTED]. The intention is to then re-start train delivery so that the remaining fleet can be accepted by summer 2019 with deliveries at a steady and sustainable rate.
- Four 7-Car trains continue to be used on TfL Rail services between Paddington and Hayes & Harlington based at Old Oak Common. Ten 7-Car trains are available for passenger service on the Liverpool Street to Shenfield line.
- Bombardier's reliability growth plan is based on the mean distance between service affecting failures (MDSAF, a standard industry measure based on any delay over 3 minutes caused by a train fault). Bombardier's target for the 7-Car units was 7800 miles by 10 November. This is tracked weekly. Final MDSAF in the last Period (8) was 4334 miles, below target although in the first two weeks of the current Period 9 this has risen to 8439, demonstrating the short term volatility of the measure on a small fleet. BT have identified a number of key initiatives to drive improvement including finding a place in the wider software programme to update the 7-Car unit software (currently linked to 40% of failures), speeding up physical modifications, driving key suppliers harder, and increasing the resource at Ilford where the 7-Car units are based.
- Tests of CBTC signalling and associated software for the Central Section tunnels were completed on 26 September. In order to pass the full suite of 29 tests (not all of which are necessarily required for Dynamic Testing) updates are needed to: BT's TCMS software (R7.2.2.6), built on 23 October and ETCS software (PVI 6.2) to fix 12 issues and Siemens must update their CBTC software to fix a further 3 (the date for the last fix forecast for 4 April). In addition, one of the defects requires instruction from Crossrail as to which party (BT or Siemens) is best placed to undertake the change.
- The next Crossrail 'test window' is planned to take place from 7 to 10 December. This will be focused on testing Siemens new release of wayside and train software.
- The start of Main Dynamic Testing in the Central Section tunnels is planned for 13 January. Good intensive work has taken place over the last few weeks to optimise the programme for Siemens and Bombardier software and to rationalise the requirements of assurance activities, so as to improve the robustness of the Crossrail Dynamic Testing programme and also allow some time and resource for testing of the Stage 2 'Heathrow' software (see below).



- Bombardier continues to validate the 9-Car software to be used for running in passenger service on Network Rail infrastructure. This will allow the 9-Car units to be used on passenger trains between Paddington and Hayes & Harlington and will help build reliability prior to use in the tunnels. The first test runs took place 21-22 November. Initial results show some unreliability of the driver information screens which is being investigated for root cause. Further meetings with the regulatory bodies are scheduled as well as submissions to the relevant safety review panels. The target for passenger operation remains December but there is a risk given the activities still outstanding.
- The build of Release 7.3 on-train software is complete. This will be used for Heathrow services utilising the European 'ETCS' signalling system. Initial testing on rigs shows a number of bugs and the next iteration 7.3.1 is being prepared. BT are currently updating their programme to optimise use of test facilities (rigs and track) and seeking additional specialist resource to cover two overlapping workstreams (the extended period of dynamic testing in the central tunnels and finalisation of Heathrow software). A revised programme for Heathrow is due to be delivered to TfL this week.
- CRL has completed its review of system integration and implementation is underway, encompassing both programme and technical integration. This includes train and signalling software but also many other aspects of the Crossrail project activities.
- The milestones in Appendix A will be updated following the completion of the new Crossrail Master Operational Handover Schedule (MOHS) at the end of November.



Key Programme Milestones

Stage 2	P80 Programme (V3_5_1) 11thJan	Current Forecast
Approval for driver training on Great Western routes excluding European Train Control System	27 Feb	Completed
Commence build of TCMS release 7.3 (the Stage 2 passenger service software)	26 June	Completed
Independent Safety Assessment body ('ISA') approval for European Train Control System MR3 software necessary for Stage 2	6 Aug	Under review
Independent Safety Assessment body ('ISA') approval for TCMS release 7.3	18 Sept	Under review
Approval for European Train Control System driver training on Great Western	24 Aug	Under review
Approvals for European Train Control System Passenger Service	28 Sept	Under review
Stage 3		
Completion of Transition testing at Melton ready for Central Operating Section Dynamic Testing	29 Jan	Completed
Commence build of TCMS release 7.2 (the Stage 3 passenger service software)	24 April	Completed
Independent Safety Assessment body ('ISA') approval for European Train Control System MR2 software necessary for Stage 3	22 May	Completed
Approval of CBTC signalling for Central Operating Section Trial Operations	22 Jun	Completed
Availability of 22 trains for Trial Running in the Central Operating Section	13 Aug	Unit Acceptance Paused
Approval of Class 345 for Stage 3 Passenger Service	10 Oct	Under Review
Start of Stage 3 Passenger Service	9 Dec	Autumn 2019
Old Oak Common Depot		
Section A Brought into Use	1 Mar	Completed
Section B1 Brought into Use	11 Apr	Completed
Section C Brought into Use	30 May	Completed

