

TRANSPORT FOR LONDON

BRIEFING NOTE

Subject: Weekly Mayoral update on Crossrail / Elizabeth line

Date: 7 August 2018

Manifesto commitment(s)

Not applicable

Mayor's Transport Strategy (MTS)

A good public transport experience

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.

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 High-level items:

- 2.1 Crossrail Ltd (CRL) and TfL convened a high level meeting on 7 August involving Siemens, Alstom TSO Costain (ATC) joint venture and Bombardier to impress upon them the criticality of delivering the Crossrail project and Elizabeth line safely but as quickly as possible.
- 2.2 A proposed revised delivery schedule will be discussed with the CRL Board on 29 August, followed by the Sponsor Board on 3 September and the Mayor on 6 September.

3 Routeway construction:

- 3.1 All routeway installation is now due to be complete before the end of October, after which full dynamic testing is due to commence.
- 3.2 Critical programme metrics for routeway construction are tracked weekly and actively monitored by CRL. Progress against plan can vary week by week as the contractor ATC coordinates and prioritises its activity:
 - **Cabling:** 94 per cent complete (vs forecast 96 per cent complete)
 - **Tunnel Walkways:** 83 per cent complete (vs forecast 78 per cent complete)
 - **Firemain:** 89 per cent complete (vs forecast 89 per cent complete)
 - **Drainage:** 89 per cent complete (vs forecast 91 per cent complete)



- **Permanent tunnel ventilation:** 95 per cent complete (vs forecast 94 per cent complete)

- 3.3 All cabling for communications (which is key to mission critical control and radio systems) has now been installed and will need to be tested. There is a major challenge in securing sufficient testing resources from Siemens and through regular contact pressure is being applied to Siemens to secure additional resources.
- 3.4 Static testing of all assets is behind plan. Measured by the first testing stage of Interim Release Notes (IRN), actual completion is at 45 per cent (vs plan 79 per cent). IRNs are being prioritised and actively monitored by all contracts but cannot be provided if installation of the equipment has not been achieved.

4 Signalling implementation and testing

- 4.1 All cabling for signalling has now been installed in Zones 3&4 (Paddington to Whitechapel) and now needs to be tested. There is a similar challenge to the communications contract in securing the necessary resource from Siemens and this is also being managed via regular contact with Siemens.
- 4.2 All signalling equipment is now installed and the power has been turned on for the signalling transition on the eastern route. Testing of the tunnel signalling system up to the boundary is planned during an additional dynamic testing window on 8 August prior to testing on the Greater Anglia route on 11 and 12 August.
- 4.3 Installation of equipment for the signalling transition on the western route is nearing completion prior to testing during the dynamic testing window 8-9 September.

5 Train production and testing

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

6 Stations

- 6.1 All central stations¹ are working towards staged completion dates (currently between beginning October and mid-November). Interim maintenance arrangements are being put in place and subsequent full handover dates being agreed (with the Infrastructure Managers (LU and RfL)).
- 6.2 Switching on the permanent high voltage power for stations will be completed during August.
- 6.3 A worldwide safety alert has been issued by Schneider Electric relating to circuit breakers installed in low-voltage switchboards produced between August 2016 and March 2018.
- 6.4 Inspections by Schneider of Crossrail equipment (97 of their circuit breakers are used across Crossrail assets) are underway and has been escalated by CRL to a senior level in Schneider UK to ensure priority attention is given. Inspections are due to be completed this week.

¹ Except Custom House which will go direct to handover (target date end-August)



6.5 Overall station completion is measured periodically/every four weeks. The Period 4 results are:

	Actual (%)	Forecast (%)
Paddington	93.3	97.1
Bond Street	88.6	91.6
Tottenham Court Road	92.8	95.6
Farringdon	97.9	98.3
Liverpool Street	91.8	93.7
Whitechapel	92.8	97.5
Woolwich	95.4	97.3

7 Network Rail works for each stage

Stage 4:

7.1 Network Rail is currently focussing its activities on:

- Finalising a delivery plan that will complete traction power upgrade works by May 2019 (modelling has been completed and is currently being analysed, although Network Rail have yet to confirm an agreed programme)
- Completion of ticket hall modifications, station refurbishments and assurance activity
- Driver Only Operation CCTV installation at Stratford and Shenfield
- Station Information and Security System (SISS) installation and connectivity to the control centre in Romford

Stage 5:

7.2 There have been [REDACTED] for the six western stations (Acton Mainline, Ealing Broadway, West Ealing, Southall, Hayes & Harlington, West Drayton) which is now forecast for [REDACTED].

7.3 In addition Network Rail has notified CRL that [REDACTED] [REDACTED] CRL has requested detailed commercial information that would substantiate NR's concerns and, with NR, is relooking at the pedestrian flows and pinch points that will arise with the predicted increase in passengers. The matter has also been escalated to Crossrail Sponsors.

7.4 The contract award for Ilford and Romford is now scheduled for November 2018 (was October 2018).

7.5 Completion of western outer platform extensions and Driver Only Operation CCTV – work is scheduled to commence in October 2018 which is on time for delivery.



8 Approvals for each stage

8.1 Overall approvals for each stage are tracked on a periodic basis. The key approvals for Stage 3 are as follows:

Stage 3 (base plan being revised in view of wider programme schedule pressures)

- ORR issues Amended/New (TBC) Safety Certificate for Yellow Plant (due in October and currently no major issues with reaching this date)
- ORR issues Authorisation to Place into Service (APIS) for Engineering Trains (complete)
- ORR issues APIS for Rail Profiling Machine (on track to be delivered in September)
- ORR issues APIS for central section to CRL (October date at risk)
- ORR issues APIS for South East Spur (NR scope) to NR (due October 2018 currently no major issues with reaching this date)
- RAB C (assurance body for Crossrail) final safety sign off (December date at risk)

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 6 August 2018

Note No: 20

Key Activities and Issues

- 54 trains have been completed in Derby by Bombardier, which is in line with the plan. TfL has [REDACTED] new trains pending delivery of further software and assurance to allow greater use of the units on Network Rail infrastructure and also confirmation of Bombardier's updated reliability growth programme.
- Full signalling was brought into use at Old Oak Common Depot on 23 July, 4 weeks earlier than programme. Only minor work remains to complete and formally handover the Depot.
- 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 with one unit at a time taken to Wembley Depot for modifications. Availability has been excellent on both routes.
- Bombardier remains focused on reliability growth. Bombardier's current plan is for a mean distance between service affecting failures (MDSAF, a standard industry measure based on any delay over 3 minutes caused by a train fault) of 5,000 miles by end of Period 5 (18 August) and 13,000 by end of Period 8 (10 November) against a programme of modifications and improvements. The most frequent failure (though with small impact per incident and seen on the 7-car fleet only) is the loss of the driver's information screen, which then has to be reset. MDSAF in the last four weeks has varied between 3,500 and 7,200 miles.
- The latest dynamic testing 'window' in the tunnels last took place on 27-30 July. It included testing signalling functions and using the current software (Release 7.2.1.3) from Bombardier and from Siemens (Release 3.0.10). Overall the test window did not achieve its full objectives as the radio connections supporting the tunnel signalling system were not complete but the train was tested in the tunnels for the first time in 'integrated mode', with the on train communication based train control (CBTC) tunnel signalling operating with the European Train Control System (ETCS) switched on as well, with the latter controlling the train's 'choice' of which of the on board signalling systems to use.
- A further train software release (7.2.2) has been built and is now being tested on the rigs at Derby and, from today, at Melton test track. This is designed to fix bugs in the previous release 7.2.1.3. The number of defects discovered in 7.2.1.3 was higher than expected and Release 7.2.2 was delayed. This does not affect tunnel testing, as the software will still be available in time for the relevant testing, all be it with some restrictions. However, this delay will affect the dates for achieving full certification for running to/from the Network Rail (NR) network so there will be less opportunity to run trains on NR to build reliability.



- Weekly meetings continue between Bombardier, Siemens, Crossrail and TfL, to coordinate software releases, testing and bug fixing. This includes taking account of delays to central section infrastructure and changes to dynamic testing. Direct Bombardier/Siemens liaison and escalation meetings are also taking place. The Crossrail project is looking to further strengthen its system integration capability and resource.
- Due to the delay to completion of Release 7.2.2, the building of Release 7.3 (to be used for Heathrow services) has been delayed. Bombardier now believe that this will impact the existing driver training (12 Oct) and public service approval (19 Nov) dates for the Heathrow software. A programme for Releases 7.2.2 and 7.3 is yet to be finalised (dates shown as TBC in the milestone report overleaf) and clarity, and further improvements, are being urgently sought by TfL.
- With a large amount of testing and a number of releases, updates and derogations all requiring approval, assurance is, once again, an increasing focus. Assurance resources and production of evidence are critical constraints on the ability to bring updated software into use. Bombardier is seeking to increase the number of signalling assurance engineers.



Key Programme Milestones – changes from dates previously reported are shown in red

Stage 2	P80 Programme (V3_5_1) 11 th Jan	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	30 July
Independent Safety Assessment body ('ISA') approval for European Train Control System MR3 software necessary for Stage 2	6 Aug	To be confirmed
Independent Safety Assessment body ('ISA') approval for TCMS release 7.3	18 Sept	To be confirmed
Approval for European Train Control System driver training on Great Western	24 Aug	To be confirmed
Approvals for European Train Control System Passenger Service	28 Sept	To be confirmed
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	29 Oct
Start of Stage 3 Passenger Service	9 Dec	9 Dec
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

