

## TRANSPORT FOR LONDON

### BRIEFING NOTE

**Subject:** Weekly Mayoral update on Crossrail / Elizabeth line

**Date:** 21 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 Routeway construction:

- 2.1 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 coordinates and prioritises its activity:
  - **Cabling:** 95 per cent complete (vs forecast 97 per cent complete): 11,108m completed in week
  - **Tunnel Walkways:** 87 per cent complete (vs forecast 79 per cent complete): 1,780m completed in week
  - **Firemain:** 89 per cent complete (vs forecast 89 per cent complete): Installation of hydrants, valves and testing ongoing
  - **Drainage:** 89 per cent complete (vs forecast 91 per cent complete): 30m of pipe installed during week and ongoing works are the tie-ins at stations, portals and shafts
  - **Permanent tunnel ventilation:** 96 per cent complete (vs forecast 96 per cent complete): 0.5 per cent achieved in week with ongoing electrical works and production of Interim Releases Notices (IRNs)
- 2.2 All cabling for communications (which is key to mission critical control and radio systems) has now been installed, though availability of resources continue to constrain testing activities. Although testing activities are not on the critical path for Dynamic Testing, the completion of testing is required for the start of Trial Operations.



Pressure continues to be applied on Siemens to secure additional resources as well as recruitment from wider UK and international industry.

- 2.3 The installation of platform screen doors is behind schedule (87.2 per cent vs 100 per cent planned) but integration testing of the doors is due to be completed on 26 September as scheduled.

### **3 Signalling implementation and testing**

- 3.1 CRL is investigating the issues identified during the latest tests and working with Siemens and Bombardier to identify solutions for the next test window scheduled for 25 to 26 August. These include:
- **ISSUE:** Difficulties with getting the train to operate successfully in integrated mode (Communications Based Train Control (CBTC) operating with European Train Control System (ETCS) active), **SOLUTION:** Under investigation as integrated mode has been successfully demonstrated at the test track but is not working on site.
  - **ISSUE:** Emergency braking caused by track database anomalies, **SOLUTION:** Reload track database.
  - **ISSUE:** Interfaces between the different signalling systems CBTC and Train Protection and Warning System (TPWS)), **SOLUTION:** Siemens and Bombardier have identified a straight forward fix that will be tested during the next test window.
- 3.2 A third test window is scheduled for 8 and 9 September to complete any remaining tests on the Great Eastern transition.

### **4 Train production and testing**

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

### **5 Stations**

- 5.1 Paddington high voltage switchboard and high voltage transformers were successfully energised on 17 August. This enables the next stage of the energisation sequence from Paddington to Bond Street.

### **6 Network Rail works for each stage**

#### **Stage 5:**

- 6.1 Following the meeting between Mike Brown, Simon Wright and the new Chief Executive of Network Rail, Andrew Haines, on 13 August, CRL have been working with Network Rail (NR) on value engineering options for the six western stations. Enabling works are already underway so value engineering scope is limited to station buildings, walkways and canopies.
- 6.2 NR are still planning to undertake enabling work at the western stations over the important Christmas works period that will include the installation of the overbridges.



- 6.3 Local authorities are likely to challenge vigorously any reductions in scope or delays to delivery. This will add to schedule pressure which will have already been extended by the potential need to reprice the works.

## **7 Approvals for each stage**

- 7.1 The overall approvals for each stage have not changed since the last weekly update.
- 7.2 CRL met with the Office of Rail and Road (ORR) on 16 August to discuss the schedule review exercise currently being carried out by CRL to assess the readiness for Stage 3 opening. The ORR has reported that they are supportive of a revised schedule to deliver a safe and reliable railway.

## **8 Appendix**

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



## Appendix A: Joint TfL and Bombardier Weekly Report

## Elizabeth line - Bombardier Weekly Report 21 August 2018

## Note No: 22

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.
- Old Oak Common Depot was brought into full use on 23 July and 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 continues to be 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 increased and ranged between 4,100 and 8,700 miles.
- The last dynamic testing 'window' took place on 11-13 Aug, including testing the transitions to and from the Network Rail Great Eastern line. There were a number of issues arising from the tests involving trackside signalling and connected on train software, the logs from the tests are being analysed by Siemens and Bombardier and actions undertaken in readiness for the second set of transition tests at the end of this week.
- A further train software release (7.2.2) has been built and is now being tested on the rigs at Derby and at Melton test track. Testing was slightly delayed by a configuration failure in the associated Siemens signalling software. Updated Siemens software is expected to be delivered today and in the meantime testing of other functions has been rescheduled to make use of the time available. The focus for 7.2.2 is to use it for Crossrail Test Window 12 (29 September) and also from that date for running in traffic hours on Network Rail, which will allow the 9-Car units to substantially increase the mileage operated and help build reliability prior to use in the tunnels.
- 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 still looking to further strengthen its system integration capability and resource.

- Due to the delay to completion of Release 7.2.2, the build and testing 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. The updated 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. Bombardier senior management are examining the possibilities to mitigate after which they will provide an updated programme to TfL later this week.
- With a large amount of testing and a number of releases, updates and derogations all requiring approval, assurance is a continuing 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**

<b>Stage 2</b>	<b>P80 Programme (V3_5_1) 11th Jan</b>	<b>Current Forecast</b>
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	Commenced 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
<b>Stage 3</b>		
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
<b>Old Oak Common Depot</b>		
Section A Brought into Use	1 Mar	Completed
Section B1 Brought into Use	11 Apr	Completed
Section C Brought into Use	30 May	Completed

