

## TRANSPORT FOR LONDON

## BRIEFING NOTE

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

**Date:** 11 September 2018

<b>Manifesto commitment(s)</b>	<b>Mayor's Transport Strategy (MTS)</b>
Not applicable	<b>A good public transport experience</b>
	<b>Proposal 57:</b> 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 Crossrail Ltd (CRL). Progress against the plan can vary week by week as the contractor coordinates and prioritises its activity:
  - **Cabling:** 96 per cent complete (vs forecast 98 per cent complete): 2,442m completed in week
  - **Tunnel Walkways:** 91 per cent complete (vs forecast 90 per cent complete): 1,244m completed in week
  - **Firemain:** 89 per cent complete (vs forecast 89 per cent complete)
  - **Drainage:** 89 per cent complete (vs forecast 95 per cent complete): all stations shafts and portals tie-in inspections completed
  - **Permanent tunnel ventilation:** 97 per cent complete (vs forecast 98 per cent complete): Final completion is pending the Installation Release Notes (IRN) sign off, snagging items and resolution of constraints around Bond Street West
- 2.2 Static testing of all assets remains behind plan. Measured by the first testing stage of station IRNs, actual completion is at 40 per cent (vs plan 87 per cent). IRNs are being prioritised and actively monitored by all contracts but progress is slowed by both the resource challenges to produce the evidence documentation and the progress of the physical works. CRL is monitoring the process across all sites and has reviewed the latest IRN completion statistics for accuracy. Actual completion has reduced due to a



reassessment of how completion was being measured. There was a slight difference in interpretation of what complete included but all metrics are reviewed on a regular basis for accuracy.

### 3 Signalling implementation and testing

- 3.1 Dynamic Testing window number 10 took place on 7 September. Testing was reduced to a single day due to Network Rail (NR) overhead line works for Crossrail not being completed in time to enable transition testing on the interface of the Great Western.
- 3.2 CRL has now agreed a plan with NR and stakeholders to enable completion of a minimum work scope for overhead line works during two nights this week. This will enable transition testing at low speeds to take place during test window 11 commencing 15 September. The DfT are assisting with prioritising NR activity to ensure works are completed for transition testing on 15 September.
- 3.3 CRL will switch from the current approach to Dynamic Testing of 11 day construction/3 day testing to a 5 day testing/2 day construction approach on 5 November 2018 which is a key milestone to ensure we launch Stage 3 in autumn 2019. This will enable a more concentrated focus on software testing and any bug fixing required.

### 4 Train production and testing

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

### 5 Stations

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

	Actual (%)	Planned (%)
Paddington	93.9	93.9
Bond Street	91.9	94.3
Tottenham Court Road	94.8	98.0
Farringdon	98.0	98.6
Liverpool Street	92.4	93.7
Whitechapel	93.5	98.2
Woolwich	95.5	98.0

### 6 Network Rail works for each stage

Stage 5:

- 6.1 The review of available options in regards to the expected [REDACTED] for the western station enhancement works has continued. The figure has been amended from our previous estimate of [REDACTED] because we now have more knowledge about the tender estimated the NR has received. NR has shared an options report with Sponsors that outline the available options and the priorities for the works and will present to the DfT portfolio board on 13 September.



- 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. This will add to schedule pressure which will have already been extended by the potential need to reprice the works. NR is publically committed to delivering these station upgrades by December 2019.

## **7 Approvals for each stage**

- 7.1 The overall approvals for each stage have not changed since the last weekly update but will be updated when the detailed delivery schedule is finalised by the end of October.

## **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 10 September 2018

Note No: 24

Key Activities and Issues

- 54 trains have been completed in Derby by Bombardier, in line with the plan, with 3 further units in production. TfL has [REDACTED] new trains 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.
- Old Oak Common Depot is in full operation. The fourth (of four) routes into and out of the depot has yet to be brought into use but the works rest with Network rail on their infrastructure.
- 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, increasing in the next month to eleven with the conclusion of train modification works. Availability continues to be very good on both routes.
- Bombardier's current reliability growth 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) supported by a programme of modifications, progress with which is tracked weekly. The most common event (though with small impact per incident and seen on the 7-car fleet only) is still the loss of the driver's information screen requiring a manual reset. Bombardier have recently introduced a further operational control that reduces the incidence of this failure and the benefit of this is beginning to be seen in the reliability figures but the root-cause defect requires a train-control software update to permanently correct. MDSAF in the last month has ranged between 4,300 and 8,100 miles.
- The new Siemens signalling software for the Central Section, correcting defects in a previous version has been delivered to the Melton test-track and is being tested with an updated 'R7.2.2' train-software release for integrated testing through to the end of September. Initial testing w/c 10 September identified a number of issues and both Bombardier and Siemens are making further adjustments before restarting testing this week.
- The combined focus is on completing testing at Melton so that this new configuration can be used in Crossrail Test Window 12 (29 September) and subsequently in Crossrail Dynamic Testing which is targeted for 22 October. The intention also remains to validate a derivative software version in October that can be used 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 Central Section tunnels.
- Weekly meetings continue between Bombardier, Siemens, Crossrail and TfL, to coordinate software releases, testing and bug fixing, and to take account of delays to



central section infrastructure and changes to dynamic testing. Bombardier and Siemens are also meeting bilaterally and TfL is holding escalation meetings with them where necessary. A plan to further strengthen the Crossrail project's system integration capability and resource is now in development.

- Development testing has continued for Release 7.3 on-train software, which will be used for Heathrow services over the European 'ETCS' signalling system. Bombardier has submitted a programme, currently under review by TfL, which delivers the R7.3 train software configuration tested and validated for passenger service by 6 February 2019. TfL and BT are exploring the potential to bring this date forward but this would also require a specific safety case to allow sufficient time for driver training and familiarisation in advance.
- With a large amount of testing and a number of software releases, updates and derogations all requiring approval, software quality and assurance is the continuing focus. Good quality software reduces the burden on testing and assurance resources which are critical constraints on the ability to bring updated software into use. Bombardier has introduced a number of additional signalling assurance engineers.



**Key Programme Milestones**

<b>Stage 2</b>	<b>P80 Programme (V3_5_1) 11thJan</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	8 Oct Under review
Independent Safety Assessment body ('ISA') approval for TCMS release 7.3	18 Sept	26 Nov 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	6 Feb 19 Under review
<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	16 Nov
Start of Stage 3 Passenger Service	9 Dec	Autumn 2019
<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

