

## TRANSPORT FOR LONDON

### BRIEFING NOTE

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

**Date:** 20 September 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 Crossrail Ltd (CRL).
- 2.2 The weekly progress figures report now focuses on the Interim Releases Notices (IRNs) and static testing for these items.
- 2.3 At current levels of productivity the 22 October 2018 completion date and the risk date of 5 November for routeway construction are unlikely to be achieved. Installation is forecast to be complete by 22 October, but testing is indicating slippage to later in November.
- 2.4 IRN progress and static testing results for the key routeway commodities are circulated to CRL executives weekly as part of tracking readiness for the start of the 5 day testing/2 day construction approach. This was due to commence on 5 November but is now at risk despite commitments at a very senior level by the joint venture (JV) contractor (Alstom TSO Costain) including Alstom's European Executive Committee level. CRL met with the JV's CEOs last week to reinforce the requirements needed and they gave a strong commitment to deliver the requirements by 22 October. Pressure continues to be applied on the joint venture contractor to complete their works in line with the schedule by improving productivity and planning.
- 2.5 The results of the second part of the independent schedule review commissioned by the Sponsors will be presented at the Crossrail Sponsor Board on 20 September.



### 3 Signalling implementation and testing

- 3.1 Dynamic Testing window number 11 took place on 15-16 September. Network Rail (NR) completed the required overhead line installation allowing transition testing of the interface with Great Western to commence at slow speed. A number of positive activities and tests were achieved including:
- Positive testing of the transition from TPWS to CBTC moving from the Great Western to the central tunnel section on Line 6
  - For the first time, trains were fully prepared offsite ahead of time and successfully transited directly in from the Old Oak Common Depot for the testing window
  - A new tool recording train data and CCTV from the driver's cab was used, making analysis of results easier
  - Outcomes were largely in line with pre-testing at the Crossrail Integration Facility (CIF) meaning future tests should be more predictable.
- 3.2 What was not achieved during the testing includes:
- The full transition from CBTC to ECTS/TPWS leaving the tunnel
  - The physical location of some track balises were not consistent with the on-board track database
  - The train still requires resetting when reversing and operating using the more complex modes.
- 3.3 Further software updates from both Siemens and BT (currently under test at Melton) are needed to address these issues and considerable further transition testing (but less disruptive to NR) will be required. Subject to further Melton testing this week, new train and wayside software is expected to be available for use in October. In addition CRL continues to look at enhancements to collaboration between the two contracts and at improving System Integration more widely.
- 3.4 A readiness review for entry into 5 day testing/2 day construction will take place on 21 September. This review will be chaired by an independent expert (Phil Threlfall) and attended by George Clarke, Transport for London, Director of Engineering. The criteria being assessed have been shared with the project Sponsors.

### 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 5 results are:

	Actual (%)	Planned (%)
Paddington	94	94
Bond Street	92	94
Tottenham Court Road	95	98
Farringdon	98.0	99
Liverpool Street	92	94
Whitechapel	94	98
Woolwich	96	98



- 5.2 A new Master Operating Handover Schedule is due to be finalised in October and will include planned handover dates for the stations.

## 6 Network Rail works for each stage

### Stage 5:

- 6.1 The review of available options in regards to the expected [REDACTED] [REDACTED] for the western station enhancement works has continued. The need and options for [REDACTED] were discussed at the DfT portfolio board on 13 September and will now be raised at NR's Executive committee on 2 October.
- 6.2 NR will commence enabling work at Ealing Broadway, West Ealing, Southall and Acton Main Line this month and to maximise use of the important Christmas works period.
- 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 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 17 September 2018

Note No: 25

Key Activities and Issues

- 54 trains have been completed in Derby by Bombardier, which is 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. The actions being taken to address this are summarised below, with the urgency being to re-start train delivery so that the remaining fleet can be accepted by summer 2019 with deliveries at a steady and sustainable rate.
- 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 as this work relies on Network Rail's 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 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) remains 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. MDSAF in the last month has ranged between 3,842 and 8,506 miles.
- The new Siemens signalling software for the Central Section, has been delivered to the Melton test-track and is being tested with the latest 'R7.2.2.4' train-software release. Initial testing w/c 10 September identified a number of issues and following rectification testing started on 12 September. To date 2 tests have been completed successfully out of 4 attempted.
- The plan is to complete testing at Melton this week and make the associated changes and fixes to both the Siemens and Bombardier software such that this new configuration can be used in Crossrail Dynamic Testing, currently targeted for 22 October. The intention also remains to validate a derivative software version by 5 November (previously October) that can be used for running in traffic hours on Network Rail. This will allow the 9-Car units to substantially increase the mileage operated and help build reliability prior to use in the Central Section tunnels.



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Further software updates from both Siemens and BT (currently under test at Melton) are needed to address these issues and considerable further transition testing (but less disruptive to Network Rail) will be required. Subject to further Melton testing this week new train and wayside software is expected to be available for use in October. In addition Crossrail continues to look at enhancements to collaboration between the two contracts and at improving System Integration more widely.

- 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 underway.
- Development of Release 7.3 on-train software continues. This will be used for Heathrow services utilising 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 continue to explore the potential to start driver training in advance of this date but this would also require an additional, specific, safety case.
- 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. There was a meeting with BT senior management on 11 September at which their plans and initiatives to improve software quality were discussed. 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	TBC
<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

