

TRANSPORT FOR LONDON

BRIEFING NOTE

Subject: Weekly Mayoral update on Crossrail / Elizabeth line

Date: 24 September 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 Routeway construction:

- 2.1 Critical programme metrics for routeway construction are tracked weekly and actively monitored by Crossrail Ltd (CRL). The focus is particularly on installation release note (IRN) and static testing progress for the key routeway commodities. Further details on progress will be included once the revised Master Operating Handover Schedule (MOHS) is finalised in October.

Testing and Commissioning

- 2.2 The readiness review for entry into 5 day testing/2 day construction took place on 21 September. The review chaired by an independent expert (Phil Threlfall) concluded that against key rolling stock, signalling software and infrastructure installation and testing criteria, 5/2 dynamic testing would not commence on 22 October.
- 2.3 No revised date for the start of the 5/2 dynamic testing was concluded at the meeting. CRL will consider the results of this first review and then put in place next steps. The recent 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. The CRL leadership team are now reviewing the outcome of the readiness review and are in the process of recasting the MOHS (the master schedule). This will determine any further schedule pressures. It is expected the review of the MOHS will take a further week.
- 2.4 Dynamic Testing window number 12 will take place on 29-30 September. Tests will include transition testing to the Great Eastern, testing at line speed in the tunnels and platform train interface testing.



Systems integration

- 2.5 To strengthen Crossrail's approach to systems integration, CRL convened a meeting involving CRL, TfL, RfL and MTR to agree a refreshed approach. Key actions were:
- Commitment to a “one-team approach” (including key suppliers such as Bombardier Transportation (BT), Siemens and MTR) based on greater transparency and openness in dealings with one another
 - Gain further commitment from Siemens particularly through provision of adequate resources, including nominated Germany-based leaders
 - Closer involvement of BT and increase the transparency of programme and status
 - Improve the focus of the systemwide contractor ('ATC') on facilitating testing and commissioning, as their current procedures are restrictive and efficiency in this area will be critical once full dynamic testing gets underway
- 2.6 CRL has appointed a systems integration specialist who will review the current status of systems integration activity and put forward recommendations relating to revised structure, process, governance and accountabilities. It is likely that a substantial systems integration authority will be embedded within the existing Crossrail management structure. The results of this review will be used to form the structure and personnel requirements for this new team.

3 Train production and testing

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

4 Stations

- 4.1 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	99
Liverpool Street	92	94
Whitechapel	94	98
Woolwich	96	98

- 4.2 The new MOHS is due to be finalised in October and will include planned handover dates for the stations.

5 Network Rail works for each stage

Stage 5:

- 5.1 The review of available options in regards to the expected [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.



- 5.2 NR will commence enabling work at Ealing Broadway, West Ealing, Southall and Acton Main Line this month, and continue to plan to maximise use of the important Christmas works period.
- 5.3 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.

6 Approvals for each stage

- 6.1 The overall approvals for each stage will be updated when the detailed delivery schedule is finalised by the end of October.

7 Appendix

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



Appendix A: Joint TfL and Bombardier Weekly Report

Elizabeth line - Bombardier Weekly Report 24 September 2018

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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, notably the introduction of 9-Car units into passenger service on Network Rail's infrastructure, planned for November. The intention is 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 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.
- 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. MDSAF in the last week is in the range 4,191 to 6,635 miles.
- The latest Siemens signalling software for the Central Section is being tested at Melton Test Track with the latest 'R7.2.2.5' train-software release. Testing started on 12 September. As of 20 September, 21 out of the 29 formal tests to be undertaken have been completed with 7 passed, 4 are under analysis and 10 failed. Some of the more complex tests have been scheduled early in the cycle and the necessary fixes are already being programmed into further releases by Siemens and Bombardier. This is scheduled for 16 November.
- BT continues to undertake work to validate the software which 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 will help build reliability prior to use in the Central Section tunnels. The target for making submissions to the necessary safety bodies is 5 November.
- The next Test Window is scheduled for 28/29 September and will include further testing of the transition between the CBTC signalling and national rail (TPWS) signalling at Stratford, at the eastern end of the central tunnels.
- Weekly meetings and daily calls continue between Bombardier, Siemens, Crossrail and TfL, to coordinate software releases, testing and bug fixing and respond to the results of



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

- 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 which delivers the R7.3 train software configuration tested and validated for passenger service for 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 and the immediate focus is on the 7.2 series software for dynamic testing in the central tunnels.
- With a large amount of testing and a number of software releases, updates and derogations all requiring approval, software quality and assurance are 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.



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	Commenced 30 July
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	6 Feb 19 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

