

TRANSPORT FOR LONDON

BRIEFING NOTE

Subject: Weekly Mayoral update on Crossrail / Elizabeth line

Date: 24 April 2018

Manifesto commitment(s)

Not applicable

Draft 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 Headlines

- 2.1 Following the approval of safety assurance documents, a new train is operating in the Crossrail tunnels under automatically signalling mode, running successfully at 55mph in sections between Canary Wharf and Woolwich.
- 2.2 Crossrail Ltd (CRL) has made progress with installing station ventilation fans, in line with the forecast dates in Crossrail's master project schedule. The team will install the new fans at Paddington station on 5 May 2018 and at Bond Street station on 16 July 2018.
- 2.3 TfL Rail remains on schedule to take over the Heathrow Connect services in May 2018, using the existing rolling stock to the airport and the new Class 345 trains between Paddington and Hayes & Harlington.
- 2.4 CRL is actively managing a number of challenges relating to work needed on Network Rail (NR) assets both on the east and west surface sections. The works NR needs to carry out include joining up the overhead power line between the central and surface sections as well as cabling works. The work is critical to achieving the power sequence which is needed for dynamic testing to commence in June between Whitechapel and Paddington and in the full central section between Paddington and Abbey Wood in July. TfL and DfT are both supporting CRL in its discussions with NR and seeking urgent resolution to ensure these works are completed on time.



3 Costs

- 3.1 CRL's costs are reported on a periodic basis and have increased by £3m in the last period to £12,467m.
- 3.2 Discussions took place between CRL and Sponsors (DfT and TfL) at the Crossrail Sponsor Board on 22 March, regarding the likelihood of additional funding being required to complete the project.
- 3.3 Crossrail's next formal cost forecast will be issued in late May, and will breach the funding limit as a result of incorporating the implications of the revised Master Operating Handover Schedule (MOHS), delays to energisation, current levels of productivity on the systemwide and stations contracts, and delays to the development of the train software.
- 3.4 The Sponsors have commissioned a review into some of the critical contracts (both at specific sites and systemwide) to assess the confidence of the cost scenario ranges and the level of required funding. For each selected contract, the team will look at contract performance, acceleration options, costs to date, costs to go, risk, and an assessment of the contractual position and commercial incentives.

4 Programme and Schedule

- 4.1 The key commitments and dates in Crossrail's Master Operational Handover Schedule (MOHS) 2018 are provided in the appendix A.

5 Appendix

- **Appendix A:** Key milestones from MOHS 2018 schedule
- **Appendix B:** Table of key risks and issues
- **Appendix C:** List of Acronyms
- **Appendix D:** Joint TfL and Bombardier Weekly Report

Appendix A: Key milestones from MOHS 2018 schedule



MOHS Milestones	MOHS2018 date	Status
Traction power Zones 1&2	Feb 18	Achieved on time
Dynamic testing Zones 1&2	Feb 18	Achieved on time
Traction power on Zones 3&4	May 18	Energisation sequence running slightly behind plan but still on target for dynamic testing commencing in June.
High Voltage Non Traction Power Zones 1&2	May 18	HV sequence running behind plan but not on critical path and mitigations being developed
Stage 2 commencement (contingency plan)	May 18	
Dynamic testing Zones 3&4	Jun 18	Completion of systemwide works behind plan but new plan developed to enable more productive use of tunnels to complete fit-out to enable dynamic testing to commence in June.
Network Rail award west station contract	Jun 18	
Handover of stations and elements to RfL and LU	Jun-Nov	
High Voltage Non Traction Power All locations	Jul 18	
Dynamic testing all zones	Jul 18	
Trial running commences	Aug 18	
Safety case for central section submitted to RAB C	Aug 18	
Trial operations commence	Sep 18	
Submit Approval to Place Into Service to ORR	Sep 18	
Full Stage 2 services	Tbc	
Stage 3 commencement	9 December 18	



Appendix B: Table of key risks and issues (as at Period 12, 03 March 2018)

Risk / Issue	Key date	Mitigation / Action
Stage 2 - Paddington to Heathrow, Shenfield to Liverpool Street mainline		
Timely completion of ETCS testing and BT on board signalling approval	On-train testing start 4 May 2018	Close monitoring of software development for passenger service and prioritised joint lab testing at Charleroi, Belgium.
Stage 3 - 9 December 2018 - Abbey Wood to Paddington, Heathrow to Paddington mainline, Shenfield to Liverpool Street mainline		
Timely provision of design assurance information, asset data, key operations/ maintenance information.	Systemwide Handover 5 Aug 2018	Maintain focus on design assurance close out rate and drive Tier 1 contractors to provide information in good time
Risk of delays to the Bombardier schedule for installation of the Class 345 on-board TCMS / CBTC (v 6.1.1 & v7) impacts activities for Dynamic Testing.	CBTC Authorised for Trial Running 22Jun18	Prioritisation of software development & testing for Stage 3 in latest BT programme. Revised plans build contingency to start of testing in central section
Risk of delays to commissioning of NR interfaces impacting trial running.	Commence Transition Testing Z1&2 30Jun18 Z3&4 14Jul18	Confirm blockades June & July 18. Confirm the programme for installation of wayside equipment, on board software and testing at PML
Risk of insufficient time to undertake trial operations activity.	Trial Ops 09 Sept 2018	Complete infrastructure and testing as early as possible to allow unimpeded trial operations. Clear definition of minimum requirements. Modelling systems reliability.
Risk of LU readiness being impacted by ongoing construction at stations, spares availability and completion of staff training.	Trial Ops 09 Sept 2018	Station by station Handover execution plans between CRL and LU was provided on schedule at the end of March. Comments from LU and RfL have been sent back to CRL who are currently evaluating them.
Preferred delivery option and programme for wifi and 4G for passengers from stage opening and maintenance teams from handover.	Wi-Fi for passengers 9 Dec 2018	Interim on-train wifi solution proposed. Positive initial engagement with MNOs. Commence procurement.



Appendix C: List of Acronyms

Acronym	Description
ATC	Alstom, TSO, Costain joint venture
BT	Bombardier Transportation
CBTC	Communications Based Train Control
CRL	Crossrail Limited
DfT	Department for Transport
ETCS	European Train Control System
LU	London Underground
MNO	Mobile Network Operators
MOHS	Master Operating Handover Schedule
MTS	Mayor's Transport Strategy
ORR	Office of Rail & Road
PML	Pudding Mill Lane
RAB (C)	RfL Assurance Board for Crossrail
RfL	Rail for London
TBC	to be confirmed
TCMS	Train Control Management System
TfL	Transport for London
TPH	Trains per hour



Appendix D: Joint TfL and Bombardier Weekly Report

Elizabeth line - Bombardier Weekly Report 23 April 2018

Note No: 8

Key Activities and Issues

- 43 trains have been completed in Derby by Bombardier, which is in line with the plan.
- Of the 15 trains that were available at Ilford Depot, four (out of an eventual five) trains have been moved to Old Oak Common Depot ready for Stage 2 services between Paddington and Hayes & Harlington from 20 May. The remaining 11 7-Car trains remain at Ilford Depot and are available for passenger service on the Liverpool Street to Shenfield line.
- The day to day availability and reliability of the Class 345 trains continues to improve and they performed well during the recent hot weather as well as during the snow in March. Bombardier is updating its reliability growth plan this week and an update will be provided in next week's briefing.
- Following the approval of safety assurance documents, Dynamic Testing in the Crossrail tunnels was stepped up to full Automatic Mode, with the train operating successfully at 55mph in sections between Canary Wharf and Woolwich.
- The tunnel testing is taking place using release 7.1 of the train control management software. This release resolves a number of issues with earlier versions. It has improved the efficiency of testing, however a number of bugs remain to be resolved in release 7.2.
- Safety assurance submissions and resourcing remains a key area of concern. Bombardier has reviewed this and is strengthening its process, resources and internal governance.
- Bombardier has now started building the next release (7.2) of the train control management software. This release will be developed and approved for Stage 3 passenger service. All known defects are addressed in release 7.2 although further updates will be required to address any issues discovered in future dynamic testing and trial operations.
- Some issues discovered in testing will need to be addressed in future releases of Siemens signalling software where they relate to the Siemens part of the system.
- Further meetings and workshops have taken place to drive closer integration between Bombardier, Siemens, Crossrail and TfL, in terms of joint testing, coordination of software release programmes and bug fixing. This relationship, covering train and signalling, is vital for Stage 3 testing and passenger service.



- Progress at Old Oak Common Depot remains satisfactory. The focus remains on the next stages of signalling and bringing into use as well as ‘snagging’ and rectifying defects in the currently operational parts of the depot.
- TfL Rail remains on schedule to take over the Heathrow Connect services in May 2018, using the existing rolling stock to the airport and the new Class 345 trains between Paddington and Hayes & Harlington.
- One of the key activities for the success of this plan was to update some route-specific software. The software was updated, on schedule, on 11 April and has been successfully tested in runs on the Great Western route. It remains on schedule for full safety approval on 2 May and Bombardier continues to monitor this closely.
- Further pre-testing of the European Train Control System (‘ETCS’) in the Heathrow tunnels will take place this weekend. Laboratory testing in Charleroi, Belgium allowing some ETCS tests to take place without requiring access to the actual railway at Heathrow was completed on 18 April and the results, apparently successful, are currently being analysed and a report will be issued this week. An update on this will be provided in next week’s briefing note.



Key Programme Milestones

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	Submitted 5 March
Commence build of TCMS release 7.3 (the Stage 2 passenger service software)	26 June	26 June
Independent Safety Assessment body ('ISA') approval for European Train Control System MR3 software necessary for Stage 2	6 August	6 August
Independent Safety Assessment body ('ISA') approval for TCMS release 7.3	18 September	18 September
Approval for European Train Control System driver training on Great Western	24 Aug	12 Oct
Approvals for European Train Control System Passenger Service	28 Sept	19 Nov
Stage 3		
Completion of Transition testing at Melton ready for Central Operating Section Dynamic Testing	29 Jan	Complete
Commence build of TCMS release 7.2 (the Stage 3 passenger service software)	24 April	24 April
Independent Safety Assessment body ('ISA') approval for European Train Control System MR2 software necessary for Stage 3	22 May	22 May
Approval of CBTC signalling for Central Operating Section Trial Operations	22 Jun	22 Jun
Availability of 22 trains for Trial Running in the Central Operating Section	13 Aug	13 Aug
Approval of Class 345 for Stage 3 Passenger Service	10 Oct	10 Oct
Start of Stage 3 Passenger Service	9 Dec	9 Dec
Old Oak Common Depot		
Section A Brought into Use	1 Mar	Complete
Section B1 Brought into Use	11 Apr	Complete
Section C Brought into Use	30 May	30 May

