

TRANSPORT FOR LONDON

BRIEFING NOTE

Subject: Weekly Mayoral update on Crossrail / Elizabeth line

Date: 9 November 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 Overall programme

- 2.1 The Crossrail Ltd (CRL) Board has now received formal confirmation from Sponsors that the £350m of short term repayable financing announced on 26 October 2018 is intended to cover CRL's forecasted in-year cash requirement, and will be made available in line with CRL's cash forecasts to ensure that momentum is maintained in delivering the Crossrail programme.
- 2.2 The CRL Board met on 8 November and discussed the additional funding as well as the [REDACTED] 2017/18 annual accounts. The Board will also discuss the latest progress in finalising the MOHS (master delivery schedule), noting the Sponsors' requests for immediate information regarding the dates that are emerging during the review and any impact of those dates on the cost projections for the highest spending contracts. CRL has assured Sponsors that work across the project is continuing and is not being delayed by the additional time being taken to finalise the MOHS.
- 2.3 The MOHS will include the revised target dates for delivery of Stage 2 Phase 2, Stages 4 and 5 and potential for a Stage 5a (services running Paddington (high-level) to Reading). [REDACTED] dates for critical activities and key milestones will continue to be used to drive contractor performance.

3 Safety

- 3.1 All sites have continued with their "Finish Safe" campaigns to ensure that all teams are reminded of the paramount importance of conducting all work safely.



3.2 There were three high potential near misses last week all of which are being actively investigated:

- **03 November - Whitechapel Station Main Works**

- [REDACTED]

- **31 October – Tottenham Court Road Main Works**

- [REDACTED]

- **28 October – Tottenham Court Road Main Works**

- [REDACTED]

4 Weekly progress reporting:

4.1 CRL is finalising a weekly dashboard, supplemented by commentary, for its Executive, Board and Sponsor organisations. It will contain information on performance against:

- critical paths;
- project milestones;
- systemwide (including routeway) progress;
- rolling stock development;
- signalling progress;
- stations, portals and shafts (including IRNs, Phase 3 testing, outstanding works list);
- dynamic testing; and
- assurance documentation

4.2 The draft dashboard will be discussed by the CRL Board on 8 November will then made available to Sponsors.

4.3 The table below outlines the latest available IRN progress and look ahead for the routeway commodities, which are the critical path for infrastructure readiness for Phase 4 Dynamic Testing. Completion rates remain challenging and a critical focus for CRL. Focus continues to be applied through weekly meetings to discuss and align weekly inspection and IRN plans, daily calls on each IRN forecast date, and Friday meetings for disciplines leads to reports on actual delivery.



	Fire main install	Fire main pressure test	Fire main flow test	Low voltage dist.	Pumped drainage install	Walkway install
Total IRNs ^	34	34	17	172	66	36
Total complete (actual)	22	7	0	24	15	27
% complete	65	21	0	14	23	75
To go	12	27	17	148	51	9
Completed in week	2	0	0	3	1	6
Next week look ahead	0	3	0	5	0	3
2 nd week look ahead	4	4	2	6	3	0
Expected completion date for all	21 Dec 2018	03 Jan 2019	04 Feb 2019	02 Feb 2019	05 Apr 2019	5 Jan 2019
Notes: metrics as at 28 October 2018 ^ the Total IRNs can change as the assurance programme progresses						

Testing and Commissioning

- 4.4 The latest Dynamic Testing window took place 2-4 November. The tests included:
- transitions between the different signalling systems at Westbourne Park (successful going Eastbound into the tunnel, known not to work Westbound out of the tunnel pending a future software upgrade);
 - radio coverage;
 - driver CCTV; and
 - platform screen door measurements.
- 4.5 All planned tests were completed although the traction power had to be switched off on three occasions to allow infrastructure fixes and the trains re-booted when power was restored.
- 4.6 The CRL Board on 8 November will be asked to support a proposal to consider interim dynamic testing commencing in early December in a series of test blocks prior to full 5/2 dynamic testing commencing in January 2019.
- 4.7 The independently-chaired readiness group review of entry into 5 day testing / 2 day construction will meet again on 9 November. The group will assess progress against the detailed entry criteria covering train, infrastructure and signalling readiness. Internal readiness meetings are also being held regularly and the detailed testing plans are being populated. Note that the 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.



Systems integration

- 4.8 The recommendations in the report for CRL by PA Consulting on systems integration are now being taken forward. Its recommendations relate to introducing revised structures, processes, governance and accountabilities. PA Consulting is now producing an implementation plan for CRL to take forward its recommendations. It is likely that a substantial systems integration authority will be embedded within the existing CRL management structure.

5 Train production and testing

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

6 Stations

- 6.1 When the new MOHS is finalised, it will include Tier 1 Substantial Demobilisation dates (TOSD), revised staged completion and handover dates for the stations. Several of the forecast dates for these items have slipped against the [REDACTED] dates presented in the remedial action plan presented to Sponsors and are being challenged during finalisation of the MOHS.

7 Network Rail (NR) works

Stage 5:

- 7.1 NR is submitting a paper to the NR/DfT portfolio Board meeting on 8 November this week requesting funding of [REDACTED] in Control Period 6 which commences 1 April 2019. [REDACTED] The request regarding [REDACTED] to cover cost pressure on other core contract activities is continuing to be examined by NR.
- 7.2 Following the standstill letters issued for Package 3 (Southall, Hayes, and West Drayton), NR is due [REDACTED] For Package 2 (Acton, Ealing Broadway and West Ealing) NR is assessing the tender prices and standstill letters are due to be [REDACTED]
- 7.3 NR is continuing its enabling works on the western stations to assist in maximising use of the Christmas works period by contractors.
- 7.4 Contract award for Ilford and Romford station upgrades [REDACTED] with some minor value engineering opportunities now included.
- 7.5 NR remains publically committed to delivering these station upgrades by December 2019. However, stakeholders have been informed that completion of Ilford and Romford station upgrades is now expected in 2020.

8 Approvals for each stage

- 8.1 CRL met the Office of Rail and Road recently to discuss the schedule of submissions that will be made aligned with the revised MOHS.



9 Appendix

9.1 Appendix A: Joint TfL and Bombardier Weekly Report



Appendix A: Joint TfL and Bombardier Weekly Report

Elizabeth line - Bombardier Weekly Report 5 November 2018

Note No: 32

Key Activities and Issues

- 57 trains have been completed in Derby by Bombardier. TfL has [REDACTED] 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 are summarised below including the introduction of 9 Car units into passenger service on Networks Rail's infrastructure, planned for December. 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.
- 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.
- Bombardier's reliability growth plan is based on the mean distance between service affecting failures (MDSAF, a standard industry measure based on any delay over 3 minutes caused by a train fault). Bombardier's target for the 7-Car units is 7800 miles by 10 November. This is tracked weekly. MDSAF in the last Period (7) was 5801 miles and it stands at 5284 after the first three weeks of the current Period 8 (two good weeks followed by 6 apparently unrelated faults in Week 3).
- Tests of CBTC signalling and associated software for the Central Section tunnels were completed on 26 September. Of the 29 formal tests undertaken at the Melton test track, 12 passed and 17 failed. A number of Bombardier/Siemens reviews took place with a final meeting on 18 October. All parties are committed to find a swifter way to resolve these allocation issues going forward.
- The in order to pass the full suite of 29 tests (all of which are not necessarily required for Dynamic Testing) updates are needed to: TCMS software (R7.2.2.6), built on 23 October; ETCS software (PVI 6.2) planned for 16 November and CBTC software, current final release date 4 April. There is one issue with a root cause (and fix) as yet unknown but for which a further test is taking place at Melton this week. There is also one issue requiring instruction from Crossrail as to which party undertakes the change, this is currently being decided by Crossrail's Signalling Engineer.
- The start of Main Dynamic Testing in the Central Section tunnels is currently under review as part of Crossrail's revised Master Operational Handover Schedule (MOHS). A further review of readiness is currently planned for 9 November.
- The latest Dynamic Testing window took place 2-4 November. The tests included: transitions between the different signalling systems at Westbourne Park (successful going Eastbound into the tunnel, known not to work Westbound out of the tunnel pending a future software upgrade); radio coverage; driver CCTV and platform screen door



measurements. All planned tests were completed although the traction power had to be switched off on three occasions to allow infrastructure fixes and the trains re-booted when power was restored.

- Bombardier continues to undertake work to validate the software which can be used for running in traffic hours on Network Rail infrastructure. 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. BT planned to make submissions to the necessary safety bodies on 5 November, but an additional step is required to incorporate assurance evidence from Siemens that their on-train equipment can be used to control train recovery should there be a fault with the other on-train signalling systems. This has been followed up with Siemens and they will be providing evidence to allow submission in time to allow the introduction of the longer units, the target date for passenger service is 10 December.
- The build of Release 7.3 on-train software is now complete. This will be used for Heathrow services utilising the European 'ETCS' signalling system. Bombardier's most recent programme delivered the R7.3 train software configuration tested and validated for passenger service by 6 February 2019. TfL asked for this programme to be reconfirmed given the need for further iterations of train and wayside software for the central tunnels. Bombardier undertook this further programming exercise (managing 7.2 and 7.3 together) and a satisfactory programme has still not been concluded.
- BT's revised programme for Release 7.3 currently shows June 2019 for passenger service assurance with driver training to take place thereafter. The critical issues are the availability of the Melton test facility if it is being used for further testing of software for the central section and also the availability of specialist compliance engineering resource to the two simultaneous workstreams. Potential alternative test tracks in both the UK and mainland Europe have been identified by BT and are being assessed along with greater use of rigs and other facilities for assurance and more proactive and tightly scheduled assurance submissions. There is also a need to overcome constraints in engineering and assurance resources. A further programme will be provided by BT this week and reviewed with the other parties involved.
- CRL has now completed its review of system integration and the implementation phase is underway. This includes integration of train and signalling software but also many other aspects of the Crossrail project activities.
- The milestones in Appendix A will be updated following the completion of the new Crossrail Master Operational Handover Schedule (MOHS) at the end of November.



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	Completed
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	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

