



Simon Adams
Head of Crossrail Joint Sponsor Team
Transport for London
Windsor House
London
SW1H 4TL

Crossrail Limited
25 Canada Square
Canary Wharf
London E14 5LQ
T: 020 3229 9100
F: 020 7719 0955
Helpdesk
T: 0345 602 3813
www.crossrail.co.uk

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Dear Simon

Thank you for your letter dated 29 September 2017 (received on 5 October 2017) regarding the Adverse Event Notice (AEN) of 7 July 2017 served by Crossrail Ltd (CRL) and subsequent update on 31 July, relating to:

- Uncertainty of the timely development of on-board signalling and train control management software by Bombardier Transportation UK Ltd (BTUK) under the Rolling Stock and Depot Service Provision agreement between BTUK and Rail for London Ltd (RfL) dated 18 February 2014

Sponsors have requested that CRL provide a revised assessment on the key points raised in the AEN and have specified a number of areas to cover in an update to be provided by 23 October. This letter is structured to cover the specific issues raised by Sponsors.

Sponsors have also had the opportunity to analyse the information contained in the operational readiness dashboards included in each of our periodic Board reports which highlight the status of individual milestones for Stages 2 and 3. Some elements, including the results of train testing, are subject to daily update and we are very happy to provide further information to the Sponsor Board on 30 October.

The actions taken by CRL, TfL/RfL and BTUK and outlined in the update provided on 31 July have been helpful, as has escalation of the concerns by TfL/RfL at the highest levels in BT's worldwide organisation. TfL/RfL and CRL also participate in weekly senior level calls with BT. However, there have been slippages against several of BTUK's P80 dates since July causing consequential delays to the testing programmes for Stage 2 and a degree of uncertainty with regard to any effect on Stage 3 testing.

i. The confidence in delivering passenger services to the current Stage 2 date ('Plan A')

- The current assessment is that the 20 May 2018 date to deliver Stage 2 (ONW between Heathrow and Paddington substantially complete with Crossrail services running at a frequency of 4tph into Paddington high-level) remains achievable but increasingly challenging.
- The confidence level for Stage 2 is calculated for inclusion in the Semi Annual Construction Report (SACR) (68% at SACR17). The new confidence level will be available when SACR18 is presented to Sponsors on 23 November.

ii. The development of a fall-back plan for Stage 2 including:

a. A description of the Plan B being considered and rationale for choosing this

The fall back plan (Plan B) has been developed on an assumption that ETCS functionality on the C345s is not available in the Heathrow tunnels and involves:

- 2 tph Class 360s running between Paddington and Heathrow
- 2 tph Class 345s full length units (FLU) running between Paddington and Hayes and Harlington
- Heathrow Inter Terminal Transfer train between CTA and T4 to continue to operate 2tph to provide a combined 4tph

All from 20 May 2018.

Plan B requires FLUs and Class 360's to be available and the bay platform works at Hayes and Harlington to be completed by Network Rail.

The rationale for pursuing Plan B is:

- To give certainty of operator (and hence contractual responsibilities, ticketing etc) on the route from the planned Stage 2 date. The variables being the type of rolling stock used for through services to Heathrow and whether the service between Hayes and Harlington and Heathrow is 2tph or 4tph
- This allows a swift move from Plan A to B (or vice versa) as the number of third parties affected is minimised. This is important as the choice between Plan A and Plan B is not binary, or likely for an extended period; if Plan A is followed it will still be necessary to have a fall back if problems emerge late in the programme, conversely, if Plan B is used to start the service on 20th May 2018, it will still be necessary to bring Plan A in as soon as possible thereafter.
- This plan also allows the Class 345's to be used for the benefit of passengers and to gain experience of FLU operation, even if Plan B is used to start the Stage 2 service

An alternative scenario (Plan C) has also been considered if the FLUs are not available or not authorised for the western route:

- 2 tph Class 360s running between Paddington and Heathrow
- 2 tph C345 Reduced Length Units (RLU) running between Paddington and Hayes and Harlington

b. An outline of the activities needed to implement this plan

- Agree retention/lease/operational agreement for Class 360s by with Heathrow. Several meetings have been held, lawyers identified and a draft agreement provided to Heathrow by TfL.
- NR to deliver the extended bay platform at Hayes and Harlington in time for driver training and operation
- Clarify the timetable to be used and if the timings on Network Rail between Paddington and Hayes and Harlington are any different in Plan B to Plan A
- MTR to drive Class 360s Heathrow to Paddington under the existing concession with TfL
- Agree Bombardier scope for Class 345 FLU operation and any changes needed (intermediate approvals) to the regulatory approvals work stream being pursued already for Plan A
- Sufficient driver training on the Class 345 FLUs and Class 360's (MTR already have involvement in the latter)

c. Detail of how and when a decision to enact Plan B (if required) would be made

- Plan B will continue to be developed working with stakeholders (TfL/RfL, MTR, HAL, BTUK, NR) alongside Plan A
- A decision to switch to Plan B could be taken in December 2017 or possibly later as long as sufficient progress on developing the activities outlined above can be maintained.
- The critical determinants of timing are (i) the degree to which the train times between Paddington and Hayes and Harlington vary between plan A and Plan B and (ii) the need to have drivers trained to cover whichever Plan is pursued as the primary option.
- As above, the decision to lead with Plan A or B would, in any case, require the other options to be maintained for if and when they are needed. The decision (other than any decision to completely drop Plan B/C which is not recommended) is of the degree of priority and emphasis between the options.
- If a switch to Plan B is supported for introduction on 20 May 2018 as the best option for the project we would anticipate a decision from the CRL Board and a decision from Sponsors as Plan B is a change from the affirmed Opening Strategy.

iii. The provision of train with stable software release and sufficient functionality for CRL to conduct meaningful dynamic tests both initially in November 2017, but continuing through the full dynamic testing period.

- During the last three months CRL has followed the approach outlined in the update provided to Sponsors on 31 July to consider adjusting and optimising the MOHS on the basis of the P80 dates and functionality available provided by BTUK as well as other non BTUK factors pertinent to dynamic testing
- On the basis of information available in September from BTUK, examination of construction schedules, testing plans, logistics and commercial consequences, it was concluded by the CRL Executive that there was no justification to move away from the existing schedule or dynamic testing plan commencing 1 November in Zones 1&2 and February 2018 in all zones as contained in the MOHS
- It should be noted that:
 - An overview of the dynamic testing plan is now contained in our periodic Board report
 - Information from BTUK regarding the detailed functionality available on the test train has sometimes been unclear, so whilst it appears to CRL that functionality of the relevant software (Releases 6.1.1.X and 7.X) will fully support Dynamic Testing plans this depends on delivery of the full functionality as anticipated. Meetings have been held with BTUK to minimise the risk of misunderstanding in this respect.
 - BTUK has missed several of the P80 dates subsequent to the conclusion reached by the CRL Executive in September
 - However, there have been delays in the dates for commencement of energisation and dynamic testing. Dynamic Testing is now due to commence on 29 November rather than the 1 November 2017.

iv. Completion of construction activities in parallel with the constraints of dynamic testing in order to support:

- a. Energisation, including revised timeframes**
- b. Dynamic testing on 1 November 2017 (Zones 1&2)**
- c. Dynamic testing on 26th February 2018 (all zones)**
- d. Handover on 5th July 2018.**

- Energisation (of Zones 1&2) is currently planned to be complete by 14th November 2017
- Dynamic Testing (Zones 1&2) is currently planned to commence 29th November 2017. A Class 345 is currently scheduled to be hauled into the Central Operation Section (COS) and through the tunnel to Abbey Wood on 28th October 2017 although at that stage it will not have fully tested CBTC functionality. The first 4 weeks of Dynamic Testing will involve infrastructure tests including slow speed moves by a single Class 345 train which will operate in Staff Accountable (SA) mode, not using the full CBTC signalling system.

- Dynamic Testing (Zones 3&4) is planned to commence on 26th February 2018, although, as made clear in our periodic Board report there is some pressure on the programme activities leading to this date.
 - Handover is planned to take place 5th July 2018
- v. ***Confidence in delivering passenger services at Stage 3 as currently planned.***
- The current assessment is that the 9 December 2018 date to deliver Stage 3 (*Paddington Low Level to Abbey Wood - Crossrail Services running from Paddington (low level) to Custom House/ Abbey Wood allowing a nominal 3 months for Trial Operations on that Part*) remains achievable.
 - The confidence level associated with Stage 3 is calculated for inclusion in the SACR (77% at SACR17). The new confidence level will be available when SACR18 is presented to Sponsors on 23 November.

vi. ***Most efficient and best value option to complete construction.***

CRL believes that the Master Operational Handover Schedule continues to define the most efficient and best value option to complete construction.

Yours Sincerely



Andrew Wolstenholme OBE FREng
CEO

- cc. David Hughes (TfL)
Simon Kilonback (TfL)
Matt Lodge (DfT)
Nick Joyce (DfT)