

TRANSPORT FOR LONDON

RAIL AND UNDERGROUND PANEL

**SUBJECT: REVIEW OF THE NEW SUB-SURFACE RAILWAY SERVICE
PATTERN INTRODUCED ON 13 DECEMBER 2009**

DATE: 8 FEBRUARY 2011

1 PURPOSE AND DECISION REQUIRED

- 1.1 This paper provides a review of the performance of the new Sub-Surface Railway (SSR) Working Timetable 8 (WTT8) introduced on 13 December 2009. This incorporated changes to the 'Extended Circle' service pattern along with a number of changes to train frequencies and updates to scheduled running times.
- 1.2 The Panel is asked to note this paper.

2 BACKGROUND

- 2.1 The key objectives of WTT8 were as follows:

Improve the reliability of the Circle line

- 2.2 The Circle line has historically been more unreliable than other London Underground (LU) lines. The absence of terminus reversing on the old Circle line route contributed to the unreliability by making it impossible to schedule adequate 'recovery time' (additional time allowed in a round trip so that trains can recover to time if disruption has caused late running, principally scheduled through longer layovers at termini where trains can stand without impeding the service). The new Circle line route alleviates this problem by introducing termini at Hammersmith and Edgware Road, where layovers include recovery margins that have significantly reduced late running throughout the day.
- 2.3 The line's previous reliability problems were exacerbated by the Circle line not having a depot on its old route, meaning that defective trains had to be worked off-route outside their timetabled paths, causing disruption to other lines, in order to reach a depot. Again, the new route alleviates this problem by enabling Circle line trains to reach Hammersmith depot for maintenance.

Upgrade readiness

- 2.4 It was considered critical to overall SSR reliability to mitigate the reliability risks associated with the introduction of a new train fleet by facilitating improvements in Circle line recovery margins and depot access in advance of the forthcoming introduction of the new S7 rolling stock.

Improve train frequencies serving the Hammersmith Branch

- 2.5 The Hammersmith Branch previously had a relatively infrequent service (seven or 7.5 trains per hour (tph)) compared to other Zone 2 locations. Hammersmith (Hammersmith & City) station, for example, has passenger demand comparable to Manor House, White City, Archway and Barons Court, all of which have scheduled service levels of at least 15 tph throughout the main parts of the traffic day, while other stations on the branch are experiencing significant growth in demand due to the opening of the Westfield Centre in Shepherd's Bush and office and retail developments in Paddington.
- 2.6 The new service pattern helps to support this demand growth and reduces platform wait times and crowding by supplementing the existing Hammersmith & City line services with Circle line services, leading to an increase in train frequencies of 71 per cent at peak times and 60 per cent at off-peak times.

Introduce representative run times identified in the 2007 run time review

- 2.7 Since scheduled run times on the Sub-Surface lines were last updated in 2001, SSR demand has increased by 17 per cent, leading to an increase in average end-to-end run times of 7 per cent at peak times and four per cent at off-peak times.
- 2.8 LU amended SSR schedules to reflect this increase in order to prevent trains from accumulating lateness, the knock-on effects of which cause unreliability.

Accommodate the loss of scheduled reversing from Whitechapel

- 2.9 Construction of the Whitechapel Crossrail station necessitates removal of LU's reversing sidings to provide space for lifts and escalators. This means that off-peak Hammersmith & City line trains that previously reversed at Whitechapel had to be extended to Plaistow.
- 2.10 This change provided an improved train frequency between Whitechapel and Plaistow. However, the additional train working had to be accommodated within the existing fleet size, which constrains the number of trains available for service. This necessitated a reduction in the off-peak train frequency on the line from 7.5 to six tph.

3 CHANGES TO SCHEDULED TRAIN FREQUENCIES IN WTT8

Peak Services

- 3.1 The most significant beneficiaries of the changes to the service pattern were customers on the Hammersmith Branch, who experienced a significant increase in train frequency (from seven to 12 tph) due to the new route for the Circle line.
- 3.2 The extended route of the Circle line and increases in actual run time in the central area due to increased demand necessitated a reduction in Circle and Hammersmith & City line train frequencies from seven to six tph. Changes were made to District and Metropolitan line services to mitigate this reduction:
 - (a) the District line Wimbledon service remains at 15 tph but this was rebalanced to favour the City, with trains to Edgware Road reduced from eight to six tph and trains via the City increased from seven to nine tph. This ensures that the combined train frequency on the South side of the

Circle remains at 28 tph, and better matches the passenger demand on the Wimbledon branch, reducing wait times for the larger number travelling to the City and reducing interchanging at Earl's Court; and

- (b) one additional Metropolitan line train now runs on from Baker Street to Aldgate, so that the combined train frequency on the North side of the Circle is only reduced from 28 to 27 tph. This also improves the mix of the service, as Metropolitan line trains in this area provide more benefit than Circle and Hammersmith & City line trains, because as well as reducing platform wait time and crowding, they reduce the need to interchange at Baker Street; they also have a higher passenger capacity.

Off-Peak Services

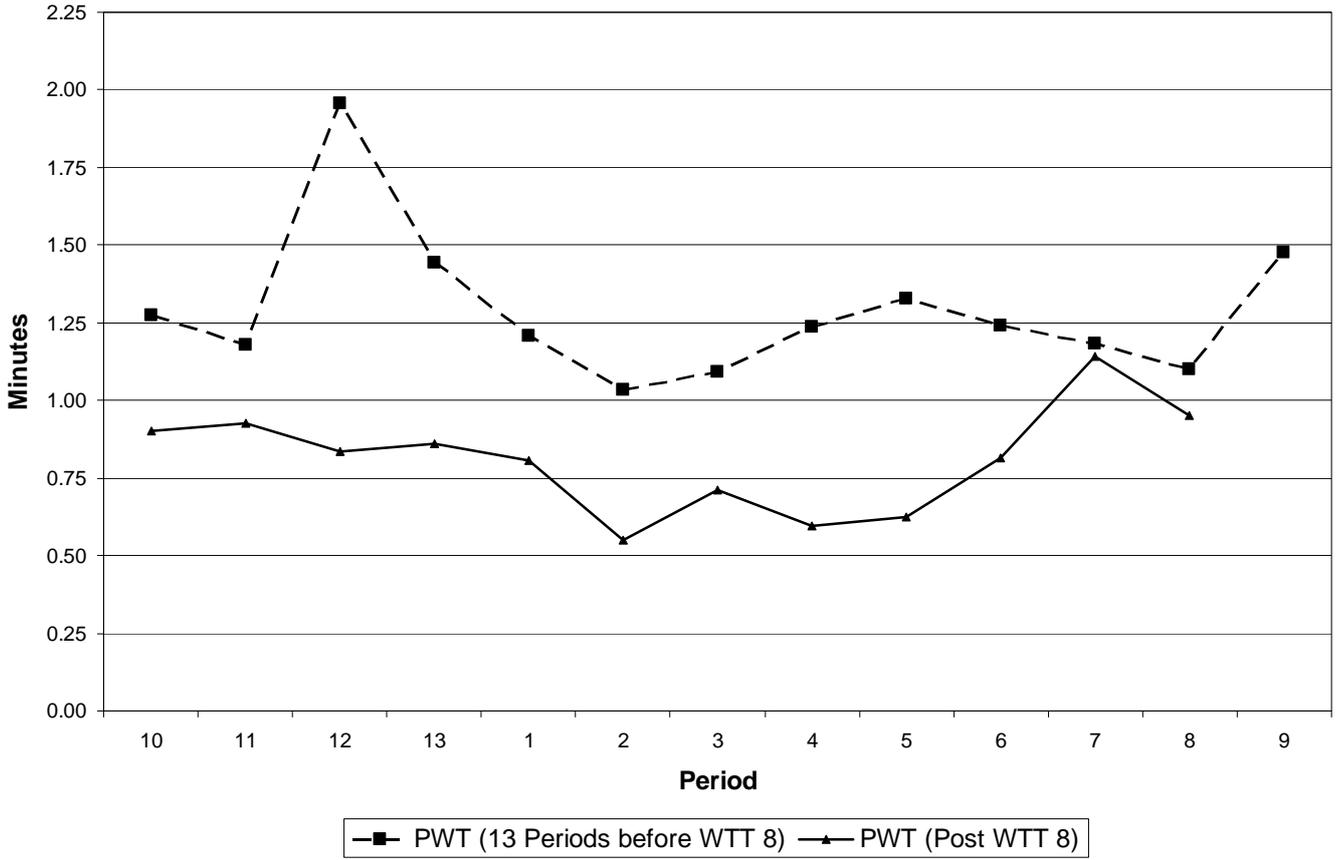
- 3.3 As with peak services, the most significant benefit is the increased train frequency (from 7.5 to 12 tph) on the Hammersmith branch.
- 3.4 Due to the necessity of extending Whitechapel reversers to Plaistow the train frequency between Whitechapel and Plaistow was increased from 4.5 to six tph.
- 3.5 Circle and Hammersmith & City train frequencies in the central area were reduced from 7.5 to six tph, although the increased reliability of the new service pattern reduces the number of long gaps between trains, so that actual platform wait time increases by less than this would suggest.
- 3.6 In order to free up the one train required to maintain District line service levels while incorporating increases in scheduled run time necessitated by increased passenger demand, the Olympia service is now operated with only one train. The introduction of stepping back at High Street Kensington enables this train to work more efficiently, so that the Olympia service is only reduced from four to three tph.

4 BENEFITS DELIVERED BY THE SERVICE CHANGE

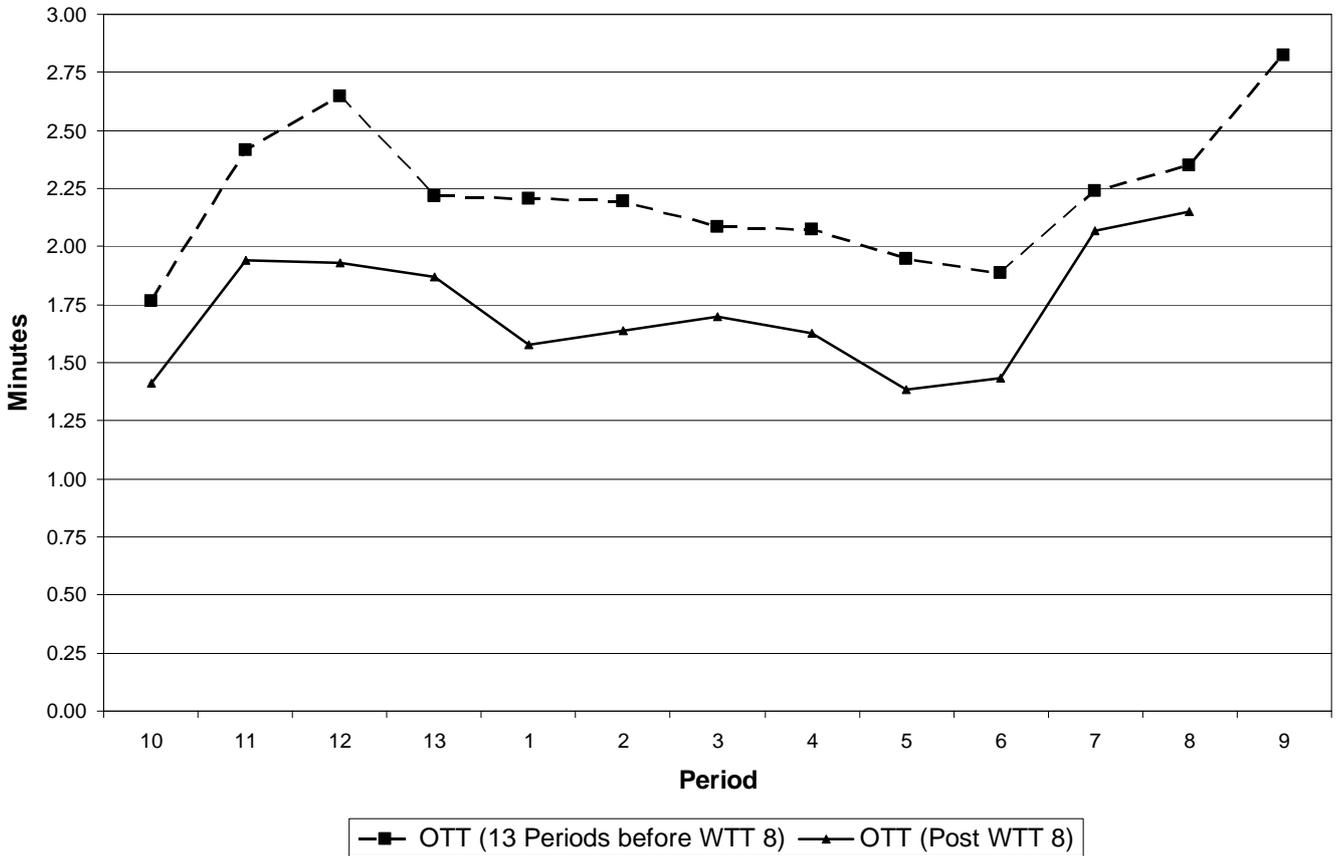
Improved Journey Time reliability

- 4.1 The timetable has achieved the key objective of improving the reliability of the Circle and Hammersmith & City lines:
 - (a) Excess Journey Time has fallen to a historic low on all SSR lines; and
 - (b) there are 12 per cent fewer gaps of 15 minutes or more since the service change. The reduction in long gaps in service is particularly beneficial, as relatively few long gaps can have a disproportionately large impact on average platform wait times, and make customers' journey times less predictable.
- 4.2 Both excess platform wait and excess on train time have fallen substantially – the following graphs show that in every period since WTT8 was introduced, both excess platform wait and excess on train time were lower than the same period in the previous year:

Sub-Surface Excess Platform Wait Time



Sub-Surface Excess On Train Time



Reduced Average Journey Times

- 4.3 In appraising the impact of timetables on Journey Time, LU routinely adjusts for external factors that would have affected journey times anyway, in order to isolate the impact of the timetable change. In appraising the performance of WTT8, adjustments were made to account for the following factors:
- (a) removal of the reversing facility at Whitechapel: loss of Whitechapel reversing facility necessitated a reduction in off-peak train frequency, which added 0.97 minutes to Circle & Hammersmith line Scheduled Journey Time;
 - (b) incidents: the impact of incidents which had a major effect on the service has been isolated from the data, notably snow and below-zero temperatures in December 2009 - January 2010;
 - (c) 'bedding in period': consistently improved performance was seen from the fourth period of operation, once operational teams had gained experience of the new service; and
 - (d) higher demand: the usage of the Sub-Surface lines has been on average 2.1 per cent higher than the preceding year, adding 0.25 minutes to average journey times due to increased dwell times and crowding.
- 4.4 The new service is delivering benefit to passengers worth £11.4m per annum through reduced average journey times. The reduction in 'excess' journey time indicates that passengers also benefit from more consistent and therefore more predictable journey times.
- 4.5 This benefit was delivered at relatively low cost:
- (a) £800k project costs, covering changes to signage, updates of on-train digital voice announcements, and modifications to IM systems to align with the new service pattern;
 - (b) £339k per annum traction power costs for additional train kilometrage;
 - (c) increased train staff working was balanced by other changes to improve the efficiency of the Train Operator pool, so the SSR Train Operator requirement was reduced by seven; and
 - (d) an increase of 16 staff in other operational roles covering signalling, train despatch and station staffing.

Reduced lateness and improved service recovery

- 4.6 The introduction of more representative run and dwell times has enabled trains to run closer to their scheduled times, leading to a significant reduction in average lateness on SSR services (shown in the following table). Trains being on time leads to smoother junction working and crew changes and reduces the need for intervention from service controllers.

Average lateness (decimal minutes) on SSR train services:

	WTT7	WTT8	Improvement (%)
C&H eastbound	2.51	0.81	68
C&H westbound	2.15	0.68	68
Met northbound	1.88	0.98	48
Met southbound	1.54	1.58	-3
Dist eastbound	2.90	0.38	87
Dist westbound	1.45	0.51	65

- 4.7 The Circle and Hammersmith & City lines' recovery from incidents, measured in the effect on Excess Platform Wait Time experienced by passengers, has been 62 per cent faster since the introduction of the new service (there has been no significant change on Metropolitan and District lines).

Opportunities for further improvement

- 4.8 LU's Post-Implementation Review of WTT8 identified a number of opportunities where management focus on specific aspects of service performance could deliver additional benefit to customers:
- (a) improved regulation of intervals between trains through Embankment to reduce variability in platform wait time;
 - (b) management of train despatch at Uxbridge to ensure trains depart on time;
 - (c) staff availability on the Circle and Hammersmith & City lines;
 - (d) staff presence on platforms at Harrow-on-the-Hill and Finchley Road to manage dwell times and reduce impedance; and
 - (e) monitoring and management of detrainment times at Rayners Lane to avoid impedance to through trains.

5 CHANGES TO STATION OPERATIONS AT PADDINGTON

- 5.1 Passengers accessing LU services at Paddington have a choice between two separate LU stations linked to Paddington National Rail station. As expected, since the introduction of the Extended Circle, customers travelling between Paddington and the north side of the Circle have generally switched to using Paddington Hammersmith & City rather than Paddington District and Bakerloo.
- 5.2 LU updated the Paddington Hammersmith & City Congestion Control Plan in anticipation of this shift. The new plan includes the following improvements:
- (a) Additional staff: Paddington Hammersmith & City now has one Station Supervisor and two Customer Service Assistants throughout the main parts of the traffic day; and
 - (b) New procedures for managing the different patterns of station congestion that were anticipated following passenger flow modelling of the new service, including a permanent 'keep right' policy on the overbridge leading to the Hammersmith & City line platforms.

- 5.3 The new Congestion Control Plan was supported by other changes at the station:
- (a) A new control room and PA system on the overbridge;
 - (b) New signage and barriers to support the 'keep right' system; and
 - (c) New LU signage throughout the Network Rail station, including electronic signage to inform passengers when Paddington Hammersmith & City station is closed.
- 5.4 The keep right policy has worked successfully in managing the increased passenger flows through Paddington Hammersmith & City station without necessitating closures due to congestion issues.
- 5.5 Further improvements in the customer experience at Paddington Hammersmith & City will be delivered by the station upgrade project, which is currently on site. The enabling and groundworks phase of the project, which includes piling, removal of platform furniture, and removal and replacement of the platform canopy, is nearing completion. The main civils contract has been let and work is due to commence in February 2011 and complete in January 2012; this phase involves the construction of the interim station that will deliver the majority of customer-facing improvements including increases in station capacity. The remaining works (principally the provision of step-free access and completion of non-public areas of the station) are due for completion in 2014.

6 STAFF FEEDBACK

- 6.1 Feedback from LU operational staff has generally been positive, with fewer than 20 issues raised. Service Control staff, in particular, have noted the improvement in service recovery following disruption, while Station Staff report that customers on the Hammersmith branch have noted the improved train frequency.
- 6.2 District line Duty Managers have welcomed the reduction in the number of short breaks between Train Operator driving spells, reporting that this makes crew management easier. Some Circle and Hammersmith & City line trains have had to wait for platform availability on arrival at the Hammersmith and Edgware Road termini, principally due to early running.
- 6.3 The 'pilot operations' held on three weekends in June, July and October 2009 were beneficial in allowing operational staff to gain experience of the new service pattern and refine plans for managing service disruption.

7 CONCLUSIONS

- 7.1 The timetable has achieved the key objective of improving the reliability of the Circle and Hammersmith & City lines while increasing the train frequency serving the Hammersmith branch, and has delivered significant journey time benefits across SSR.
- 7.2 Detailed cross-functional planning with operators, planners, Network Rail and stakeholders was a key contributor to the successful implementation of the service change.

7.3 Areas for further work have been identified and further improvements are in prospect for December 2011:

- (a) WTT8 added approximately five per cent to scheduled run times, and the improved reliability means that this could now be reduced by approximately one per cent to reduce the tendency for early running trains to be held at red signals;
- (b) the Circle and Hammersmith & City line services will no longer be inter-worked at Hammersmith, allowing the new S7 trains to be introduced on the Hammersmith & City line as soon as they are delivered;
- (c) off-peak trains that currently reverse at Plaistow will be extended to Barking, delivering an increase in train frequency of three tph to passengers using Upton Park, East Ham and Barking;
- (d) the Metropolitan line off-peak train frequency between Baker Street and Aldgate will be increased by two tph, increasing the combined train frequency on the North side of the Circle from 18 to 20 tph; and
- (e) LU will seek to improve the reliability of the combined Circle, Hammersmith & City and Metropolitan line service between Baker Street and Aldgate by reducing the scheduled frequency of Metropolitan line trains in this section from 15 to 14 tph. This change has been prompted by a significant increase in passenger flows at Farringdon arising from customers re-routing their journeys in response to Thameslink works, with the result that increased dwell times are tending to cause impedence given the short intervals necessitated by the current train frequency.

8 RECOMMENDATION

8.1 The Panel is asked to NOTE this paper.

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