

THFC New Stadium i Concert scenario Rail Capacity Analysis

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Pre-event Northumberland Park

- Football timetable adjusted to 20.00 KO

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- Football timetable adjusted to 22.00 end

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- Football timetable adjusted to 20.00 KO
- 8 trains/hour timetable

Post-event White Hart Lane

- Football timetable adjusted to 22.00 end
- 8 trains/hour timetable

45K Scenario

Pre-event Northumberland Park

- Football timetable adjusted to 20.00 KO

Post-event Northumberland Park

- Football timetable adjusted to 22.00 end

Pre-event White Hart Lane

- Football timetable adjusted to 20.00 KO
- 8 trains/hour timetable

Post-event White Hart Lane

- Football timetable adjusted to 22.00 end
- 8 trains/hour timetable

Assessment of Rail Capacity

- ✍ This document contains the outcome of an assessment of National Rail service and station capacity at Northumberland Park and White Hart Lane in the light of anticipated demand associated with an expanded Tottenham Hotspur Stadium, considering scenarios where the Stadium is used to host a Concert.
- ✍ Pre-event and Post-event scenarios for 55k attendance and 45K attendance are assessed, and in all instances, a Saturday evening event is considered
 - ï Main act on stage at 20:00
 - ï Event finish at 22:00
- ✍ Attendee travel demand forecasts have been generated by Tim Spencer & Co, and reflect slightly different post-match dispersal.
- ✍ Assumptions related to the relative use of different Stadium access points and demand at Transport Nodes are listed in a separate *Data Book* (150821-563THTA-Concert Data Book - 0.2).
- ✍ Spreadsheet models of demand and capacity have been constructed to assess the performance of different parts of the network and infrastructure
- ✍ The following pages summarise the performance throughout the pre- and post-event periods at White Hart Lane and Northumberland Park. A train timetable associated with a Football Matchday has been adopted.
- ✍ Background loading on services and at the stations is included in the assessment. 8% growth has been applied to observed background figures on the White Hart Lane route and 22% growth applied to the Northumberland Park route to represent conditions in 2021. This is identical to the Football scenario presented in 2014.
- ✍ Station capacities are calculated according to SPSG *Special Events* guidance, recognising that the Network Rail guidance rates are consistent for all infrastructure types other than escalators.

Assessment of Rail Capacity

⚠ For assessment of capacity on the Northumberland Park route, the following assumptions are applied:

- ï Matchday Timetable of a 17.30 Kick-off Saturday Spurs game adapted to a 20.00 start, plus uplift to 4tph on the Stratford-Stansted services to account for the STAR service* which will be implemented in 2018
- ï All trains operated as 8-car
- ï Existing Station Layout
- ï Assumed Standardised Capacity of 734, 718, 636ppl/train dependent on rolling stock**
- ï Background Demand patterns from 2013 Abellio
 - ⚠ 22% growth applied to reflect 2021
- ï Weekend background demand derived using relative volumes recorded at different times in previous surveys (2008) applied to 2013 midweek data
- ï Platform Capacity limited to 700 at Northumberland Park
 - ⚠ Queues held outside the station when this number reached on either Platform

⚠ For assessment of capacity on the White Hart Lane route, the following assumptions are applied:

- ï Matchday Timetable of a 17.30 Kick-off Saturday Spurs game adapted to a 20.00 start, plus uplift to 4tph on the Liverpool Street-Enfield/Chestnut service when not provided (E-mail from Tim Neale, 2nd May 2014)
- ï All trains operated as 8-car
- ï Existing Station Layouts
- ï Assumed Standardised Capacity of 859ppl/train**
- ï Background Demand patterns from 2013 Abellio
 - ⚠ 8% growth applied for WHL to reflect 2021 (Railplan 7)
- ï Weekend background demand derived using relative volumes recorded at different times in previous surveys (2008) applied to 2013 midweek data
- ï Platform Capacity limited to 859 at White Hart Lane
 - ⚠ Queues held outside the station when this number reached

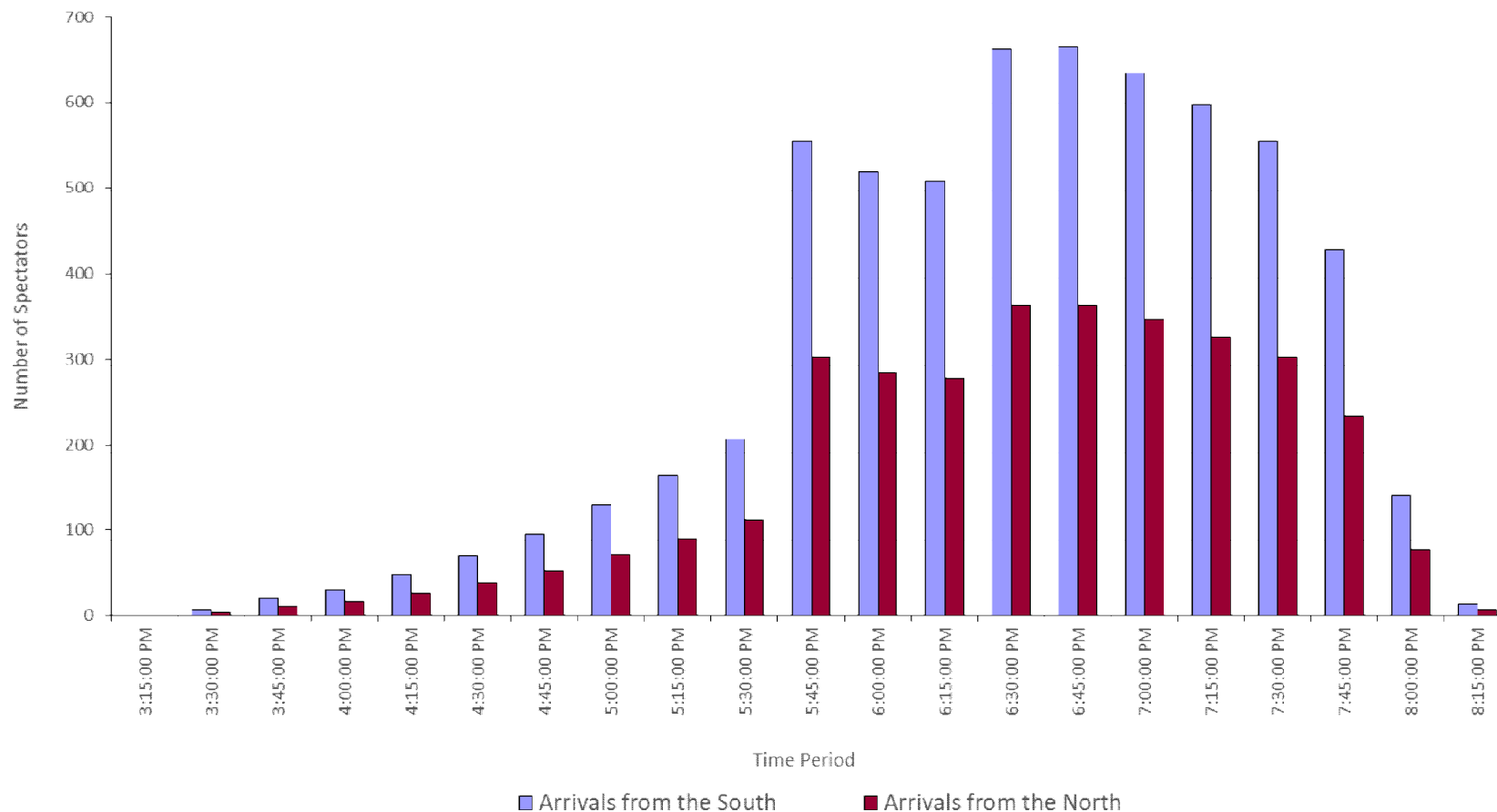
* Assumed to be 700 available capacity

** Uses LU Event Planning Methodology (E-mail from Tim Neale, 3rd June 2014)

55K Scenario
Northumberland Park Station

Northumberland Park i Arrivals

Spectator Arrivals at Northumberland Park during the Pre-Event Period



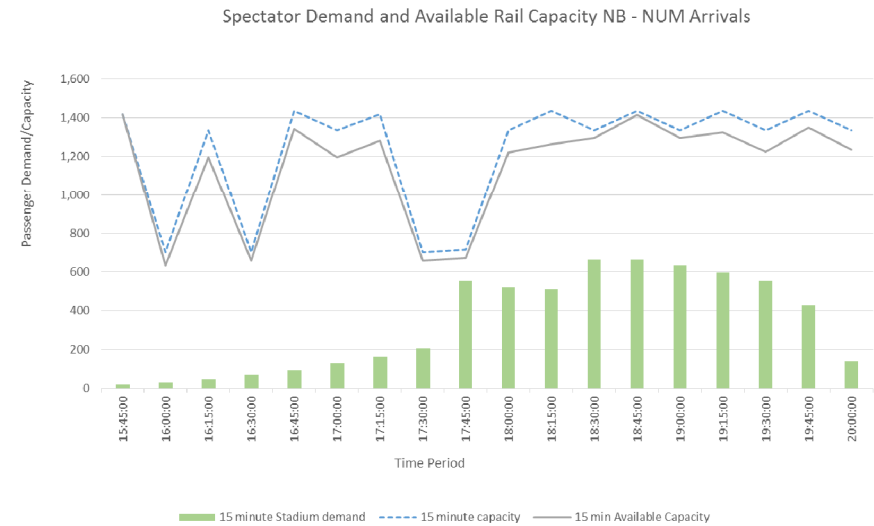
9,350 attendees in total

- 6,050 from the South (29% of these have interchanged at Tottenham Hale)
- 3,300 from the North

Northumberland Park Station - Arrivals

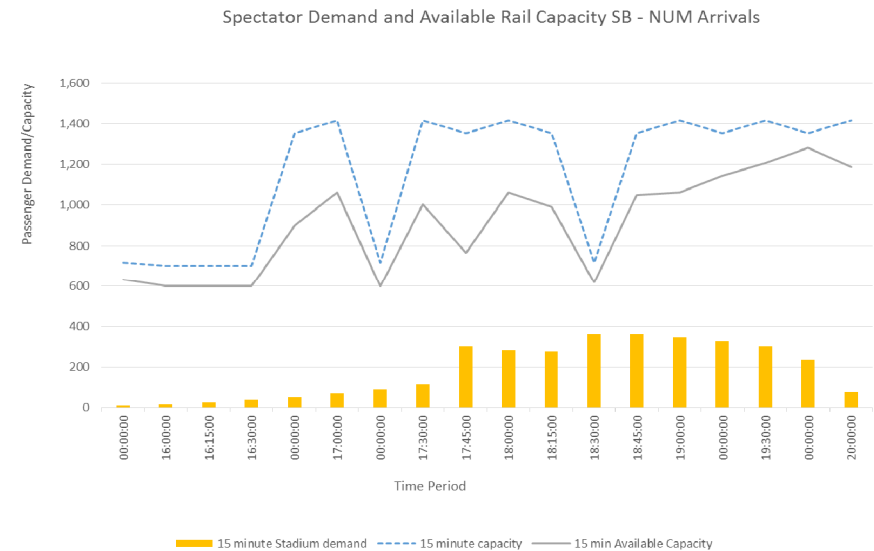
Northbound services

- There are **no** constraints on this route during the pre-event period, assuming 8 car operation is maintained



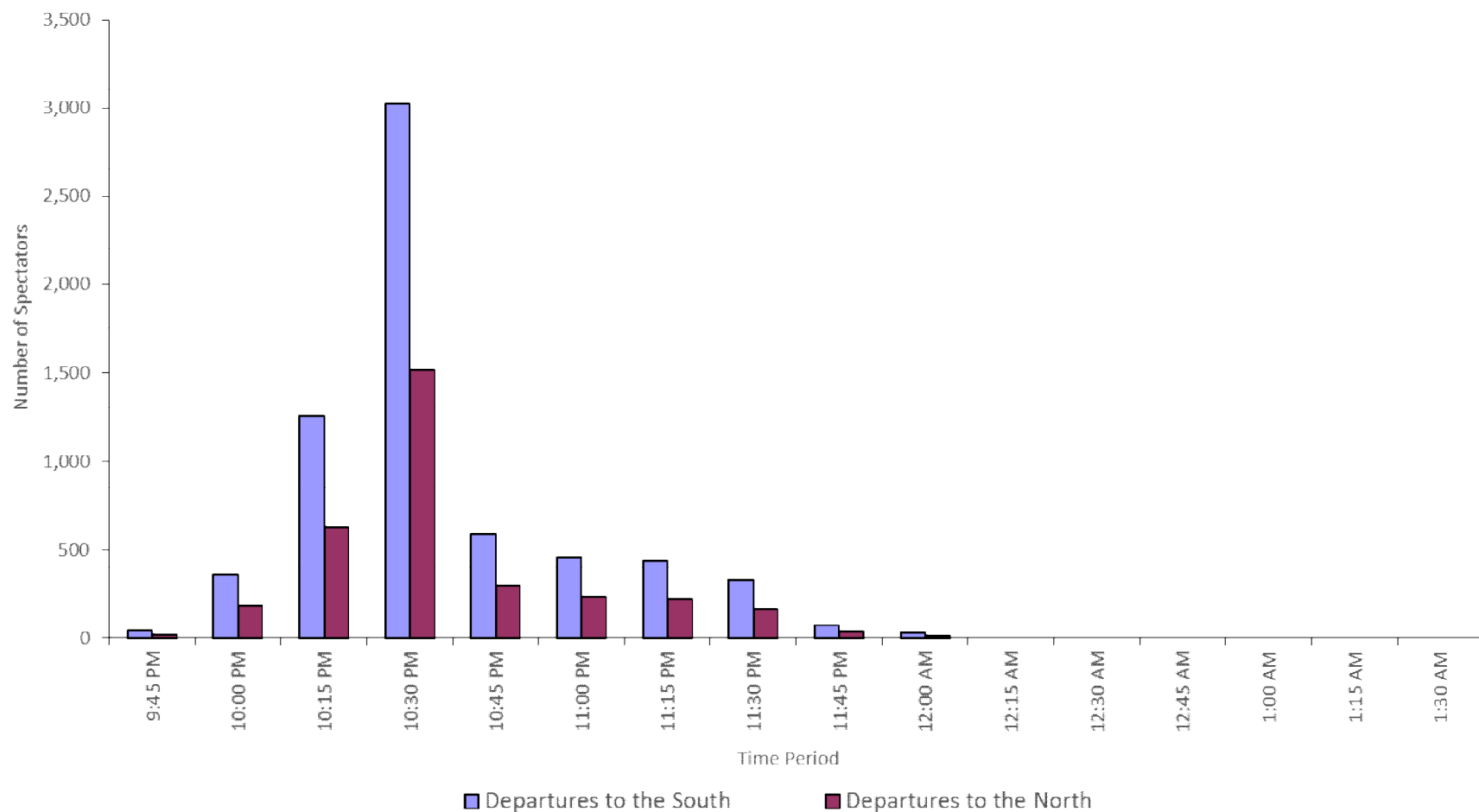
Southbound services

- There are **no** constraints on this route during the pre-event period, assuming 8 car operation is maintained



Northumberland Park - Departures

Spectator Departures from Northumberland Park during the Post-Event Period



∆ 9,900 attendees in total

- 6,600 to South (28% of these interchange at Tottenham Hale)
- 3,300 to North

Northumberland Park Station i Departures

Å Southbound Platform

- ii Queues are anticipated to form outside the station for access to the northbound platform. It is assumed that the capacity of the platform is capped at 700 people, as this broadly matches the capacity per train, and there are several occasions where the access to the platform would need to be controlled.

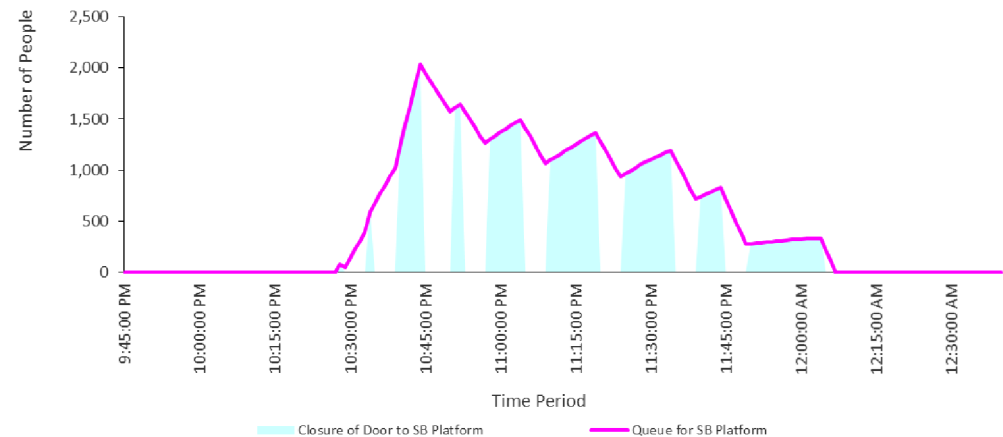
Å Maximum queue size: **2,031 people**

Å The longest delay for any individual from the time they arrive at the station to boarding a southbound train is **47 mins.**

- ii 30% of attendees would wait for 10 mins or less
- ii 14% of attendees would wait for 11 i 15 mins
- ii 12% of attendees would wait for 16 i 20 mins
- ii 10% of attendees would wait for 21 - 25 mins
- ii 8% of attendees would wait for 26-30 mins
- ii 25% of attendees would wait for more than 30 mins

Å The queue will clear in approximately **90 minutes**, although this extends beyond midnight.

Extent of Queuing outside Northumberland Park Station during the Post-Event -Adjusted Timetable



Northumberland Park Station i Departures

Å Northbound Platform

- ï Queues are anticipated to form outside the station for access to the northbound platform. It is assumed that the capacity of the platform is capped at 700 people, as this broadly matches the capacity per train.

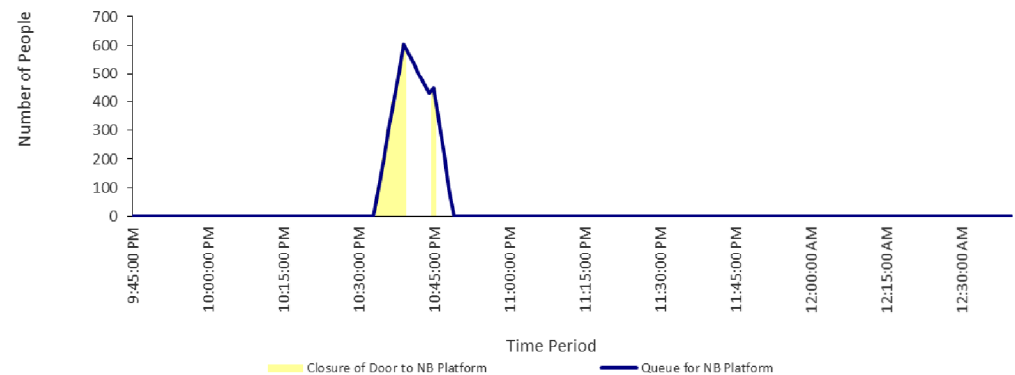
Å Maximum queue length: **605 people**

Å The longest delay for any individual from the time they arrive at the station to boarding a southbound train is **19 mins**

- ï 70% of attendees would wait for 10 mins or less
- ï 27% of attendees would wait for 11 ÷ 15 mins
- ï 3% of attendees would wait for 16 ÷ 20 mins

Å The queue will clear in approximately **15 minutes**

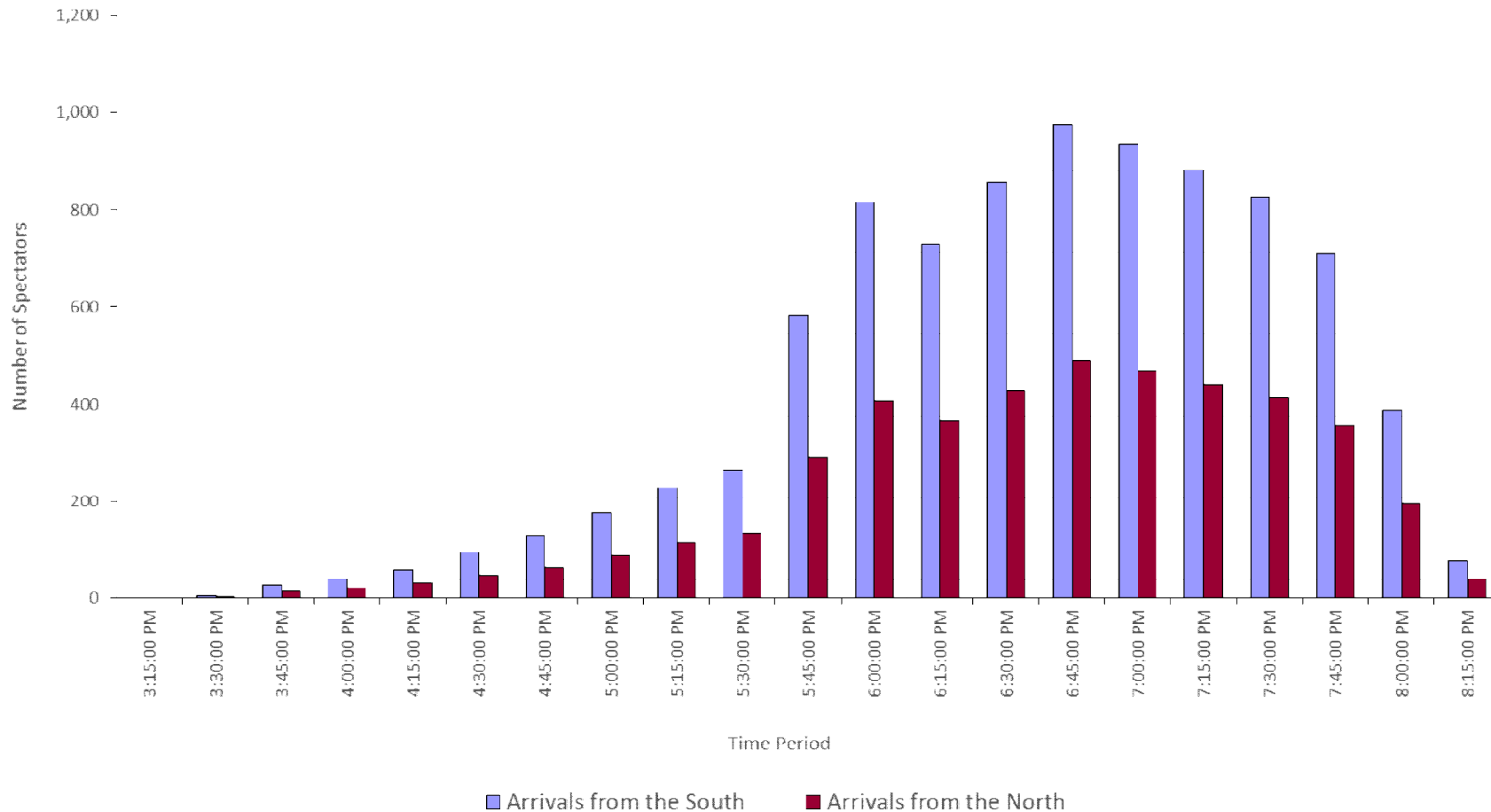
Extent of Queuing outside Northumberland Park Station during the Post-Event - Adjusted Timetable



55K Scenario
White Hart Lane Station

White Hart Lane i Arrivals

Spectator Arrivals at White Hart Lane during the Pre-Event Period



13,200 attendees in total

- 8,800 from the South (33% of these have interchanged at Seven Sisters)
- 4,400 from the North

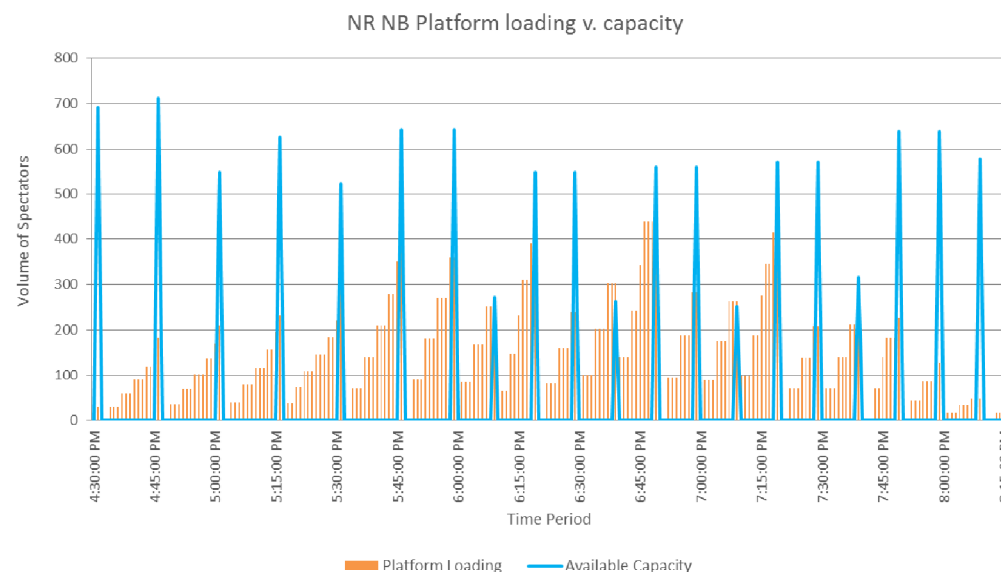
Services to White Hart Lane i Arrivals

Å Given that NB trains arriving at Seven Sisters will already be partially loaded with background travellers and event-goers travelling to White Hart Lane from Central London, there will be small capacity constraints experienced between 18:30 and 19:00. The implication is that there will be instances where some people interchanging from LU at Seven Sisters will be unable to board the first northbound train.

Å However, all passengers will be able to board the subsequent train and NR platform will remain within reasonable loading (maximum 450 people).

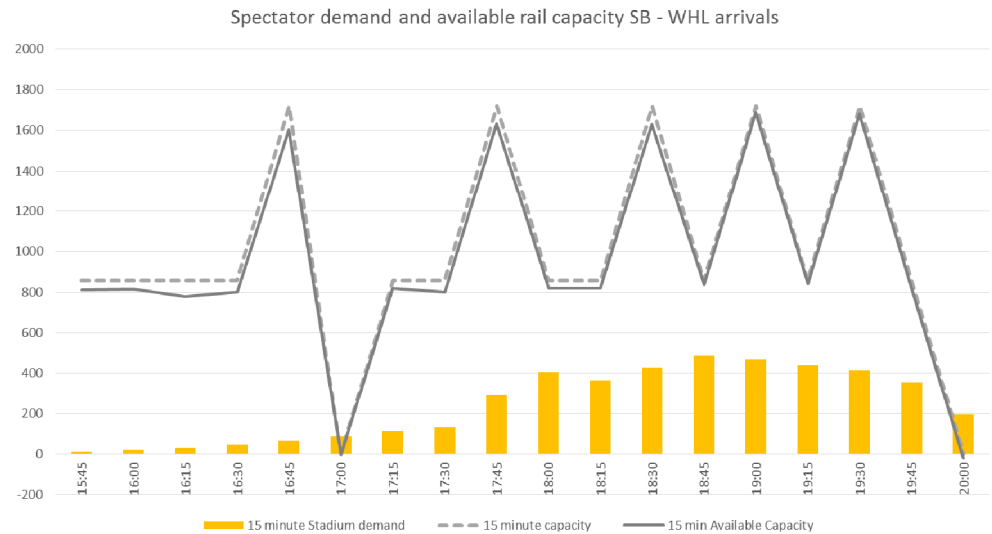
Å The adjacent chart shows the calculated minute-by-minute platform loading (orange), and the available capacity on each NB train arriving at Seven Sisters (blue) across the pre-event period.

Å NB. Based on advice from TfL, this includes a planning assumption that 85% of the available capacity can be used on trains. With efficient space management on the train and the platforms, the operational capacity may well increase above this level.

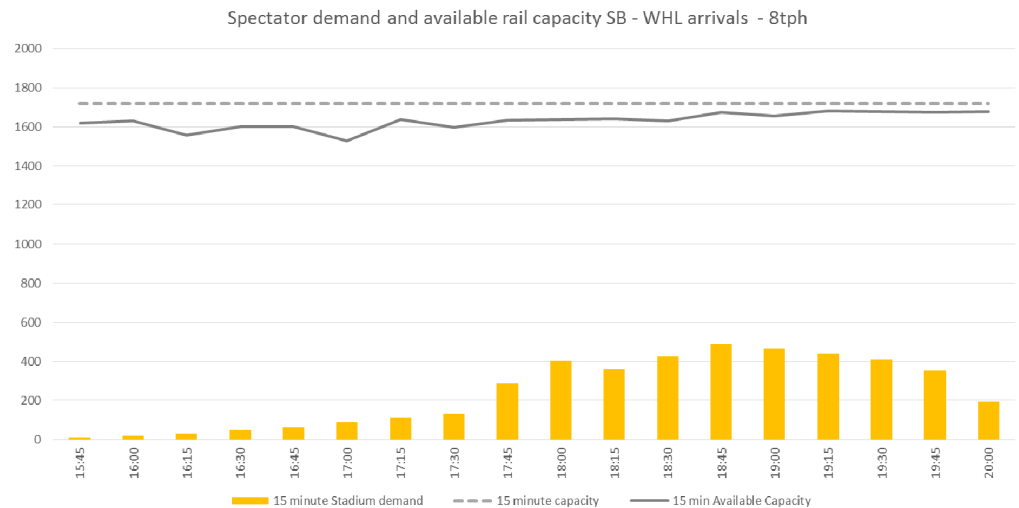


Services to White Hart Lane i Arrivals

- Assuming the use of 8-car Class 378 rolling stock, no capacity constraints are anticipated on southbound services into White Hart Lane.
- The drop in capacity between 17:00 and 17:15 is due to a 16 minute headway between trains.

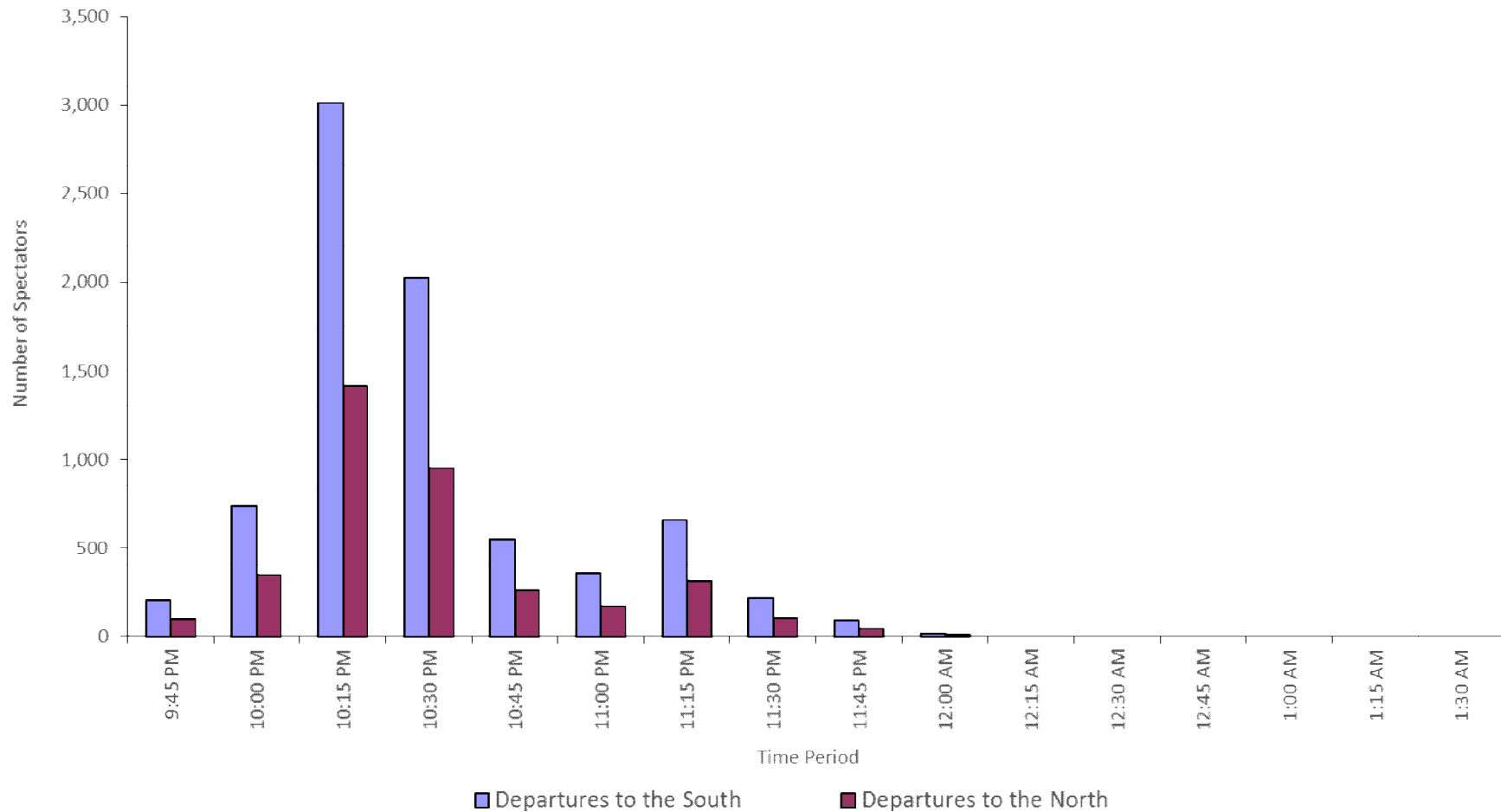


- A sensitivity test has been run to consider the impact of running a clockface 8tph timetable.
- With an 8tph timetable, there will be no capacity constraint on the southbound service.



White Hart Lane i Departures

Spectator Departures from White Hart Lane during the Post-Event Period



À 11,550 attendees in total

- 7,854 to South (33% of these interchange at Seven Sisters)
- 3,696 to North

White Hart Lane Station ÷ Departures

Ä Southbound Platform

- ÷ Queues are anticipated to form outside the station for access to the southbound platform. It is assumed that the capacity of the platform is capped at 859 people, as this matches the capacity per train (assuming that new Class 378 rolling stock is in use).

Ä Maximum queue length: **2,356 people**

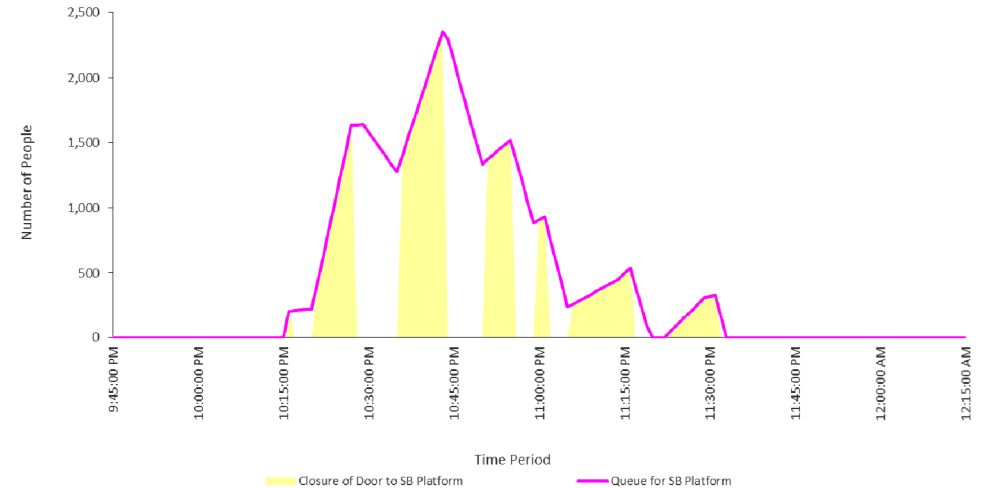
- Ä The maximum delay for any individual from the time they arrive at the back of the queue to the point at which they board a train is **29 minutes**.

- ÷ 47% of attendees would wait for 10 mins or less
- ÷ 25% of attendees would wait for 11 ÷ 15 mins
- ÷ 23% of attendees would wait for 16 ÷ 20 mins
- ÷ 2% of attendees would wait for 21 - 25 mins
- ÷ 3% of attendees would wait for 26 - 30 mins

- Ä The queue will clear in approximately **65 minutes**.

- Ä The key factor affecting the clearance rate and the size of queue is the available train capacity. In a sensitivity test where an 8 trains/hour timetable is implemented, the maximum queue length is expected to be **2,098 people**, with a queue duration of **55 minutes**. The maximum delay experienced by any individual in this scenario would be **19 minutes**.

Extent of Queuing outside White Hart Lane Station during the Post-Event - Adjusted Timetable

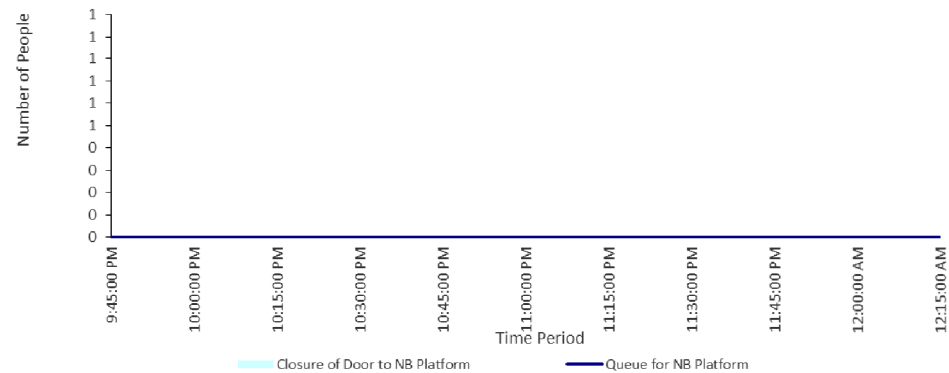


White Hart Lane Station i Departures

A Northbound Platform

- i No queues are anticipated to form outside the station for access to the southbound platform. It is assumed that the capacity of the platform is capped at 859 people, as this matches the capacity per train (assuming that new Class 378 rolling stock is in use).

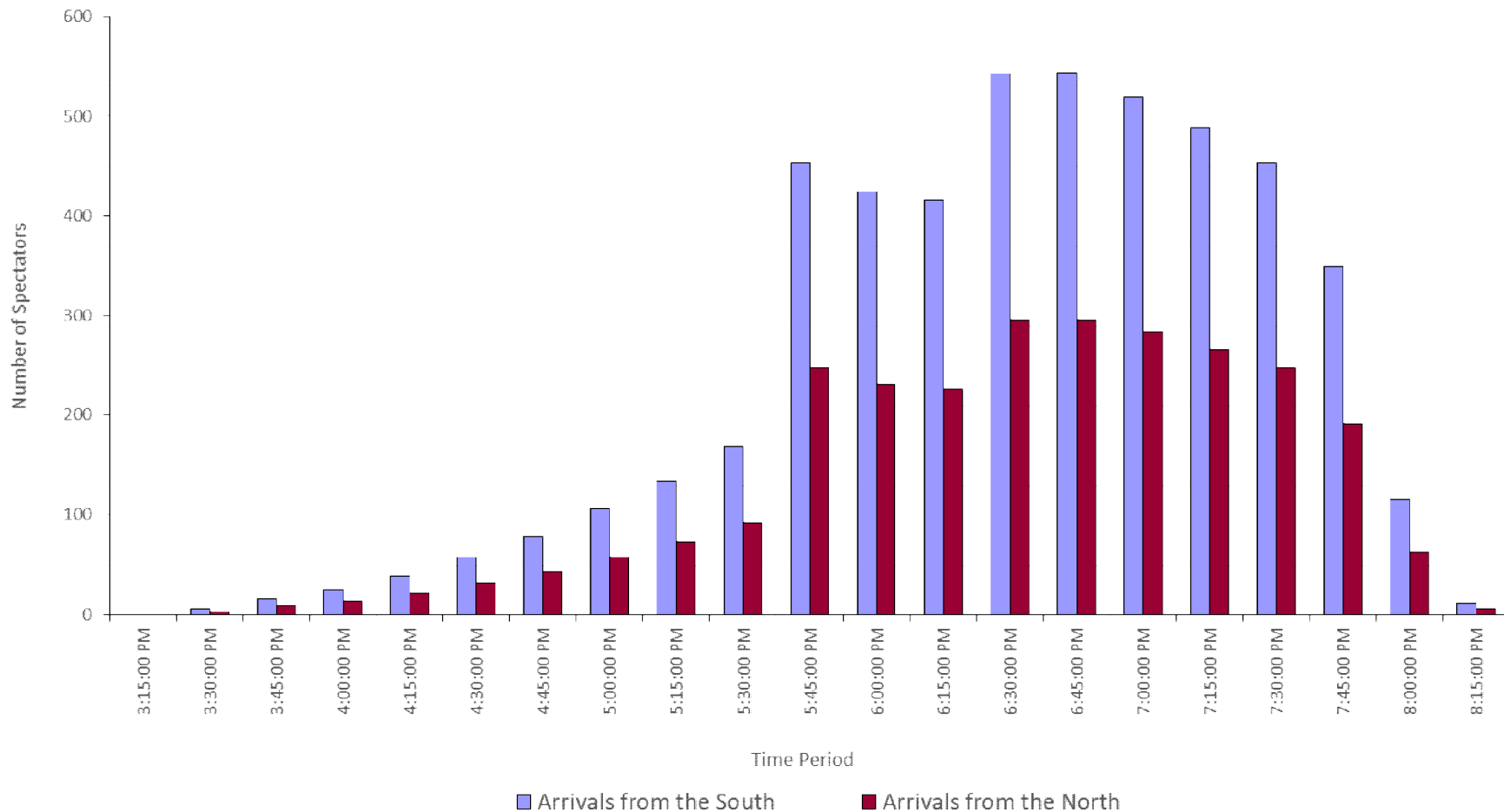
Extent of Queuing outside White Hart Lane Station during the Post-Event - Adjusted Timetable



45K Scenario
Northumberland Park Station

Northumberland Park Arrivals

Spectator Arrivals at Northumberland Park during the Pre-Event Period



7,650 attendees in total

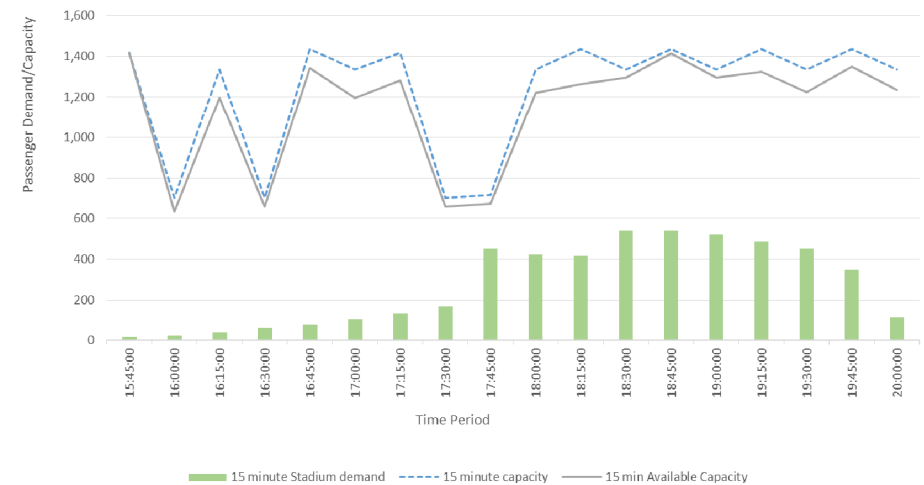
- 4,950 from the South (29% of these have interchanged at Tottenham Hale)
- 2,700 from the North

Northumberland Park Station i Arrivals

Å Northbound services

- ii There are **no** constraints on this route during the pre-match period, assuming 8 car operation is maintained

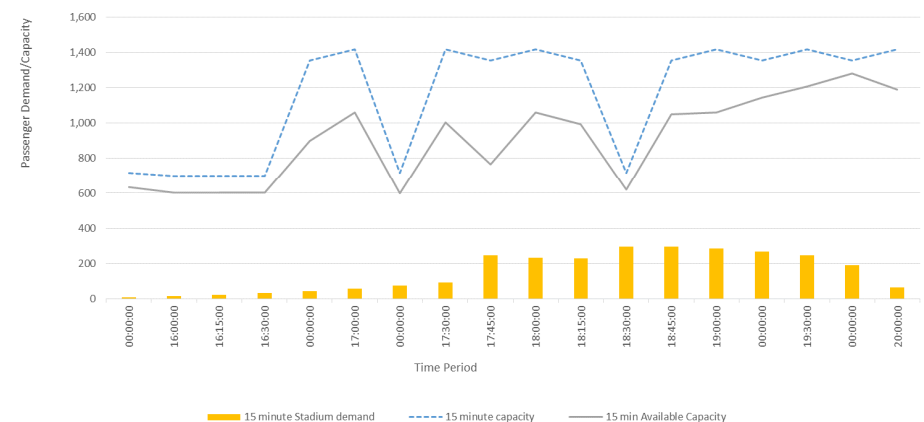
Spectator Demand and Available Rail Capacity NB - NUM Arrivals



Å Southbound services

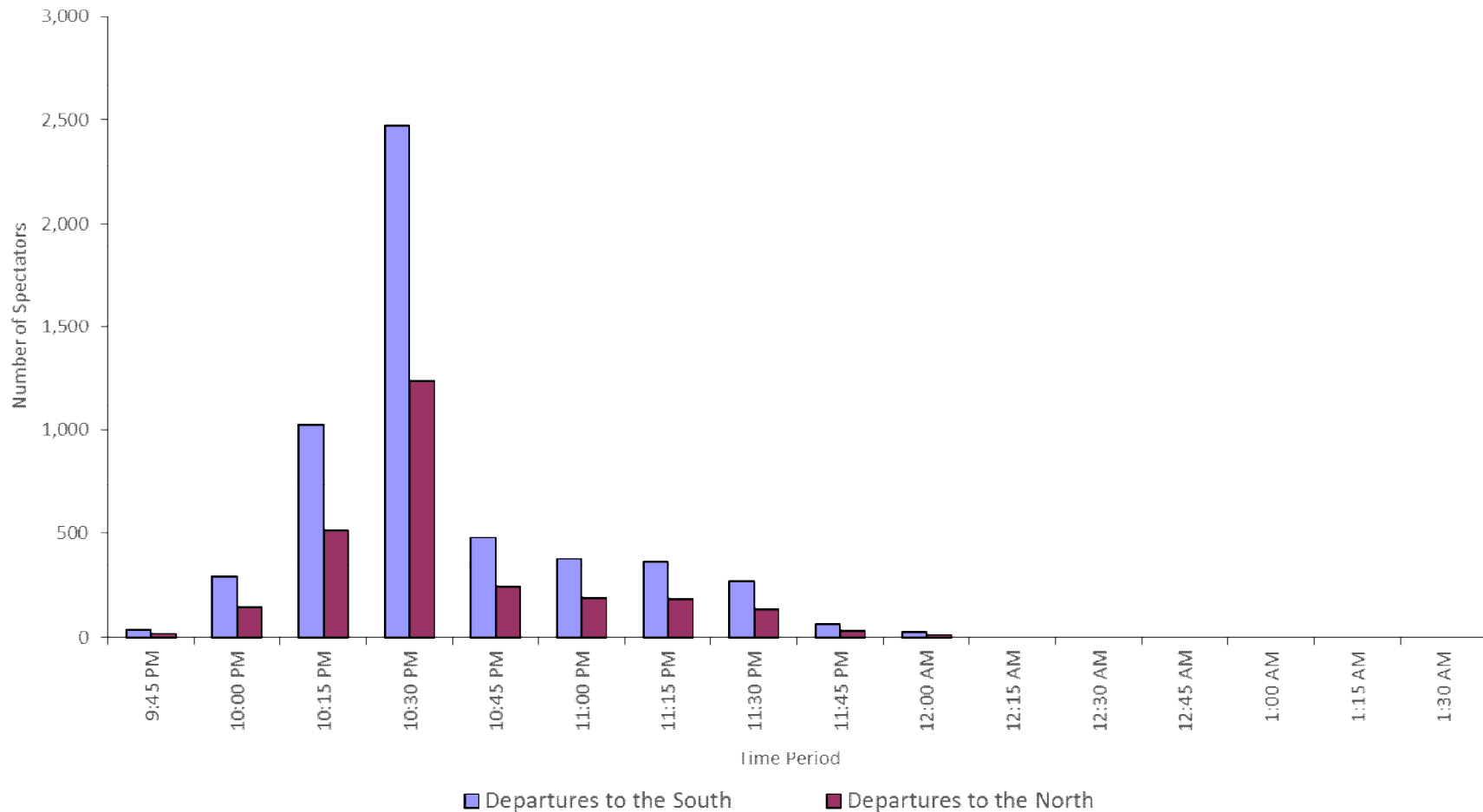
- ii There are **no** constraints on this route during the pre-match period, assuming 8 car operation is maintained

Spectator Demand and Available Rail Capacity SB - NUM Arrivals



Northumberland Park ÷ Departures

Spectator Departures from Northumberland Park during the Post-Event Period



8,100 attendees in total

- 5,400 to South (33% of these interchange at Tottenham Hale)
- 2,700 to North

Northumberland Park Station i Departures

Å Southbound Platform

- ï Queues are anticipated to form outside the station for access to the northbound platform. It is assumed that the capacity of the platform is capped at 700 people, as this broadly matches the capacity per train.

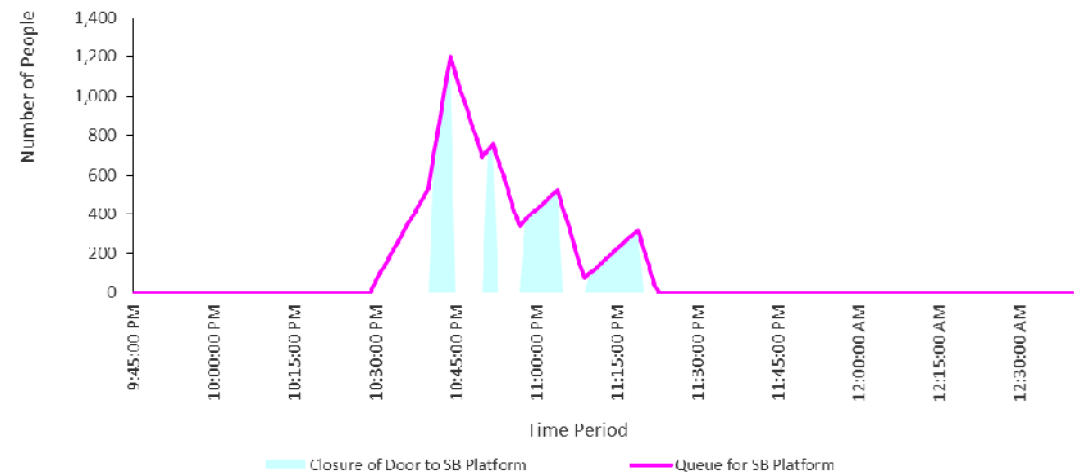
Å Maximum queue length: **605 people**

- Å The maximum delay experienced by any individual from their point of arrival at the station to boarding a train would be **31 minutes**.

- ï 48% of attendees would wait for 10 mins or less
- ï 22% of attendees would wait for 11 ÷ 15 mins
- ï 10% of attendees would wait for 16 ÷ 20 mins
- ï 16% of attendees would wait for 21 - 25 mins
- ï 3% of attendees would wait for 26 - 30 mins
- ï 1% of attendees would wait for more than 30 mins

- Å The queue will clear in approximately **50 minutes**.

Extent of Queuing outside Northumberland Park Station during the Post-Event - Adjusted Timetable



Northumberland Park Station i Departures

⚠ Northbound Platform

- Small queues are anticipated to form outside the station for access to the northbound platform. It is assumed that the capacity of the platform is capped at 700 people, as this broadly matches the capacity per train.

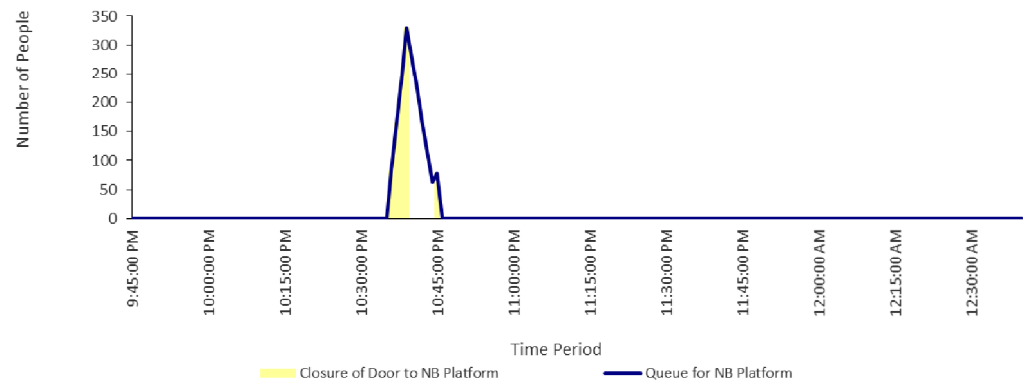
⚠ Maximum queue length: **330 people**

- ⚠ The maximum delay experienced by any individual from their point of arrival at the station to boarding a train would be **22 minutes**.

- 84% of attendees would wait for 10 mins or less
- 12% of attendees would wait for 11 – 15 mins
- 3% of attendees would wait for 16 – 20 mins
- 1% of attendees would wait for 21 - 25 mins

- ⚠ The queue will clear in approximately **10 minutes**.

Extent of Queuing outside Northumberland Park Station during the Post-Event - Adjusted Timetable

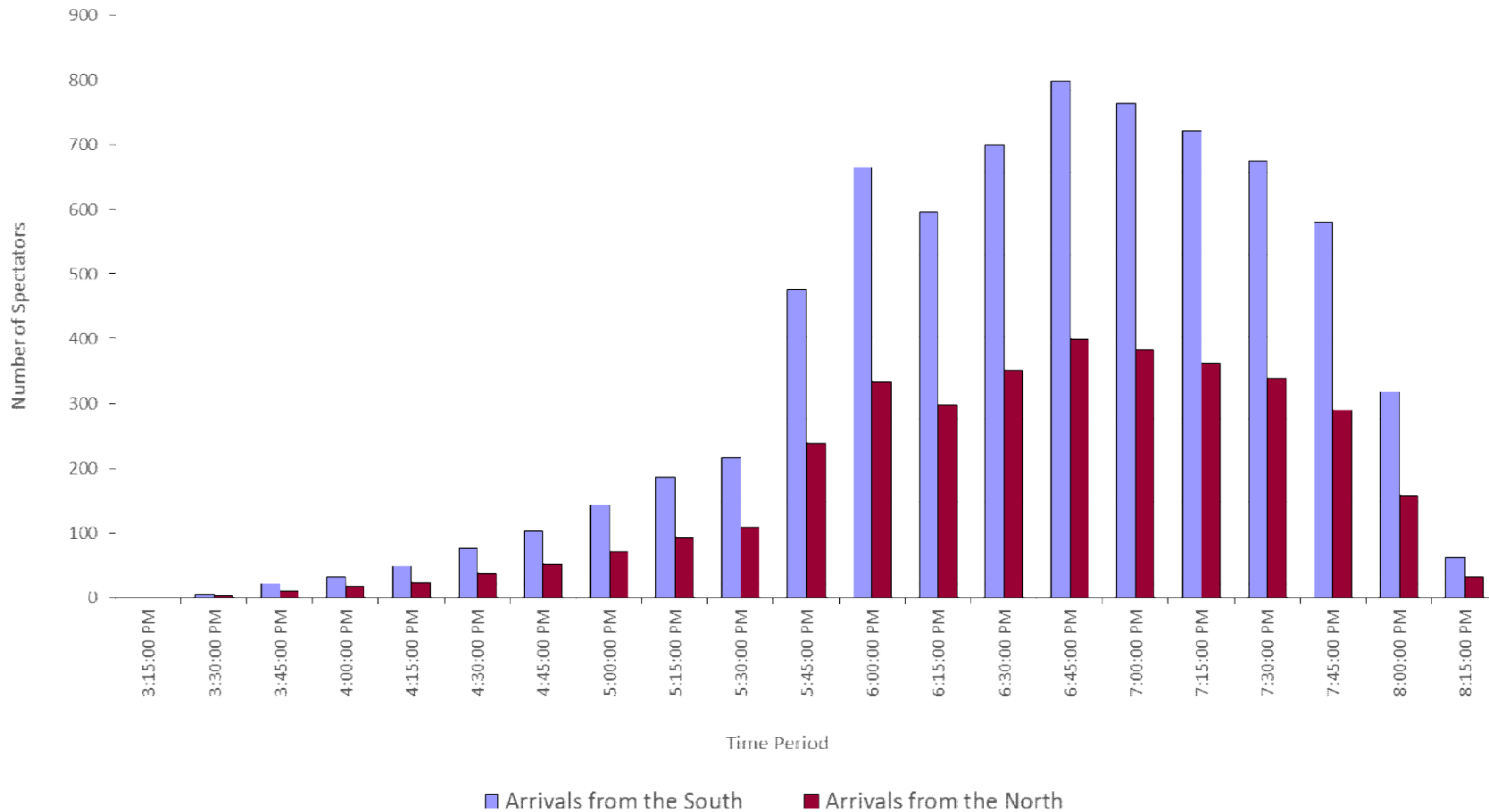




45K Scenario
White Hart Lane Station

White Hart Lane i Arrivals

Spectator Arrivals at White Hart Lane during the Pre-Event Period

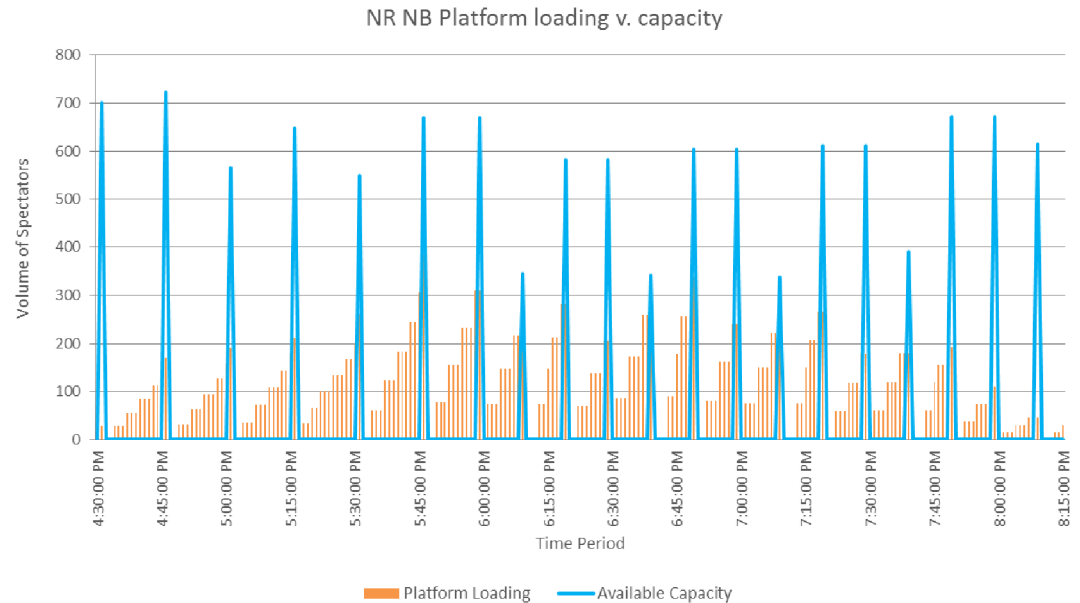


10,800 attendees in total

- 7,200 from the South (33% of these have interchanged at Seven Sisters)
- 3,600 from the North

Services to White Hart Lane i Arrivals

- Å No capacity constraint is expected at Seven Sisters station even with trains already partially loaded with background travellers and Concert attendees travelling to White Hart Lane from Central London on these trains.

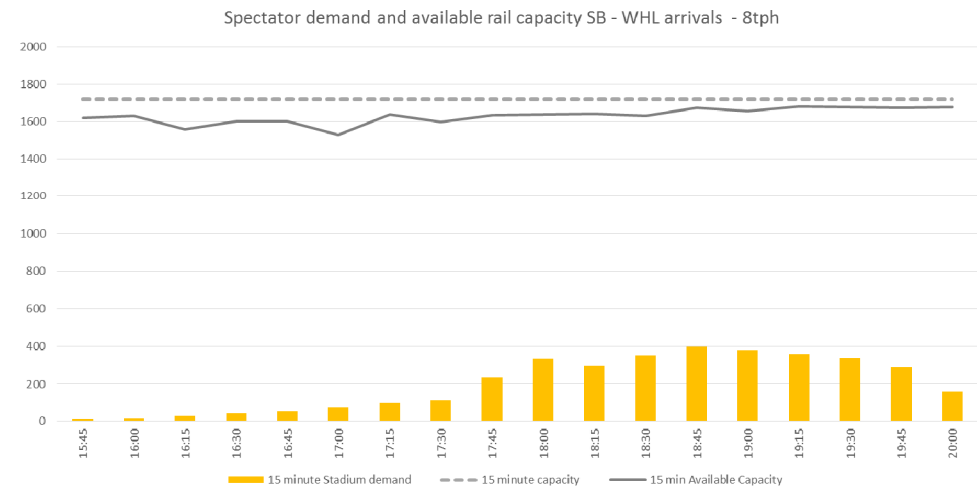
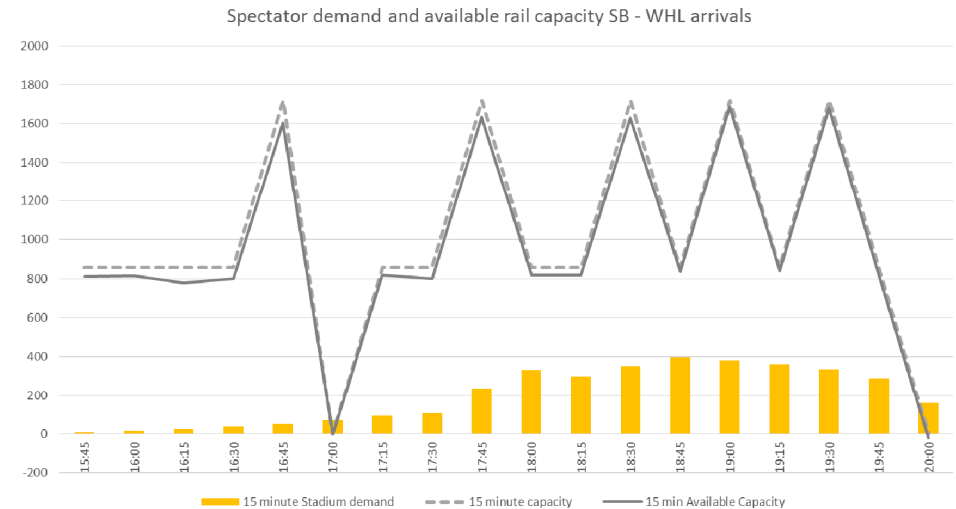


Services to White Hart Lane i Arrivals

Assuming the use of 8-car Class 378 rolling stock, no capacity constraints are anticipated on southbound services into White Hart Lane.

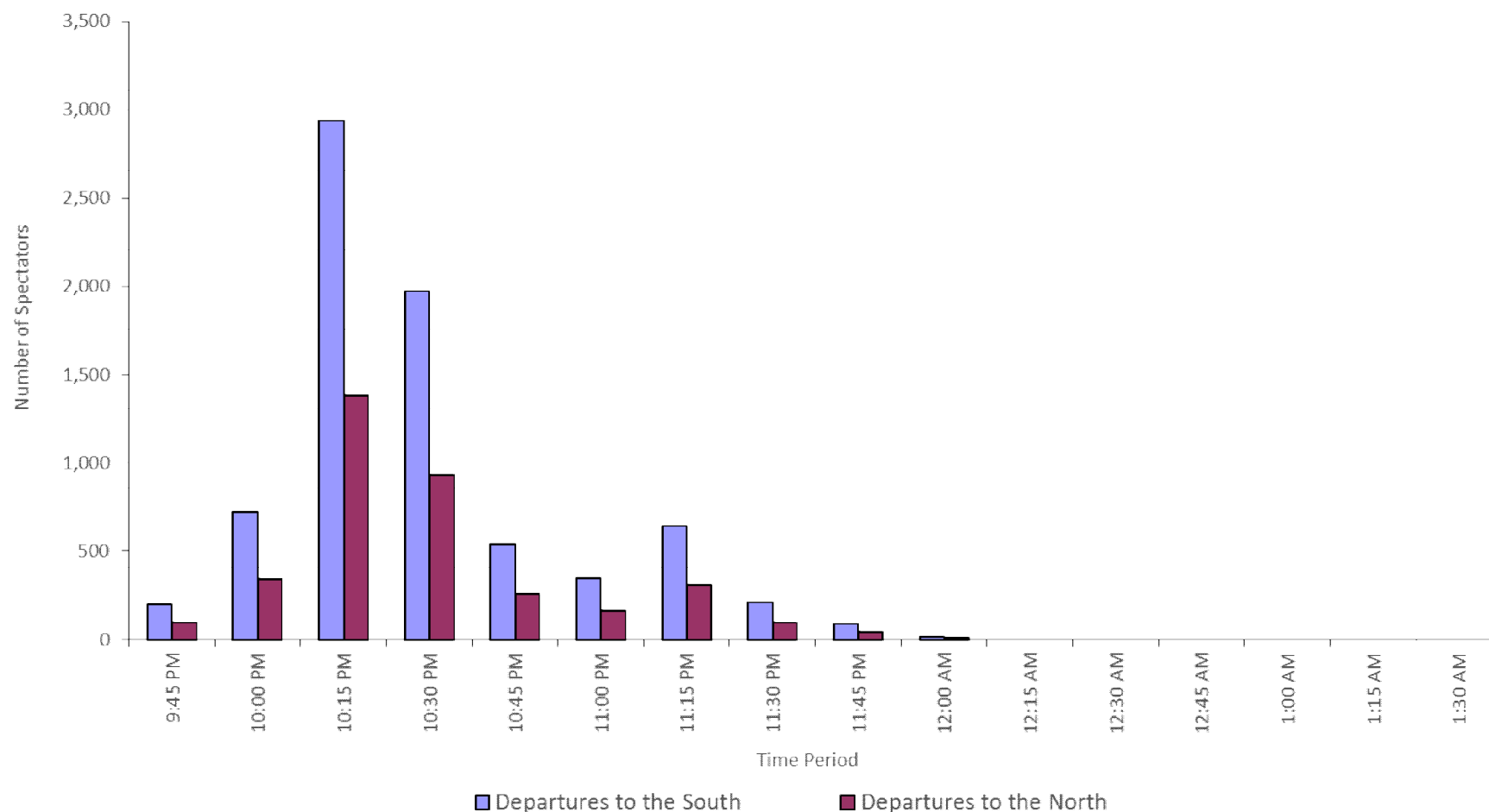
The 17:00 shortfall in capacity is due to a 16 minutes headway between trains.

With an 8tph timetable, there will be no capacity constraint on the southbound service.



White Hart Lane i Departures

Spectator Departures from White Hart Lane during the Post-Event Period



À 11,250 attendees in total

- 7,650 to South (40% of these interchange at Seven Sisters)
- 3,600 to North

White Hart Lane Station – Departures

Southbound Platform

- Large queues are anticipated to form outside the station for access to the southbound platform. It is assumed that the capacity of the platform is capped at 859 people, as this matches the capacity per train (assuming that new Class 378 rolling stock is in use).

Maximum queue length: **2,228 people**

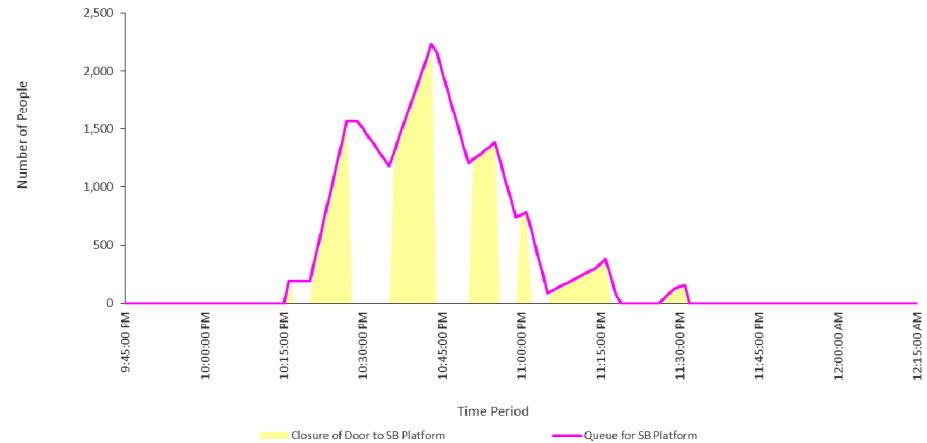
- The maximum delay experienced by any individual from the point of arrival at the station to boarding a train would be **26 minutes**.

- 49% of attendees would wait for 10 mins or less
- 28% of attendees would wait for 11 – 15 mins
- 20% of attendees would wait for 16 – 20 mins
- 2% of attendees would wait for 21 - 25 mins

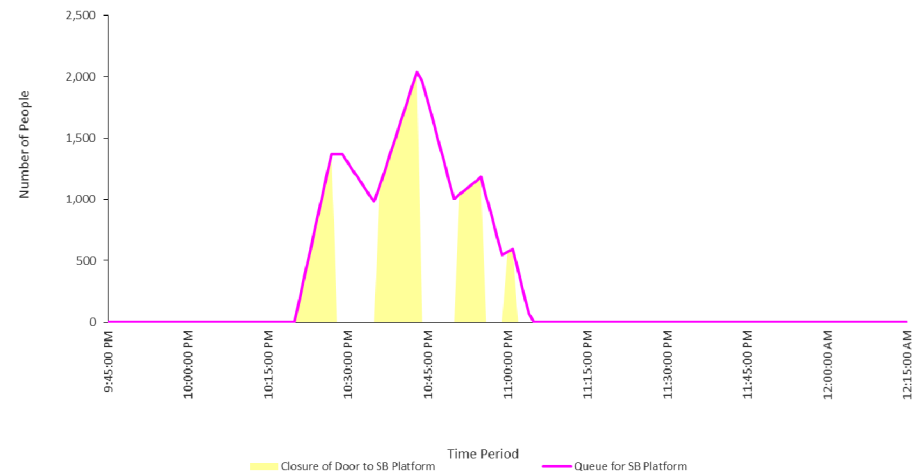
The queue will clear in approximately **60 minutes**.

- The maximum queue length is expected to be **2,034 people** if a 8 trains/hour timetable is implemented and the queue will clear in approximately **45 minutes**. The maximum delay for any individual would be **18 minutes**.

Extent of Queuing outside White Hart Lane Station during the Post-Event - Adjusted Timetable



Extent of Queuing outside White Hart Lane Station during the Post-Event - 8 tph

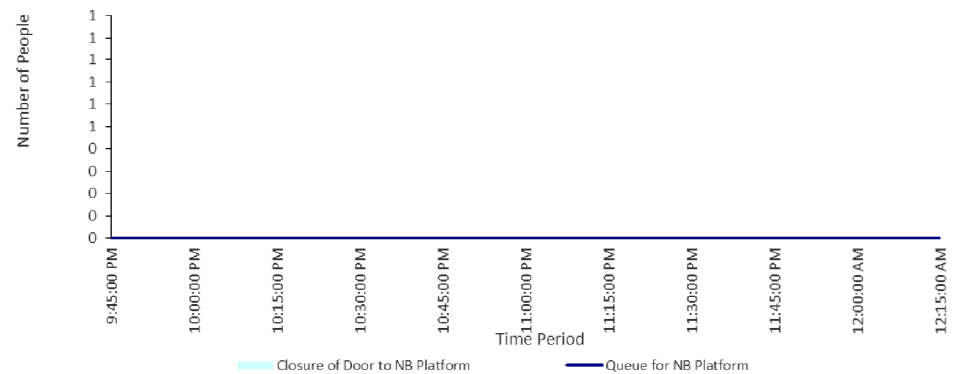


White Hart Lane Station i Departures

A Northbound Platform

- i No queues are anticipated to form outside the station for access to the southbound platform. It is assumed that the capacity of the platform is capped at 859 people, as this matches the capacity per train (assuming that new Class 378 rolling stock is in use).

Extent of Queuing outside White Hart Lane Station during the Post-Event - Adjusted Timetable



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