

THFC New Stadium i Concert scenario Tottenham Hale Interchange Analysis

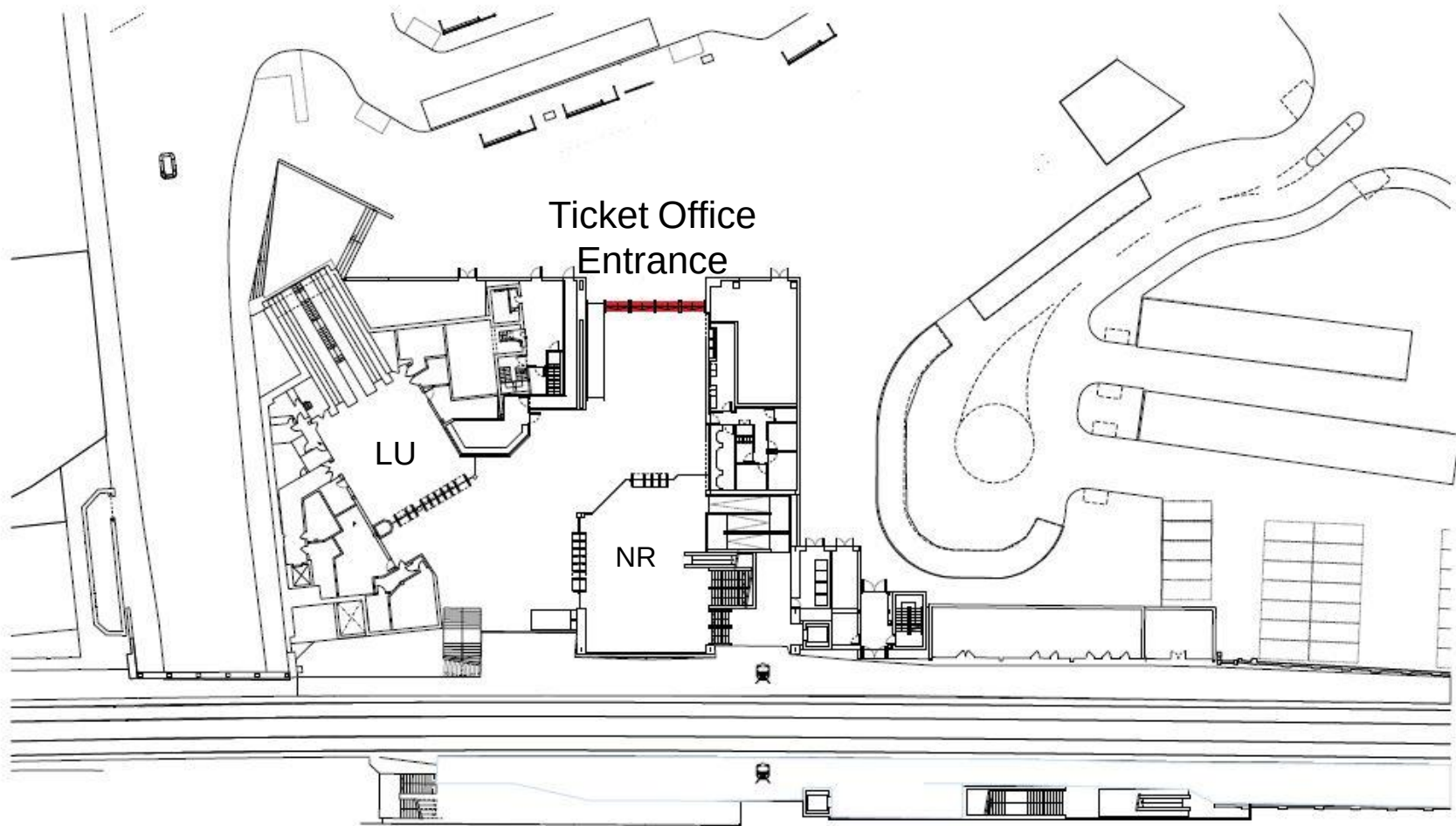
Assessment of Station Capacity

- ✍ This document contains the outcome of an assessment of capacity of Tottenham Hale Station 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.
- ✍ 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).
- ✍ A spreadsheet model of demand and capacity has been constructed to assess the performance of different parts of the infrastructure.
- ✍ The following pages summarise the performance throughout the arrival and departure periods for a Saturday Concert scenario.
- ✍ A Football Matchday National Rail train timetable has been adjusted to the start and end times of the Concert ï providing similar service capacities and timings at peak times.
- ✍ Background loading on services and at the Station is included in the assessment. 22% growth has been applied to observed background figures to represent conditions in 2021.

Station layout and entry points

Station re-configuration is currently underway. The plan below shows the layout as assumed in 2021.

At the time of assessment, the THFC Shuttle Bus pick-up/drop-off location was unconfirmed, but is assumed to be in the vicinity of the ticket office.



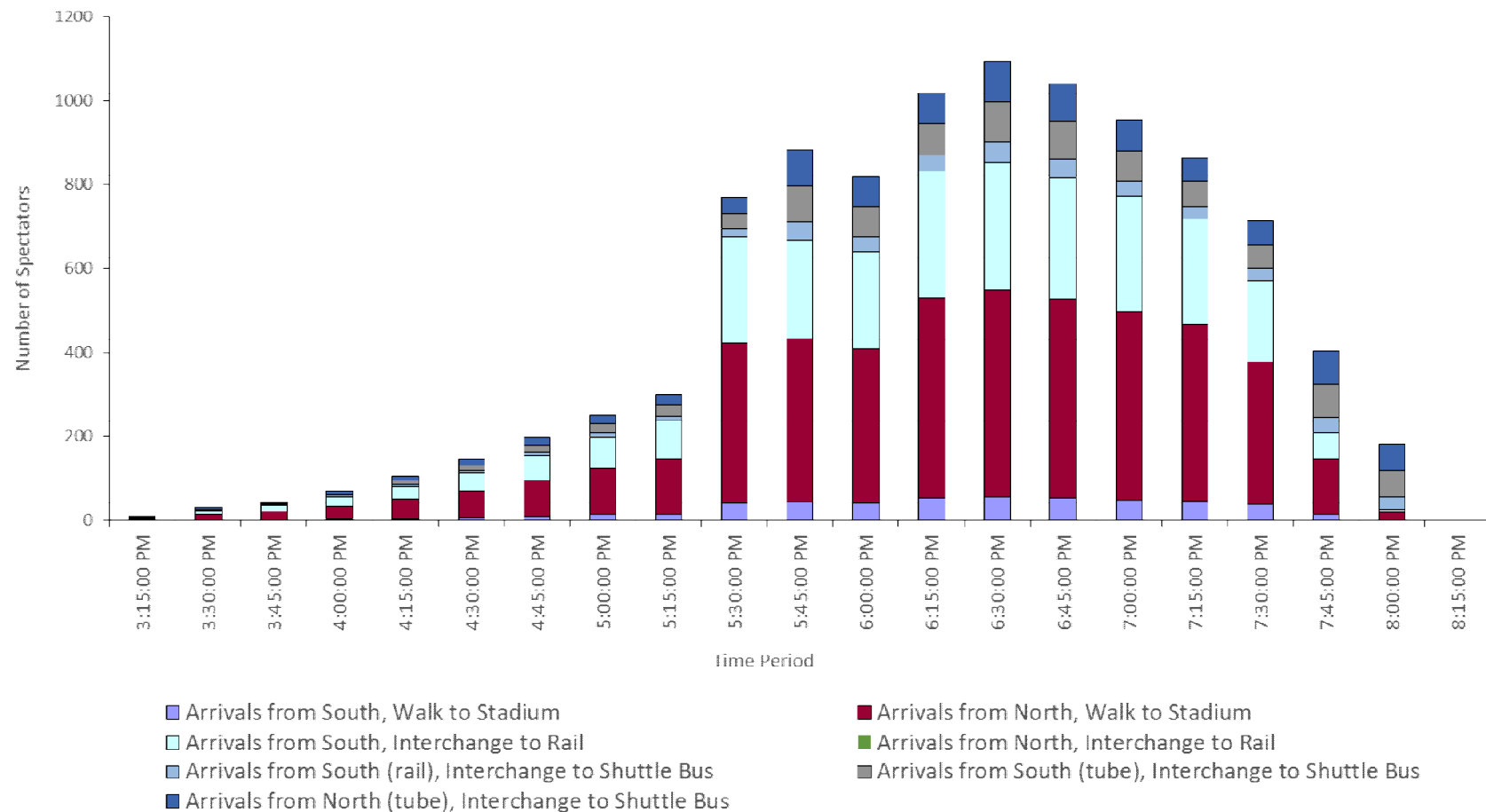


55K Scenario



Tottenham Hale i Arrival

Spectator Arrivals at Tottenham Hale during the Pre-Event Period

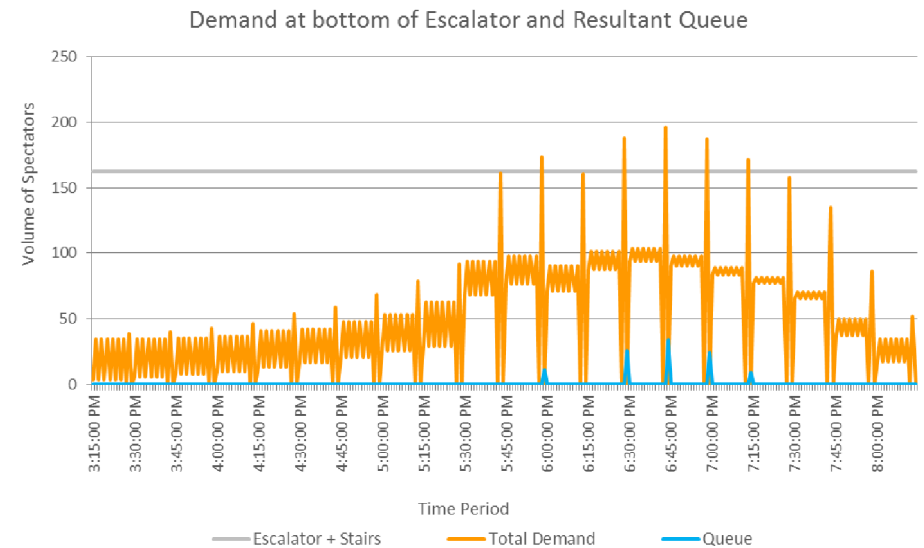
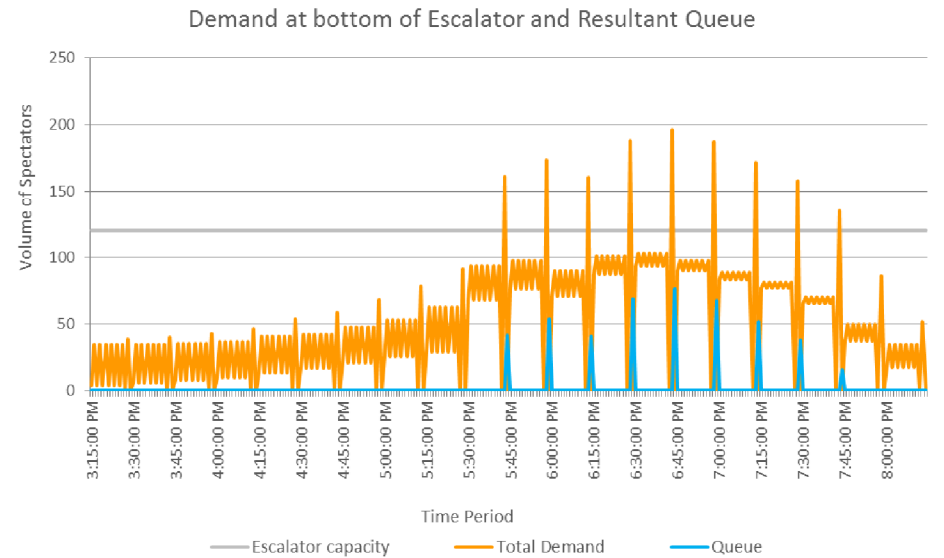


∆ 9,900 attendees in total

- 4,950 exit the Station and Walk to the Stadium
- 2,200 interchange onto a THFC Shuttle Bus
- 2,750 interchange onto National Rail services to Northumberland Park

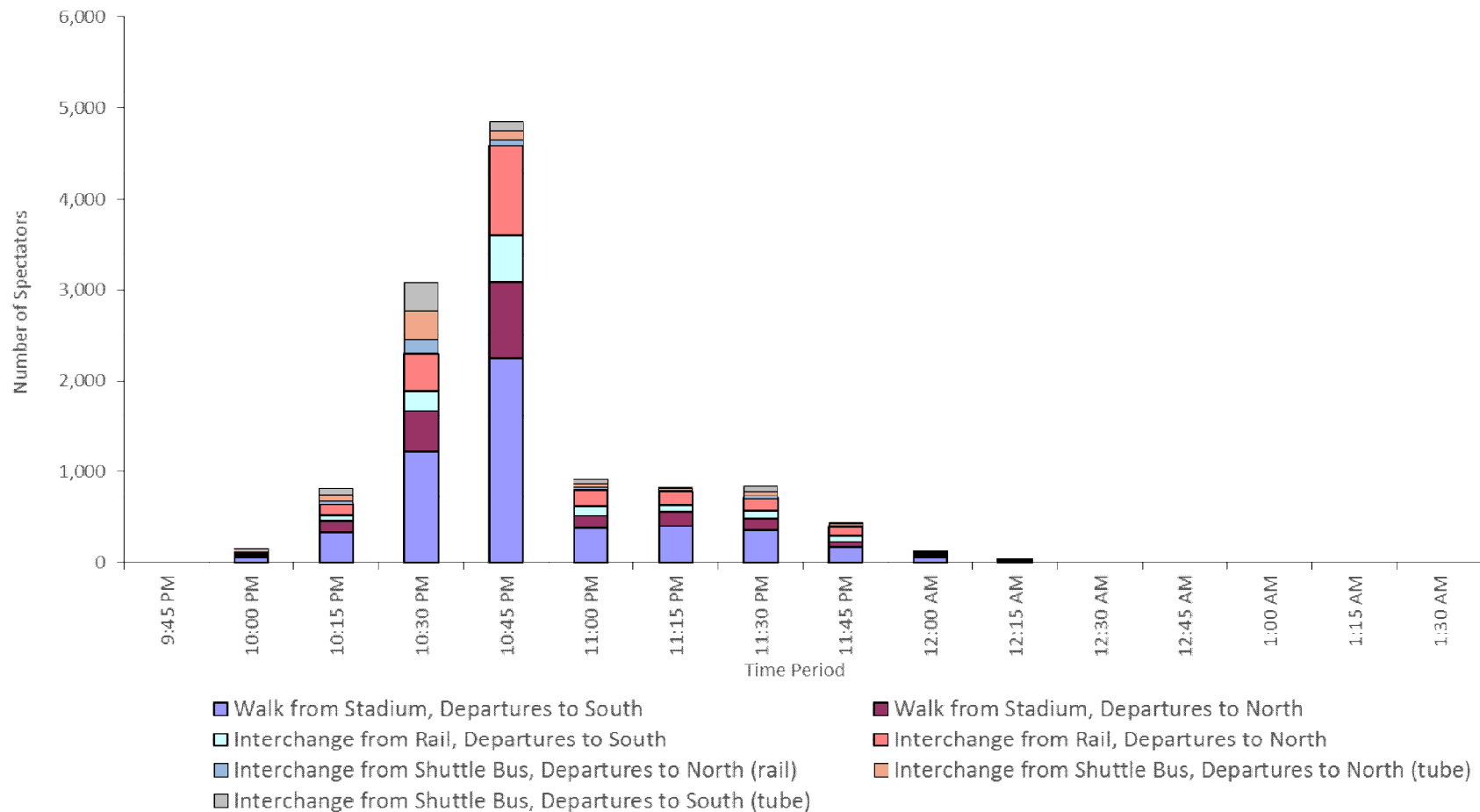
Tottenham Hale i Arrival - Vertical Circulation from the Victoria Line

- Å With 27tph in both directions, the total demand exceeds escalator capacity on several occasions, creating small, shuffling queues of up to 75 people that remain within the reservoir area capacity at the bottom of the escalator.
- Å These queues would be reduced to below 40 people if the adjacent stairwell were fully used in addition to the escalator.
- Å On-site observations suggest that the majority of people will join the queue for the escalator rather than use the stairs.
- Å This is the principal capacity constraint within the station. Once flows have been regulated at this point, the remainder of the journey through the station would be unimpeded.



Tottenham Hale i Departure

Spectator Departures from Tottenham Hale during the Post-Event Period



12,100 attendees in total

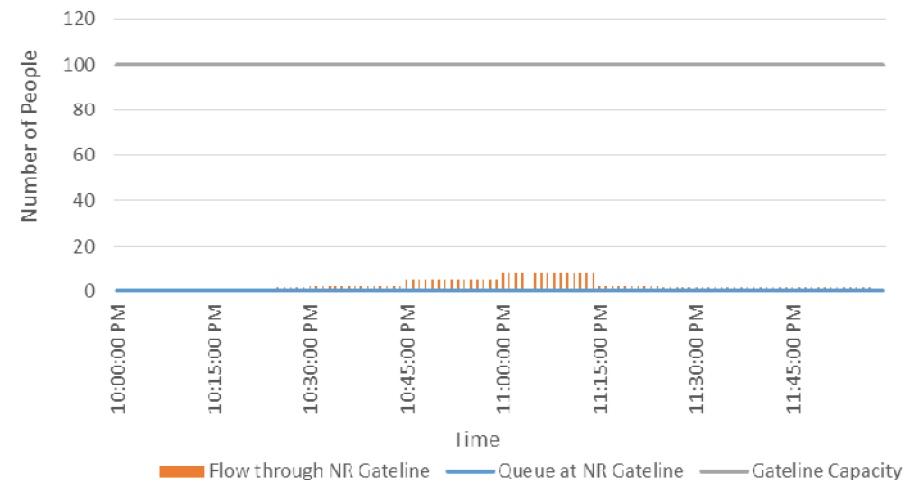
- 7,700 arrive on foot from the Stadium
- 2,750 interchange from NR train services from Northumberland Park
- 1,650 interchange from a THFC Shuttle bus service

Tottenham Hale i Departure - Use of National Rail Gateline

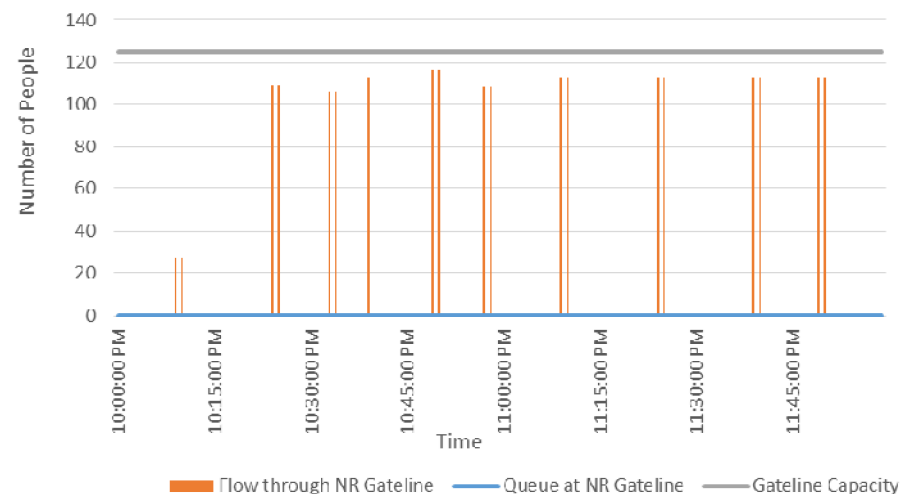
Assuming 4 entry gates and 5 exit gates

- Å No delays are anticipated at the gateline in either direction
- Å All alighters from National Rail services are able to clear through the gateline within two minutes of the train arrival. Given the stopping location of the train, as well as the configuration of the platform and station, it is anticipated that the arrival rate at the gateline would be naturally distributed over this period.

Demand at NR Gateline (entry) and Resultant Queues

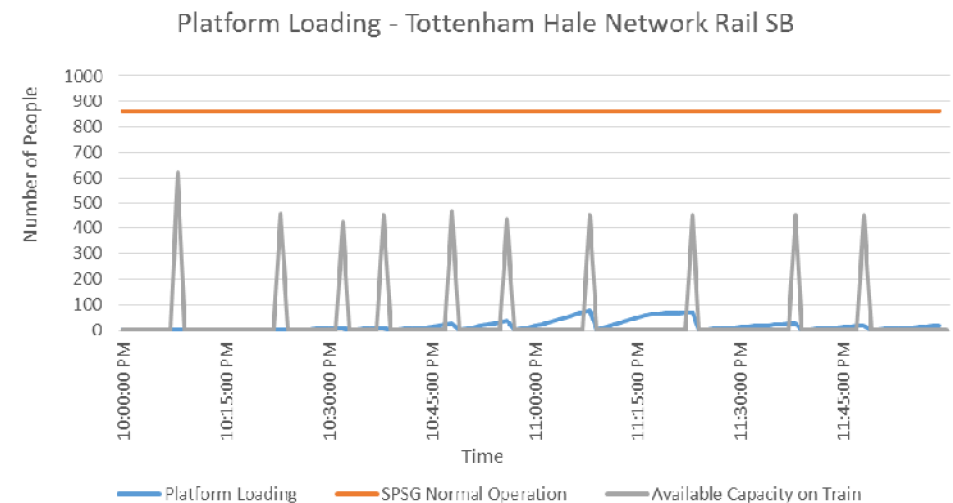


Demand at NR Gateline (exit) and Resultant Queues



Tottenham Hale i Departure - NR SB platform

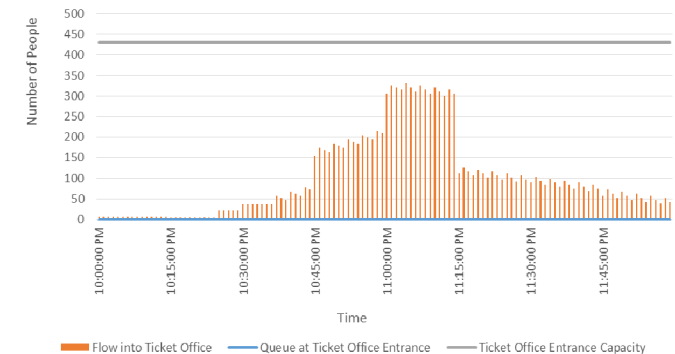
- Å Some passengers alighting from the Shuttle Bus will board National Rail services arriving from Northumberland Park.
- Å The analysis shows that all of these attendees will be able to board the next available train after their arrival.
 - ı Although the trains will leave Northumberland Park at capacity, the number of people alighting at Tottenham Hale (to interchange to LU) exceeds those wishing to board
- Å The number of people waiting on the Platform to board will peak at approximately 80 i there is no capacity issue anticipated.



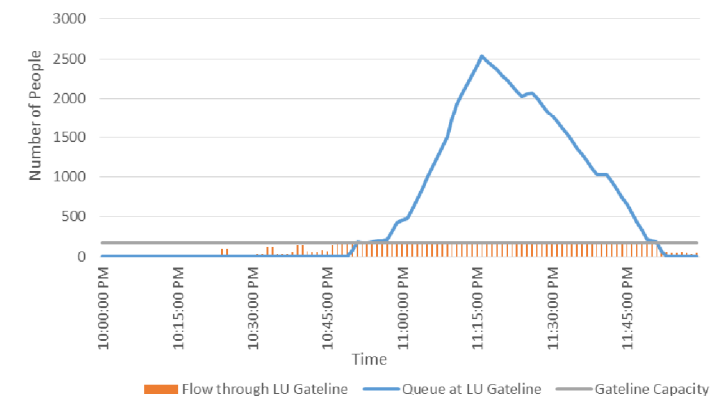
Tottenham Hale i Departure - Ticket Office and access to LU

- Å The entrance to the Ticket Office provides sufficient capacity to accommodate all flows entering the station.
- Å It is assumed that entry into the London Underground part of the station would be via **6 automated ticket gates + 1 Wide Aisle Gate**.
- Å This is matched to the vertical circulation capacity within the station, and therefore prevents any queue formation at the head of the stairs/escalator or in the gateline run-off area. This does suggest that use of the stair capacity is required in addition to the escalator and therefore may need to be encouraged.
- Å Some queuing is anticipated at the gateline
 - ı Queue duration of **63 mins**
 - ı Maximum queue size of circa **2,531 people (requires management)**
 - ı Maximum delay for any individual of **15 minutes**
- Å It is anticipated that entry to the Ticket Office may be controlled to match the gateline capacity, so that the queues could be managed outside the building. If this were to occur inside the ticket office, then other movements, including interchange flows could be affected.

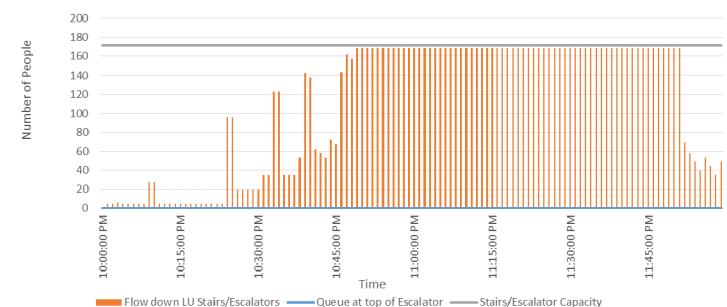
Demand into Ticket Office and Resultant Queues



Demand at LU Gateline and Resultant Queues



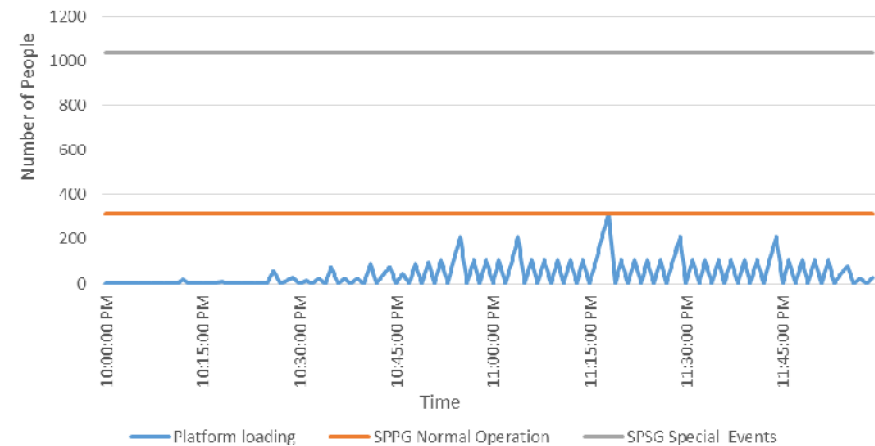
Demand at LU Stairs/Escalators and Resultant Queues



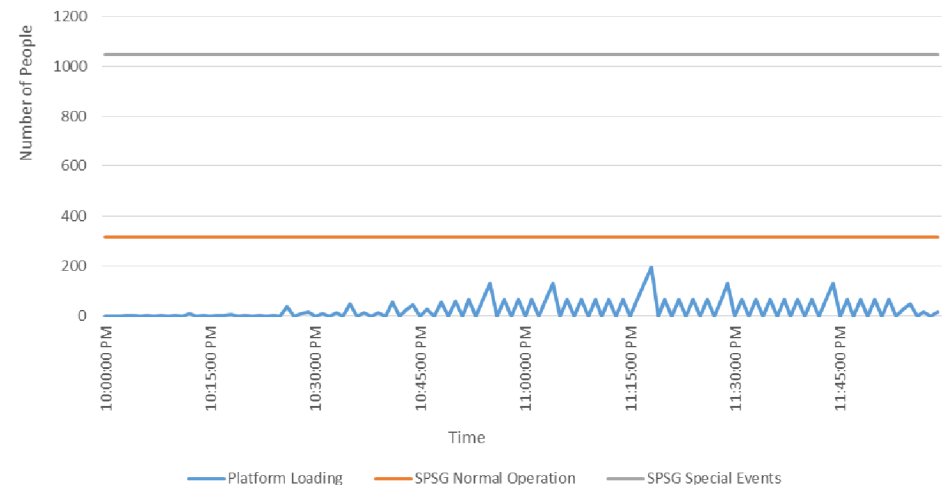
Tottenham Hale i Departure - LU Platforms

- ⚠ Under SPSG Special Events guidance, each LU Platform has capacity for approximately 1,000 people.
- ⚠ As indicated in the adjacent charts, the peak anticipated occupancy is approximately 310 passengers for Southbound services and 196 passengers for Northbound.
- ⚠ For both platforms, densities experienced are below the planning standards for Normal Operations, suggesting that conditions on the Platform during the post-match should operate safely without management intervention.
- ⚠ In both directions, all passengers would be expected to board the first train after they arrived on the Platform.

Platform Loading - Tottenham Hale Victoria Line SB



Platform Loading - Tottenham Hale Victoria Line NB

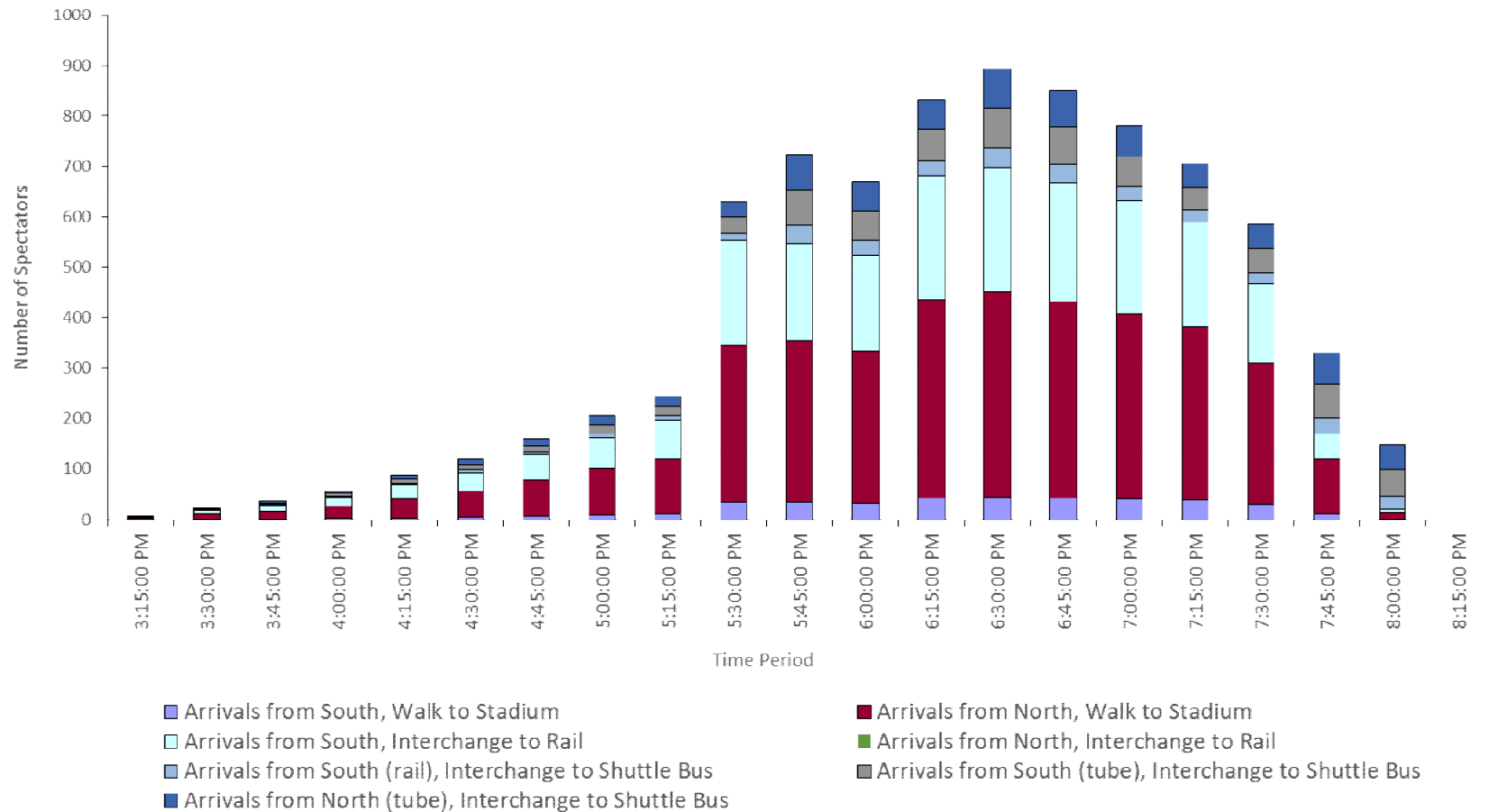




45K Scenario

Tottenham Hale i Arrival

Spectator Arrivals at Tottenham Hale during the Pre-Match Period



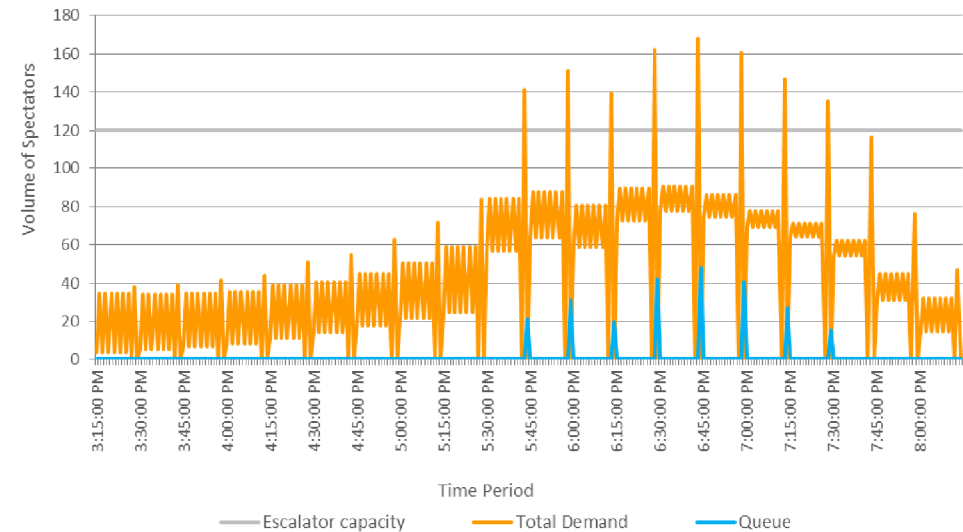
8,100 attendees in total

- 4,050 exit the Station and Walk to the Stadium
- 1,800 interchange onto a THFC Shuttle Bus
- 2,250 interchange onto National Rail services to Northumberland Park

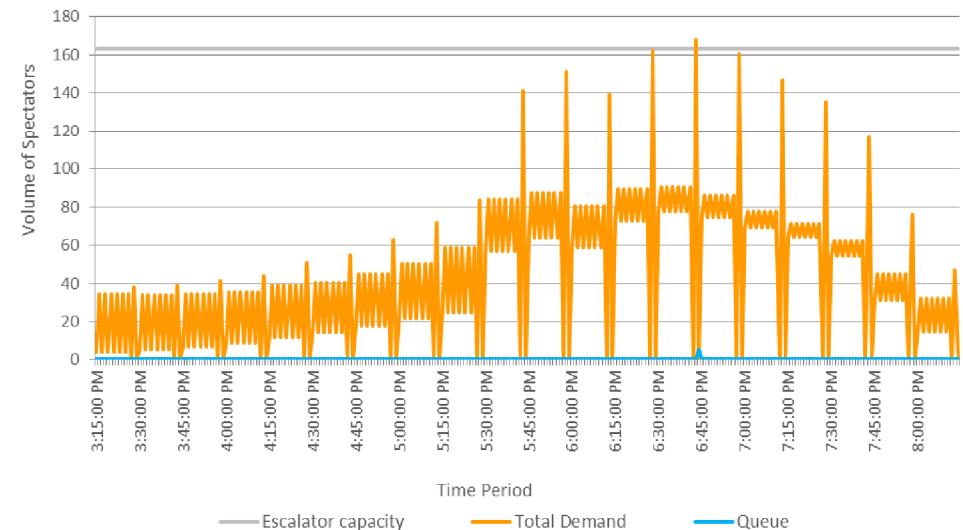
Tottenham Hale i Arrival - Vertical Circulation from the Victoria Line

- Å With 27tph in both directions, the total demand exceeds escalator capacity on several occasions, creating small, shuffling queues of up to 55 people that remain within the reservoir area capacity at the bottom of the escalator.
- Å These queues would be almost entirely eradicated if the adjacent stairwell were fully used in addition to the escalator.
- Å On-site observations suggest that the majority of people will join the queue for the escalator rather than use the stairs.
- Å This is the principal capacity constraint within the station. Once flows have been regulated at this point, the remainder of the journey through the station would be unimpeded.

Demand at bottom of Escalator and Resultant Queue

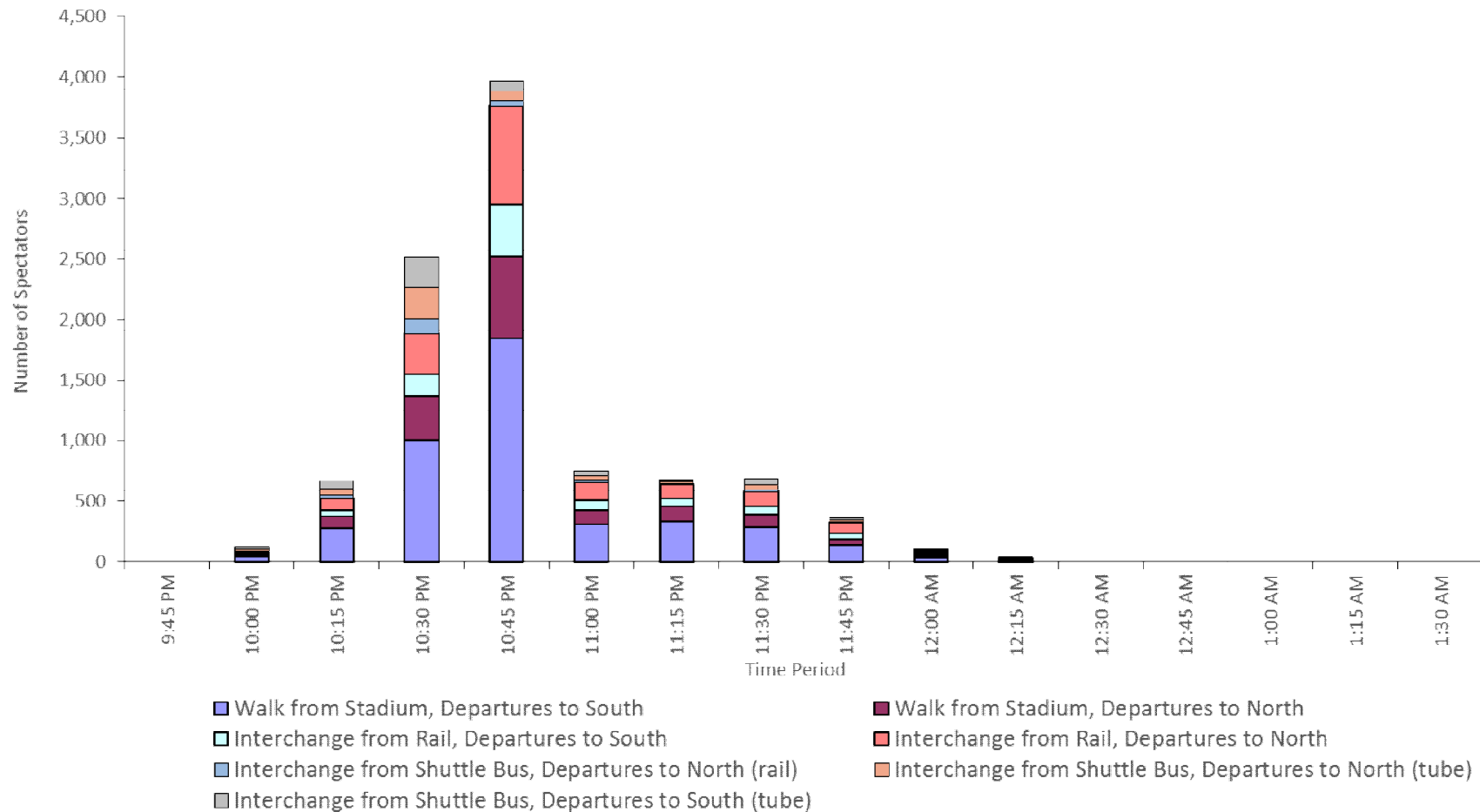


Demand at bottom of Escalator and Resultant Queue



Tottenham Hale i Departure

Spectator Departures from Tottenham Hale during the Post-Event Period



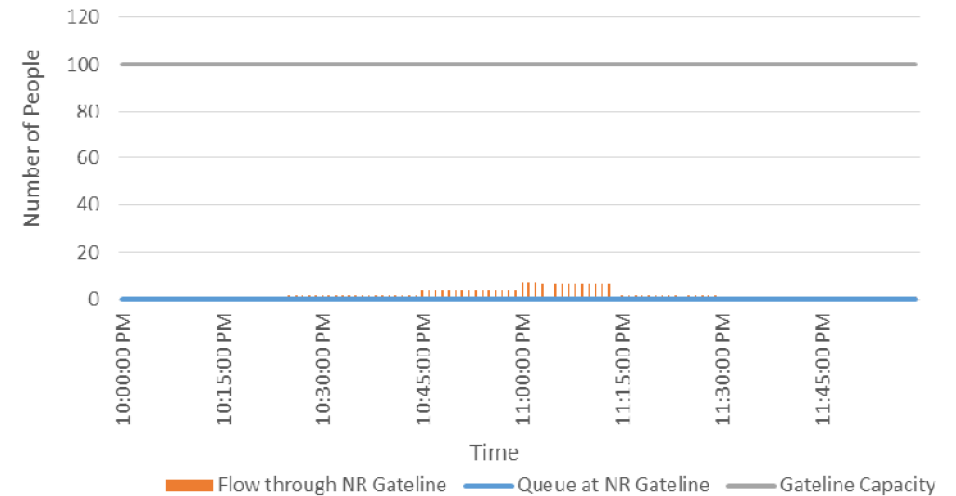
∆ 9,900 attendees in total

- 5,850 arrive on foot from the Stadium
- 2,700 interchange from NR train services from Northumberland Park
- 1,350 interchange from a THFC Shuttle bus service

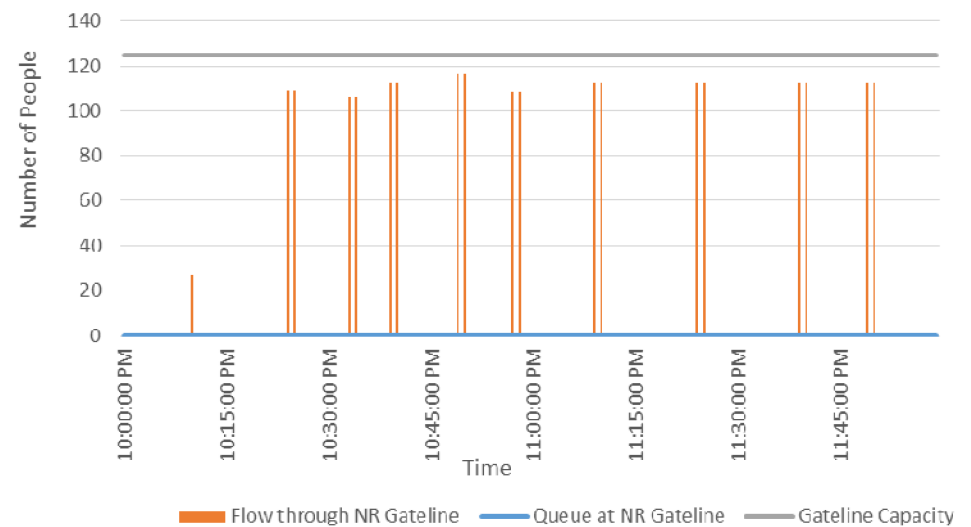
Tottenham Hale i Departure - Use of National Rail Gateline

- ⌚ **Assuming 4 entry gates and 5 exit gates**
- ⌚ No delays are anticipated at the gateline in either direction
- ⌚ All alighters from National Rail services are able to clear through the gateline within two minutes of the train arrival.

Demand at NR Gateline (entry) and Resultant Queues

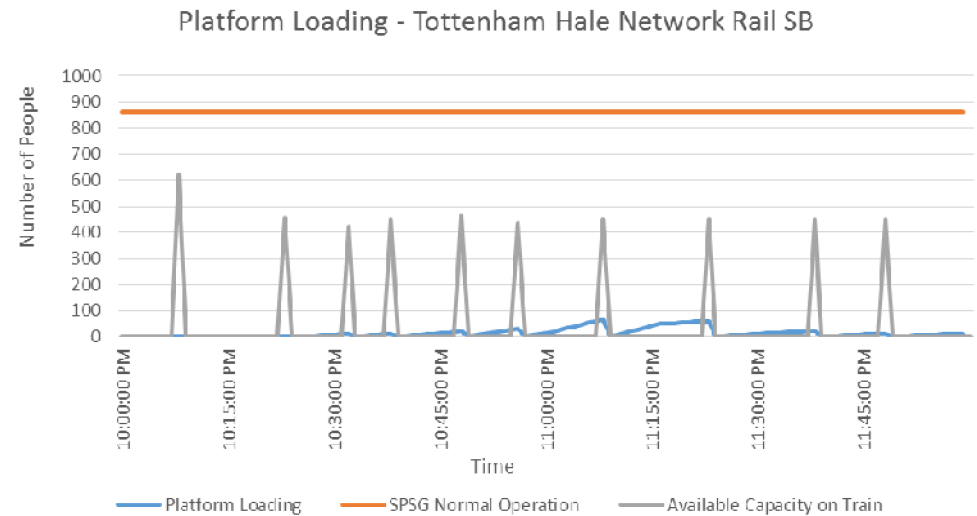


Demand at NR Gateline (exit) and Resultant Queues



Tottenham Hale to Departure - NR SB platform

- Å Some passengers alighting from the Shuttle Bus will board National Rail services arriving from Northumberland Park.
- Å The analysis shows that all of these attendees will be able to board the next available train after their arrival.
 - ï Although the trains will leave Northumberland Park at capacity, the number of people alighting at Tottenham Hale (to interchange to LU) exceeds those wishing to board
- Å The number of people waiting on the Platform to board will peak at approximately 65 – there is no capacity issue anticipated.



Tottenham Hale i Departure - Ticket Office and access to LU

Å The entrance to the Ticket Office provides sufficient capacity to accommodate all flows entering the station.

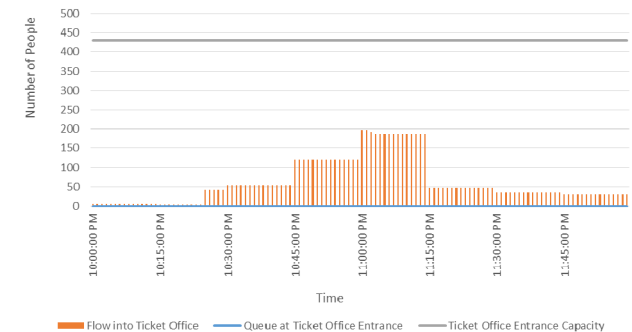
Å It is assumed that entry into the London Underground part of the station would be via **6 automated ticket gates + 1 Wide Aisle Gate**.

Å This is matched to the vertical circulation capacity within the station, and therefore prevents any queue formation at the head of the stairs/escalator or in the gateline run-off area. This does suggest that use of the stair capacity is required in addition to the escalator and therefore may need to be encouraged.

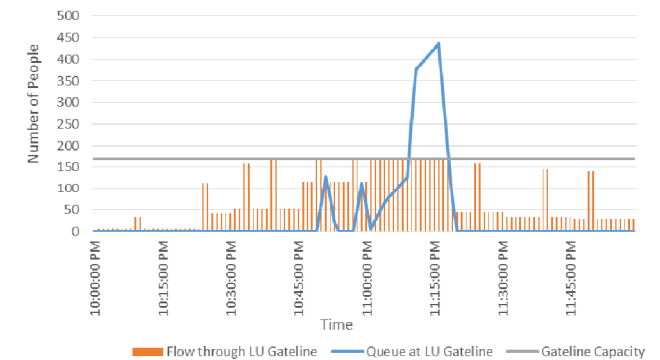
Å Some queuing is anticipated at the gateline

- ı Queue duration of **22 mins**
- ı Maximum queue size of **436 people**
- ı Maximum delay for any individual of **3 minutes**

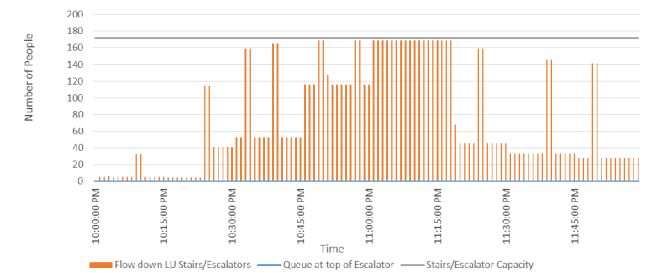
Demand into Ticket Office and Resultant Queues



Demand at LU Gateline and Resultant Queues



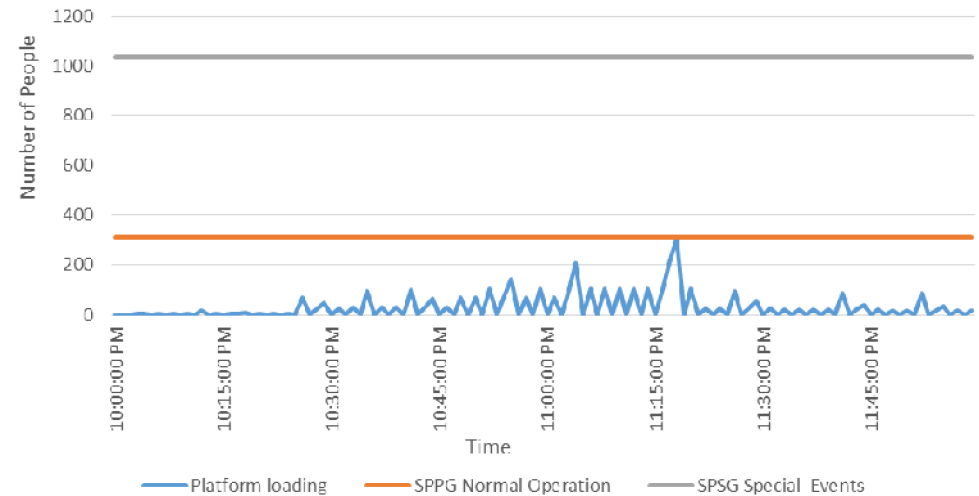
Demand at LU Stairs/Escalators and Resultant Queues



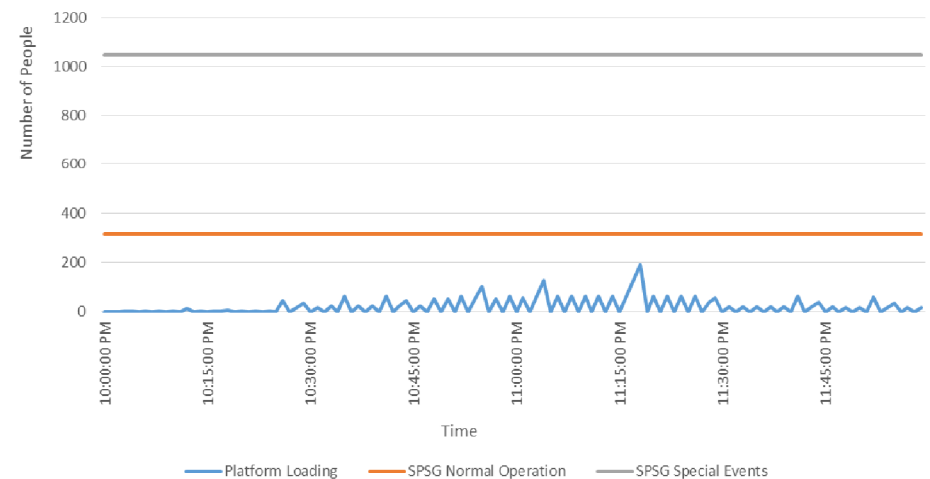
Tottenham Hale i Departure - LU Platforms

- ⚠ Under SPSG Special Events guidance, each LU Platform has capacity for approximately 1,000 people.
- ⚠ As indicated in the adjacent charts, the peak anticipated occupancy is approximately 300 passengers for Southbound services and 190 passengers for Northbound.
- ⚠ For both platforms, densities experienced are below the planning standards for Normal Operations, suggesting that conditions on the Platform during the post-match should operate safely without management intervention.
- ⚠ In both directions, all passengers would be expected to board the first train after they arrived on the Platform.

Platform Loading - Tottenham Hale Victoria Line SB



Platform Loading - Tottenham Hale Victoria Line NB



Conclusions

- ⚠ Tottenham Hale Station in its future configuration has the capacity to accommodate the forecast attendee demand in addition to regular use of the station before and after a concert. This includes an uplift in demand of >20% to 2021.
- ⚠ Two scenarios have been assessed, one of 55k attendance and 45k attendance.
- ⚠ During the pre-match period, the critical capacity constraint is the vertical circulation between the Victoria Line platform level and the ticket office, with the limited area at the base of the escalator/stairs before the queues form back as far as the platform. Calculations suggest that to avoid extensive queuing in this area it is important that high train frequencies are maintained (to spread demand across more trains) and that use of the stairs is encouraged.
- ⚠ In the post-match period, there is queuing anticipated at the entrance to the station for those arriving on foot or by shuttle. Again, the vertical circulation is the key constraining factor, however it is anticipated that from a management perspective, it would be better to introduce a constraint at either the gateline or in the Ticket Office, depending upon space and operational preference. The peak queue in the 55k scenario would be greater than 2,500 people and some crowd management is therefore required. However it is not anticipated that any individual would be delayed for more than 15 minutes. In the 45k scenario, this is reduced to 400 people and a maximum delay of 3 minutes.

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