

THFC New Stadium ï Concert scenarios Seven Sisters Interchange Analysis

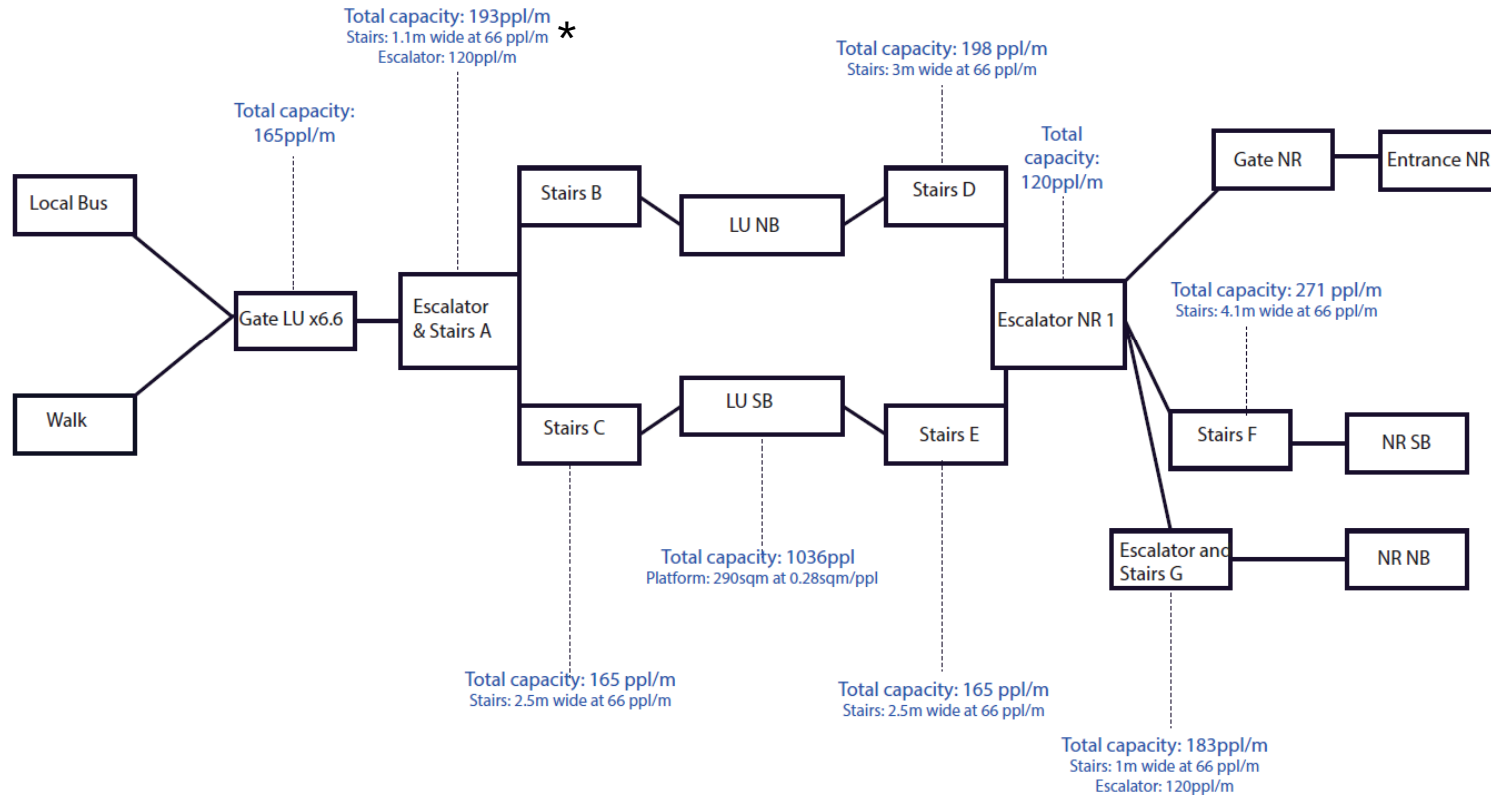
Assessment of Station Capacity

- ✍ This document contains the outcome of an assessment of capacity of Seven Sisters 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
 - ✍ Main act on stage at 20:00
 - ✍ 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 providing similar service capacities and timings at peak times.
- ✍ Background loading on services and at the Station is included in the assessment. 8% growth has been applied to observed background figures to represent conditions in 2021.
- ✍ Spectators boarding the Victoria Line at Tottenham Hale are taken into account in the assessment of available capacity on SB services in the post-match period.

Observed Post-Match Flow Rates

- ⚠ The default position for planning the capacity of different LU station elements is to adopt the flow rates contained within SPSG Special Events guidance. However, in this instance, the choice of flow rate used within the assessment is drawn from observation of actual spectator throughputs at Seven Sisters station associated with post-match conditions at Tottenham Hotspur matches. As it is expected that that future crowd management scenario at Seven Sisters in the post-match will be an extension of the current plan, it is considered appropriate to use the observed flow rates as a proxy for what can be achieved in the future. It is believed that observations should take precedence over planning guidelines where there is a contradiction between the two.
- ⚠ A count of station entries was undertaken at Seven Sisters for the post-match period associated with the THFC home match against Portsmouth on the 23rd March 2008. The peak outcome from the count data showed that at the busiest time, 811 people entered the station via the High Road within five minutes. This equates to approximately 162 people per minute. We know from the spectator survey undertaken on the day of this match that 90% of spectators travelling via Seven Sisters would board the southbound Victoria Line. Therefore, the flow towards this platform during this peak period equates to 142 people/minute and the stairs to the southbound Victoria Line platform, at 2.43m wide have been observed to operate with a capacity of **66 p/m/min**.
- ⚠ It is this data that has been used to inform the selection of appropriate flow rates for assessing the station stair capacities in a post-match operational scenario. It should also be noted that discussions with station staff and British Transport Police suggest that this is the typical outcome on a matchday, and that they have confidence that the station can operate within these parameters when required.

Station layout and entry points (Post-Event)



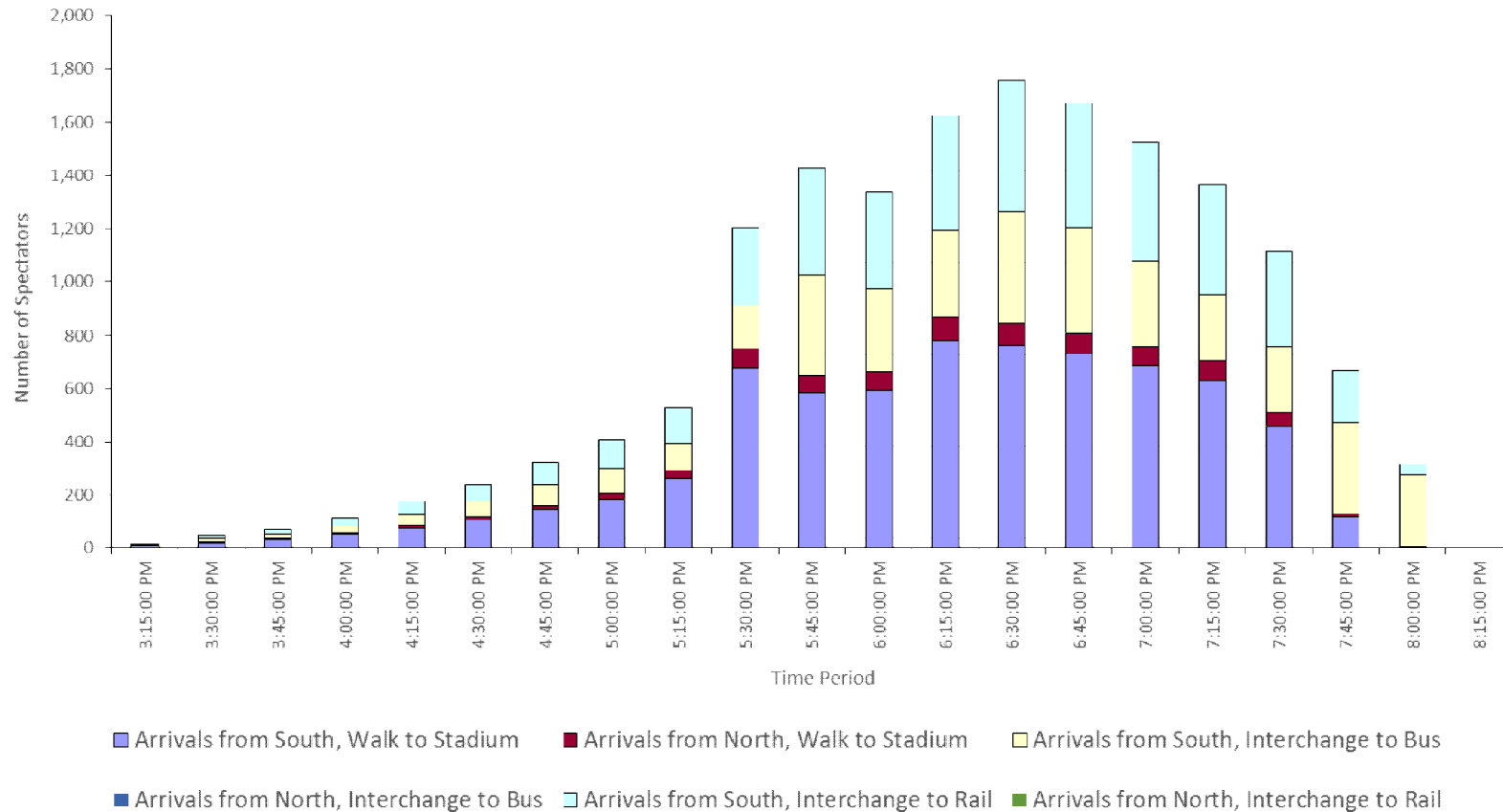
Å In the post-match management scenario, the stated capacities for Escalators & Stairs A will not be fully utilised as the flow will be regulated outside the Station to prevent queuing inside the Station (linked to capacity of Stairs C)



55K Scenario

Seven Sisters - Arrivals

Spectator Arrivals at Seven Sisters during the Pre-Event Period

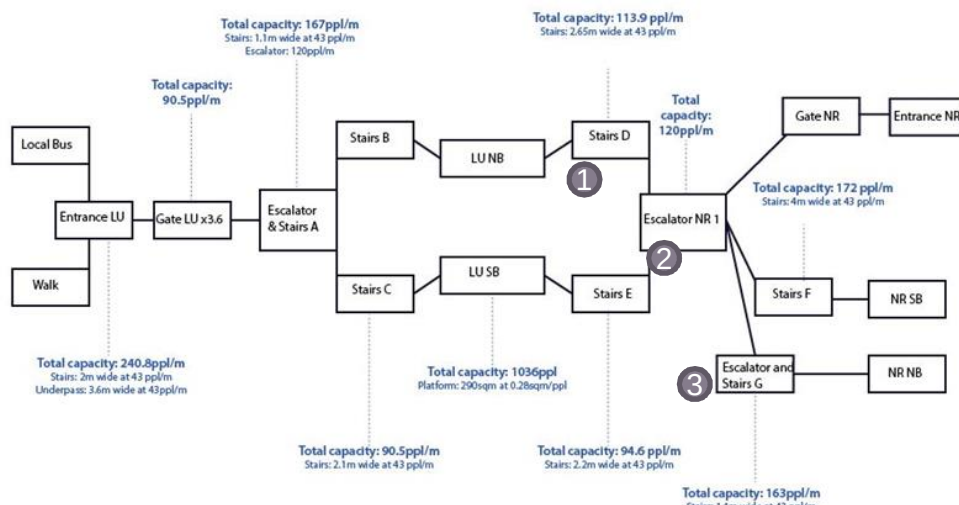


Å 15,950 attendees in total, all arriving on the Victoria Line

- 7,700 exit the station and Walk to the Stadium
- 4,400 interchange to NR trains to White Hart Lane
- 3,850 interchange onto Local Buses to the Stadium

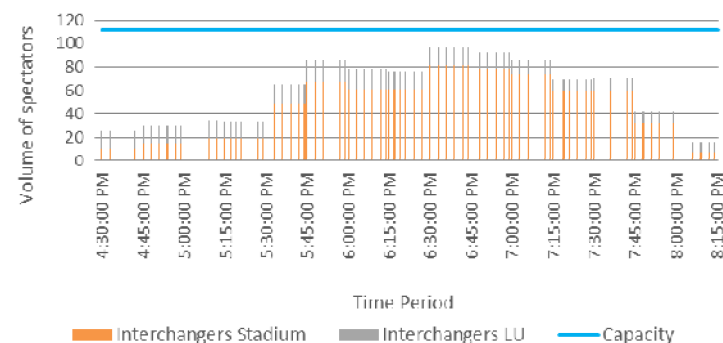
Seven Sisters - Arrivals

- Å During the pre-event period, all station vertical circulation elements provide sufficient capacity to accommodate the background and event-related flows without delay.
- Å This would also be the case should all passengers choose not to use the stairs where there is an option between escalators and stairs.



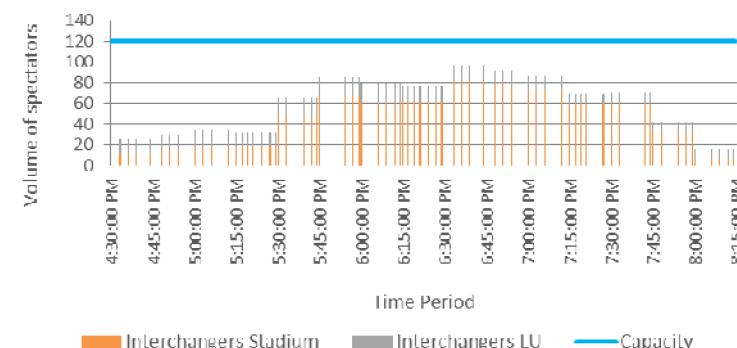
1

Demand at the bottom of Stairs from LU NB



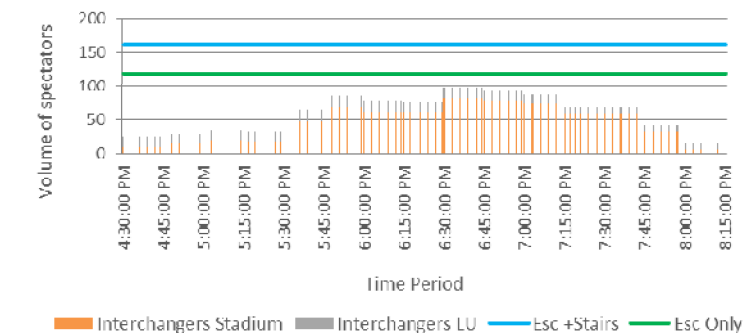
2

Demand at the bottom of Escalator from LU



3

Demand at the bottom of Escalator/Stairs to NR



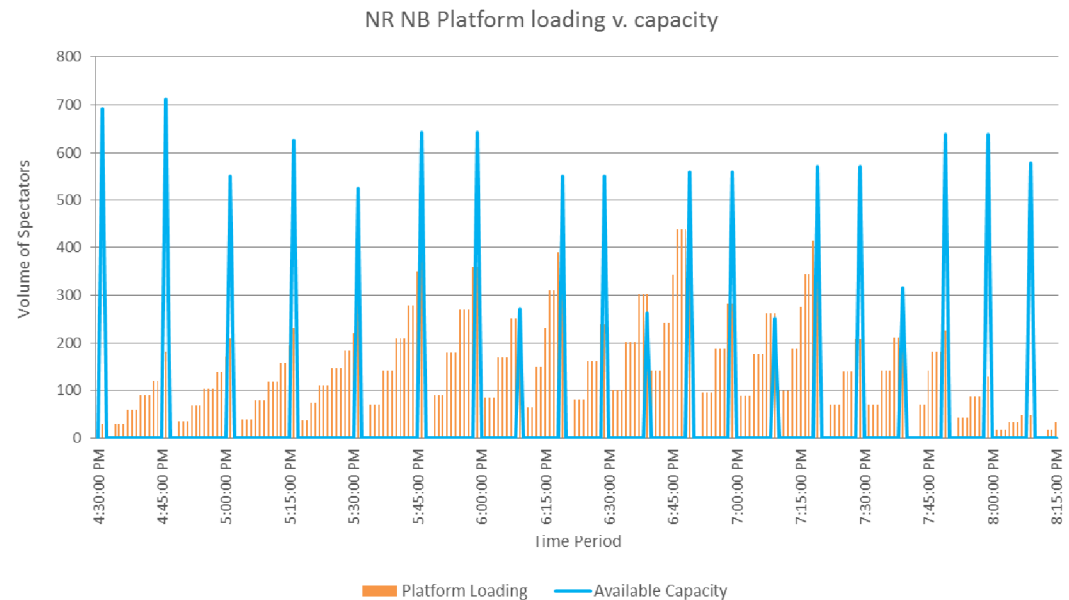
Seven Sisters - Arrivals

Å Trains arriving at Seven Sisters will already be partially loaded with background travellers and concert-goers travelling to White Hart Lane from Central London.

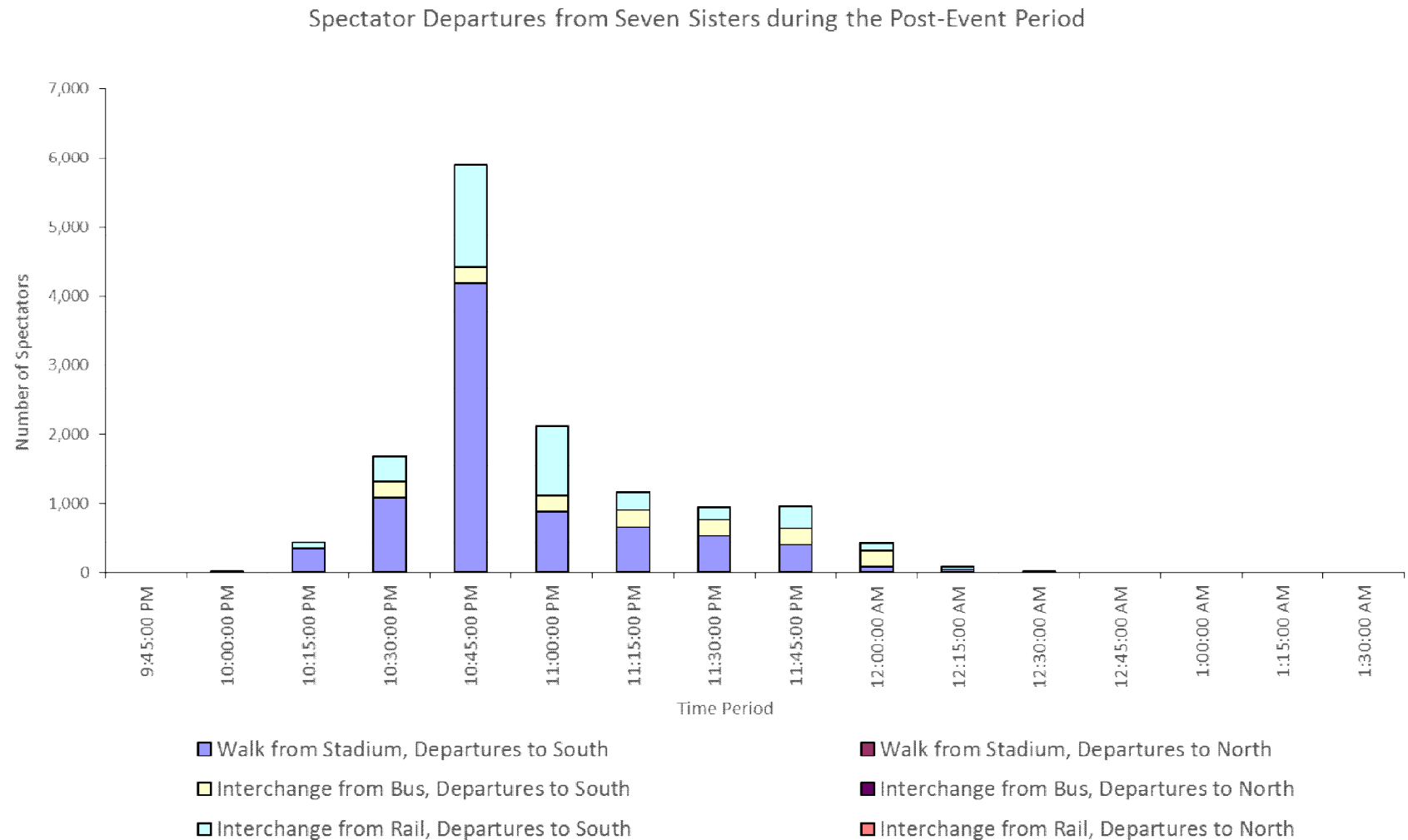
Å Train capacity is assumed to be limited to 859 pax/train (TfL advice of service capacity at 85% of train capacity for the purposes of planning for events). This implies some trains will have reduced space for boarders interchanging from the Victoria Line at Seven Sisters.

Å Almost all passengers will be able to board NB trains at Seven Sisters station except during the peak period between 18.30 and 19.00, where some passengers will have to wait to board the subsequent train.

Å This would result in peak platform loadings in excess of 400 people. However, this loading would not translate into a risk to safety or station operations.



Seven Sisters - Departures



Å 12,100 attendees in total, all departing on the SB Victoria Line

- 7,700 arrive on foot from the Stadium
- 2,750 interchanging from NR train services from White Hart Lane
- 1,650 interchanging from Buses from the Stadium vicinity

Seven Sisters i Departures i Main Entrance

Å To ensure that queuing and congestion does not take place inside the station, we have assumed that access to the station from the High Road is regulated. These are concert-goers arriving from the Stadium on foot or by bus.

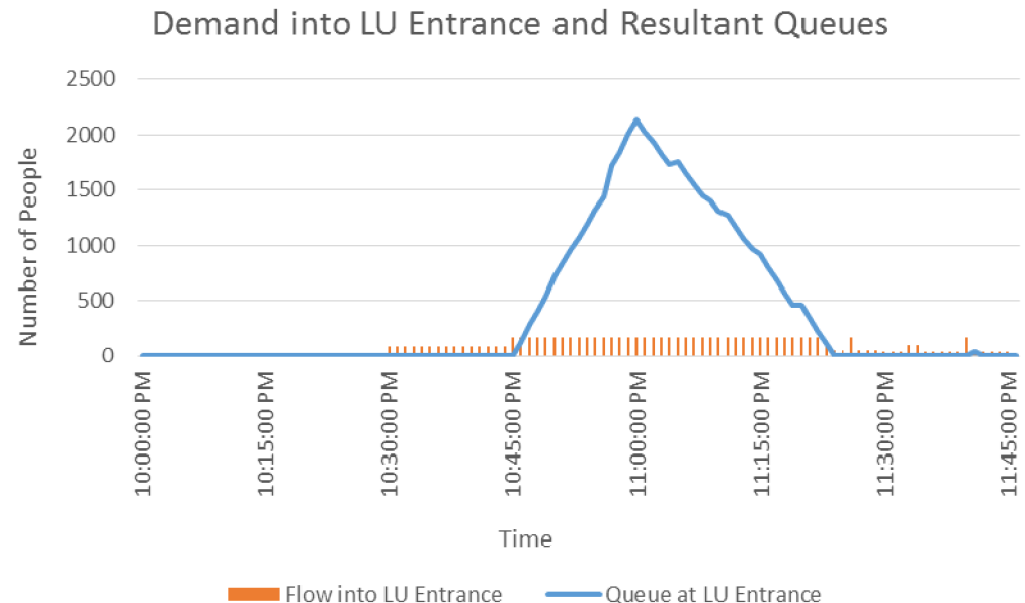
Å Therefore, queues will form outside the station i requiring a management plan to be adopted. All street level entry is assumed to be via the northernmost access point.

Å In this scenario, entry into the station would be regulated throughout at 165 people/minute (equivalent of 6 ATG + 1 WAG gateline). However, given the rate of arrival at the station, queues would form from 22:45 onwards.

Å Maximum queue length: **2,131 people**

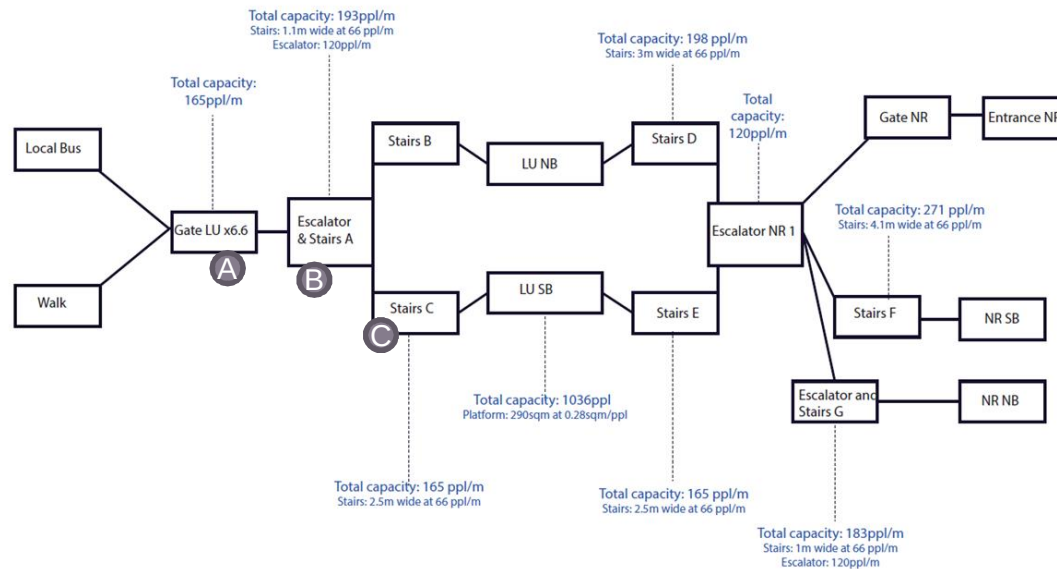
Å The maximum delay for any individual would be **13 minutes**.

Å The requirement to accommodate some level of queuing outside the station would be for approximately **40 minutes**.



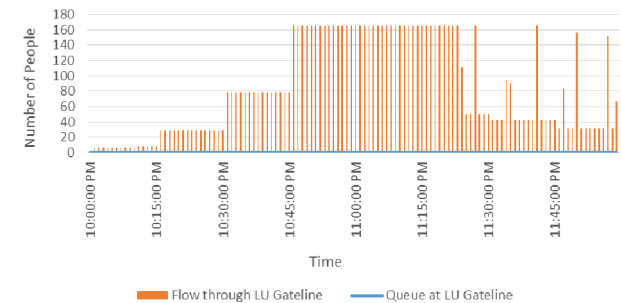
Seven Sisters i Departures i Other station elements

As demand is held outside the station to prevent queue formation inside, once people have entered their flow to the platform should not be impeded.



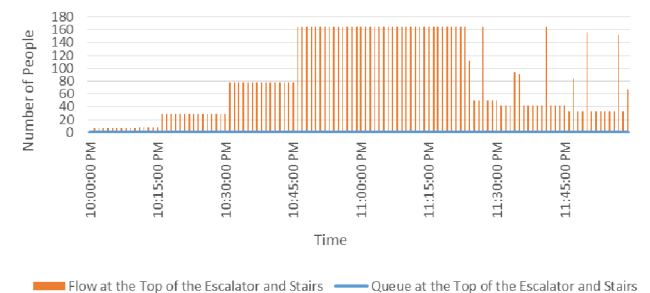
A

Demand at LU Gateline on High Road and Resultant Queues



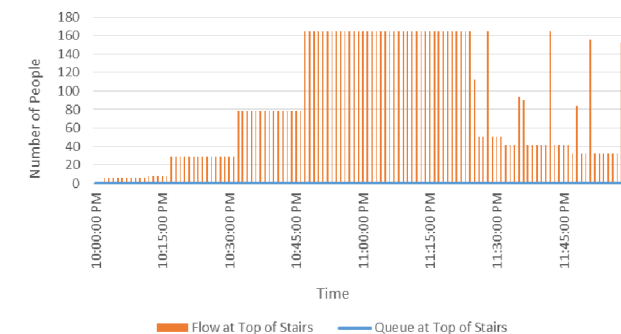
B

Demand at Top of Escalator/Stairs and Resultant Queues



C

Demand at Top of Stairs and Resultant Queues

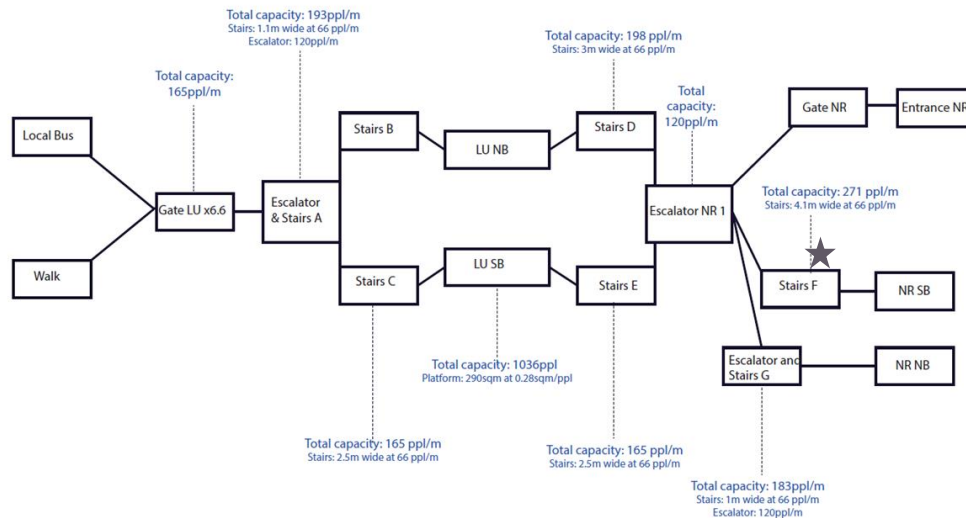
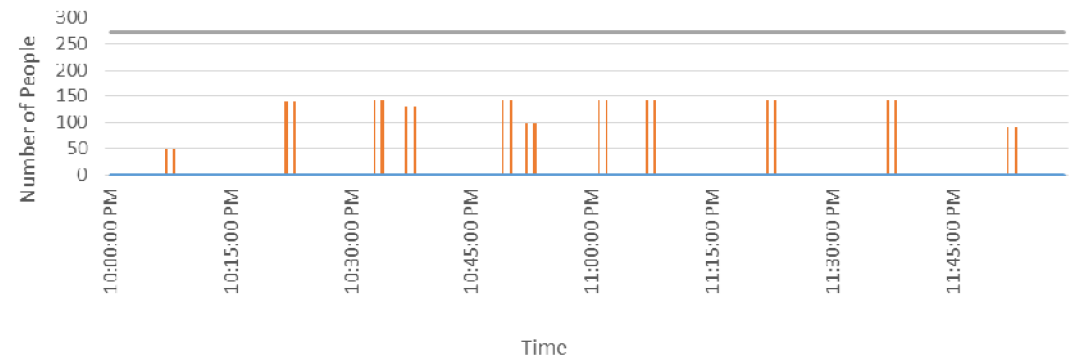


Seven Sisters - Departures Stairs from NR Platform

♿ Spectators interchanging from National Rail SB services (having boarded at WHL) onto Victoria Line services use different parts of the station to those arriving on foot or by bus.

♿ No queuing is expected.

★ Demand at Top of Stairs from National Rail SB Platform and Resultant Queues

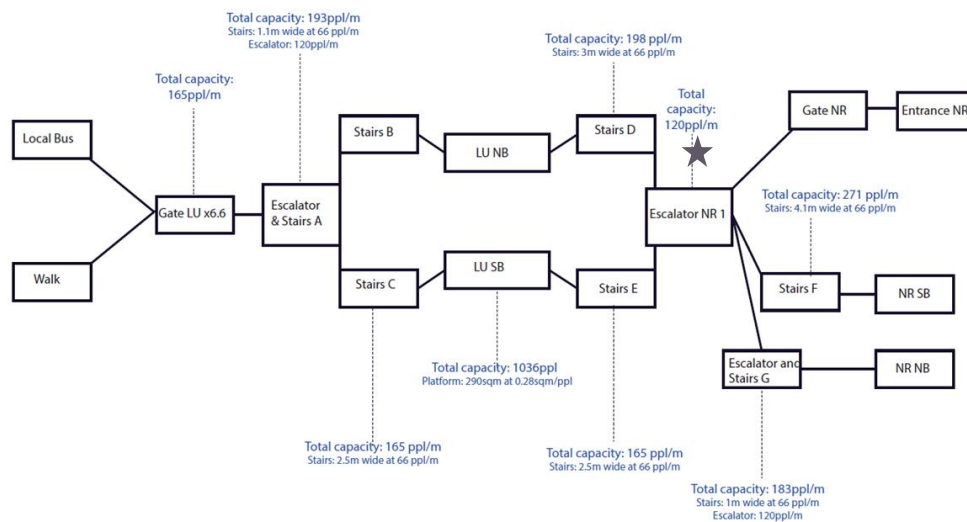
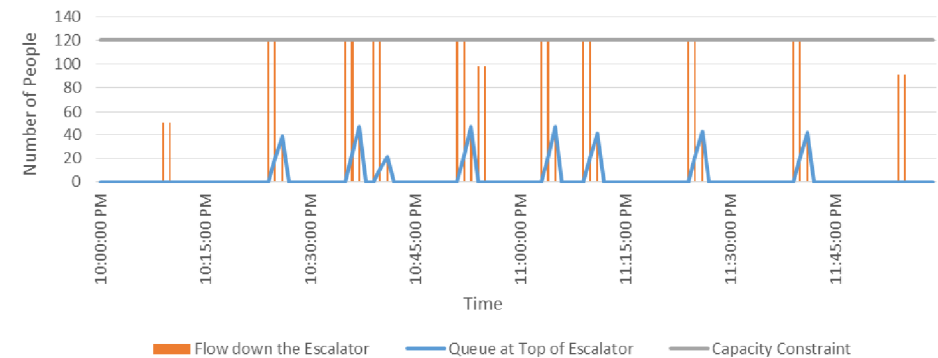


Flow down the Stairs from NR SB Platform Queue at Top of Stairs from NR SB Platform Capacity Constraint

Seven Sisters - Departures Escalator from NR to LU

- After passing from the platform through the Network Rail elements of the station, interchangers will descend an escalator to the Victoria Line.
- Small, shuffling queues of circa 50 people are expected following the arrival of each of the SB trains.
- Maximum waiting time at this point of the Station would be below 1 min.

★ Demand at Top of Escalator from National Rail and Resultant Queues

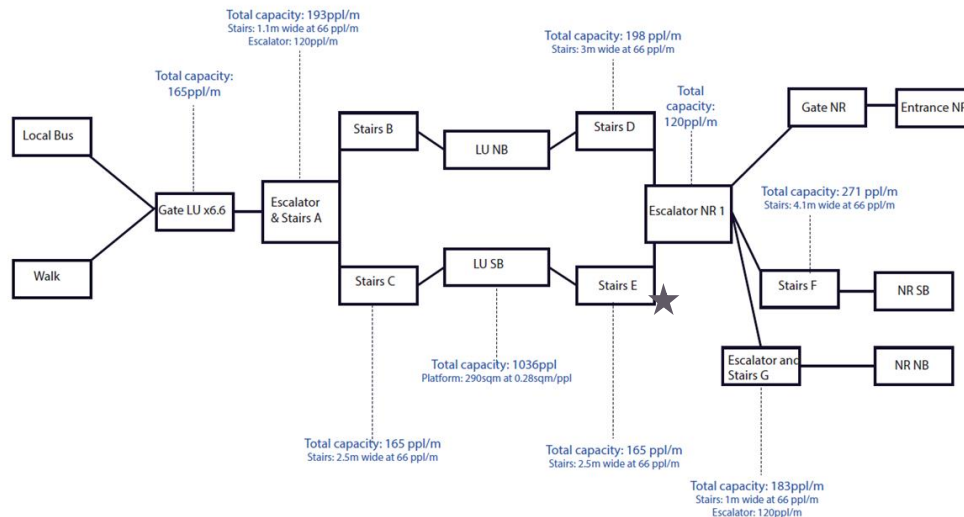
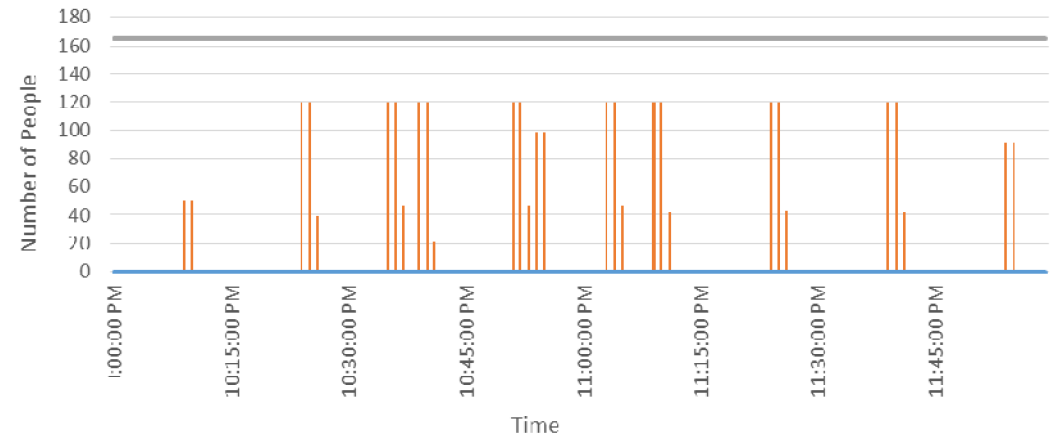


Seven Sisters - Departures- Interchange from NR to LU SB

⚠ At the base of the escalator, passengers descend further stairs to reach the Platform.

⚠ No queuing is expected.

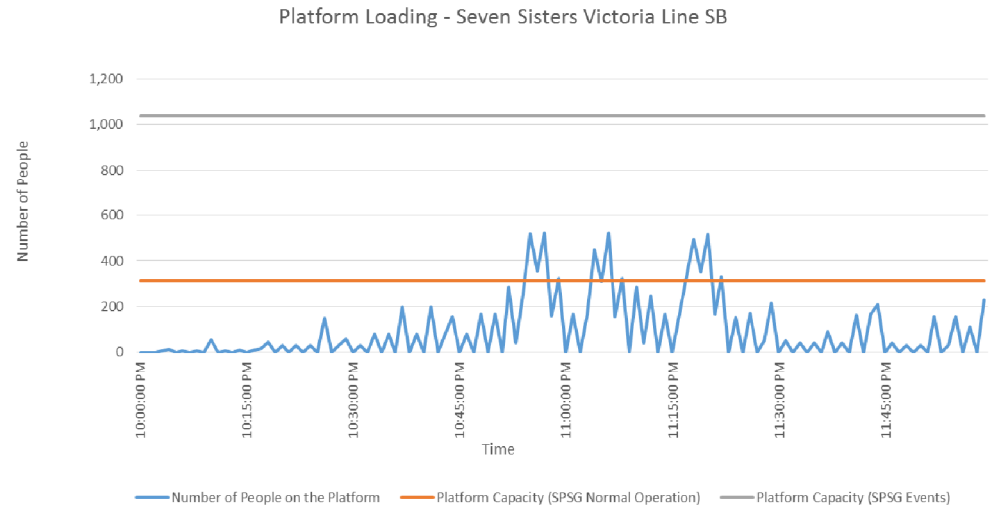
★ Demand at Top of Stairs and Resultant Queues



■ Flow at Top of Stairs — Queue at Top of Stairs — Capacity Constraint

Seven Sisters i Departures i Platform SB

- Å The SB Victoria Line Platform will be fed by two entry points at either end of the Platform.
- Å Under SPSG Special Events guidance, the Platform has capacity for approximately 1,000 people. As indicated in this assessment, the peak anticipated occupancy is 520 passengers.
- Å Whilst this suggests that conditions on the Platform during the post-match should operate safely without management intervention, any delay in service of more than two minutes at peak times may require access to be controlled.
- The available capacity on trains takes into account background users and attendees boarding at Tottenham Hale. For all but three periods (22:55, 23:05 and 23:20), it will be possible for all passengers arriving on the platform to board the next train.

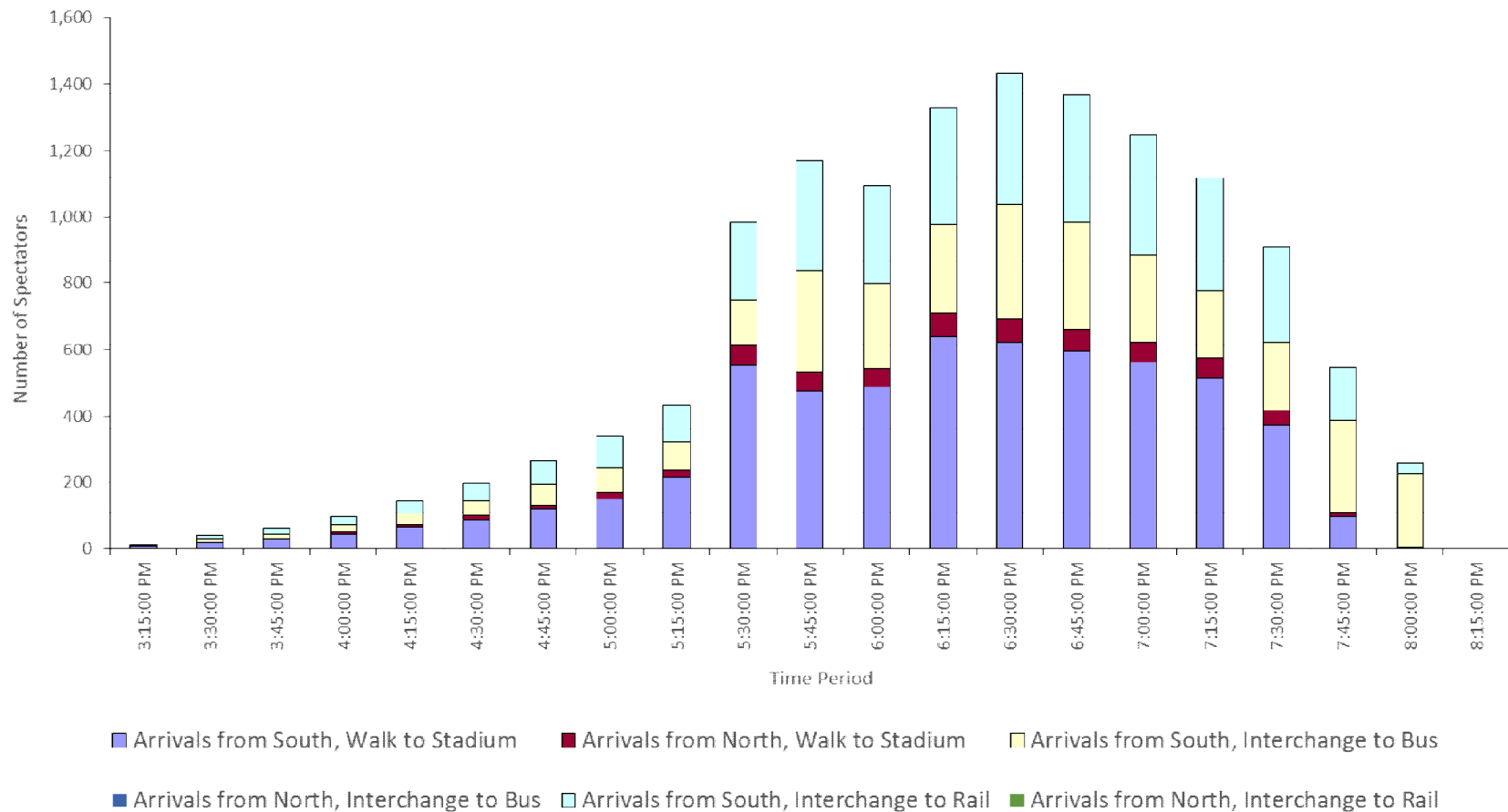




45K Scenario

Seven Sisters - Arrivals

Spectator Arrivals at Seven Sisters during the Pre-Event Period

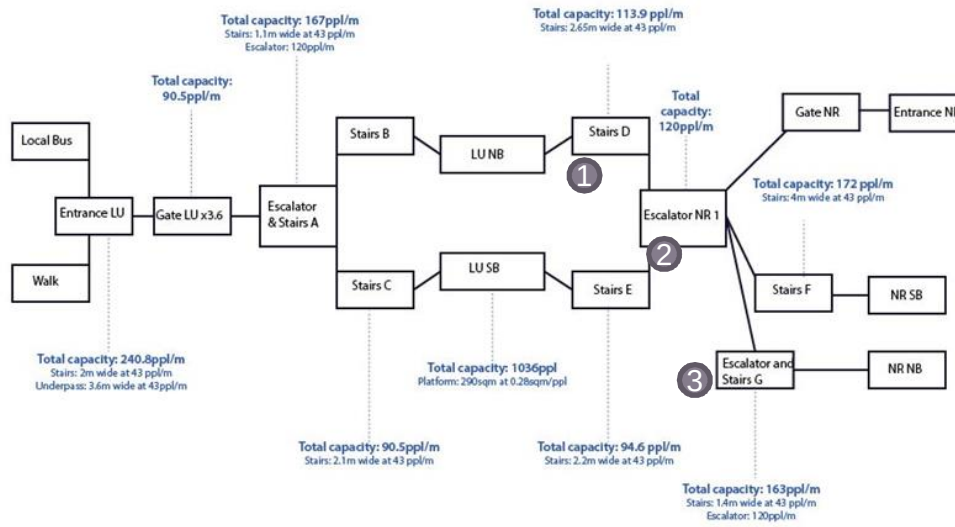


Å 13,050 attendees in total, all arriving on the Victoria Line

- 6,300 exit the station and Walk to the Stadium
- 3,600 interchange to NR trains to White Hart Lane
- 3,150 interchange onto Local Buses to the Stadium

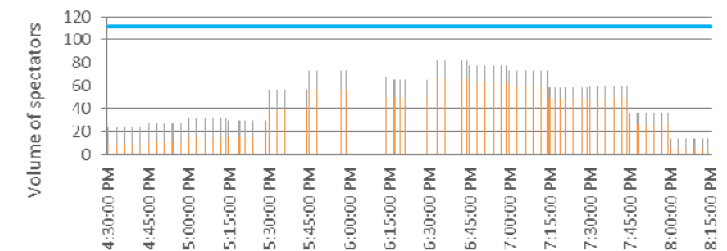
Seven Sisters - Arrivals

- Å During the pre-event period, all station vertical circulation elements provide sufficient capacity to accommodate the background and event-related flows without delay.
- Å This is also the case should passengers choose not to use the stairs where there is an option between escalators and stairs.



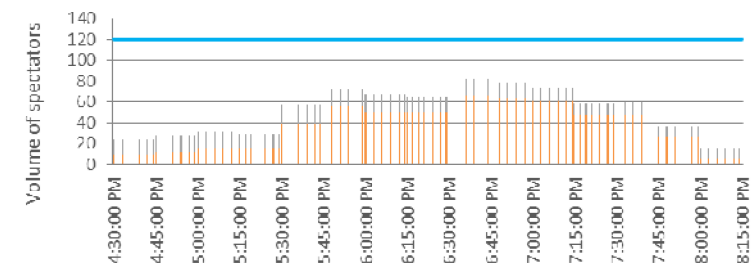
1

Demand at the bottom of Stairs from LU NB



2

Demand at the bottom of Escalator from LU



3

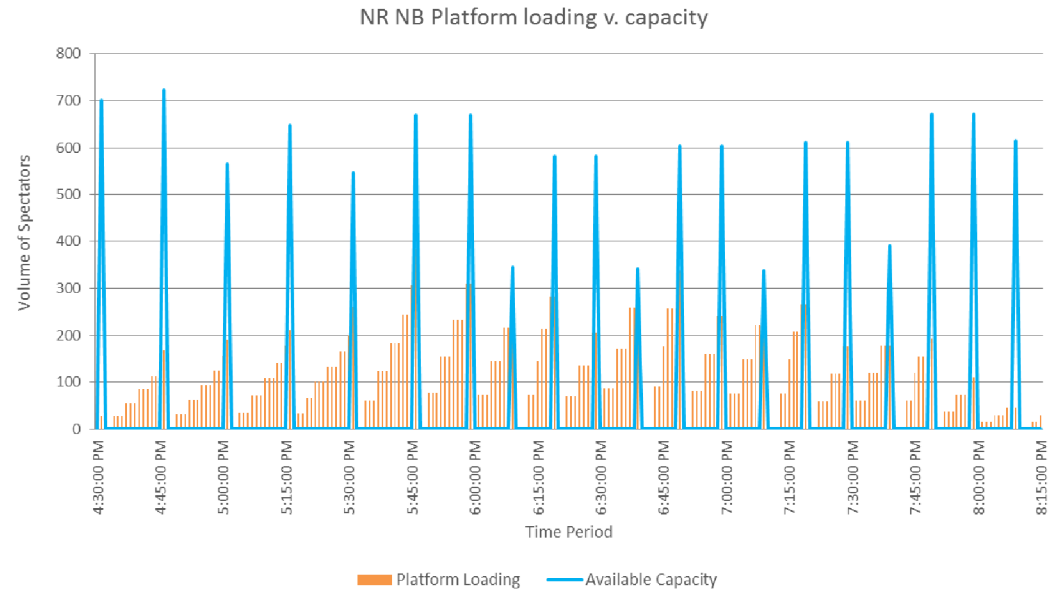
Demand at the bottom of Escalator/Stairs to NR



Time Period
 Interchangers Stadium Interchangers LU Esc + Stairs Esc Only

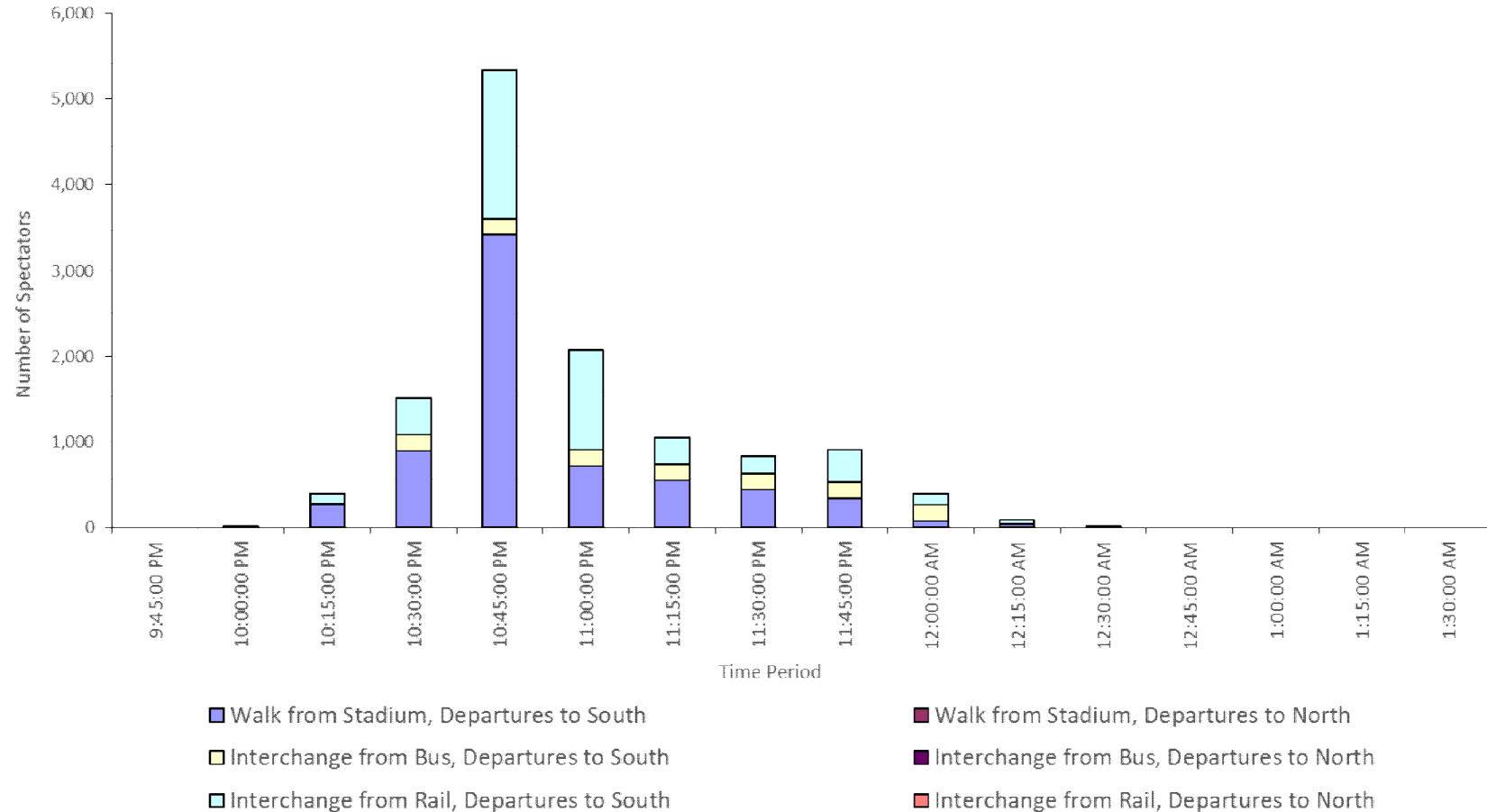
Seven Sisters - Arrivals

- Å Trains arriving at Seven Sisters will already be partially loaded with background travellers and event-goers travelling to White Hart Lane from Central London.
- Å Train capacity is assumed to be limited to 859 pax/train (TfL advice that service capacity at 85% of total train capacity for the purposes of event planning).
- Å All interchanging passengers will be able to board NB trains at Seven Sisters station and platform loading will not exceed 300 people.



Seven Sisters - Departures

Spectator Departures from Seven Sisters during the Post-Event Period

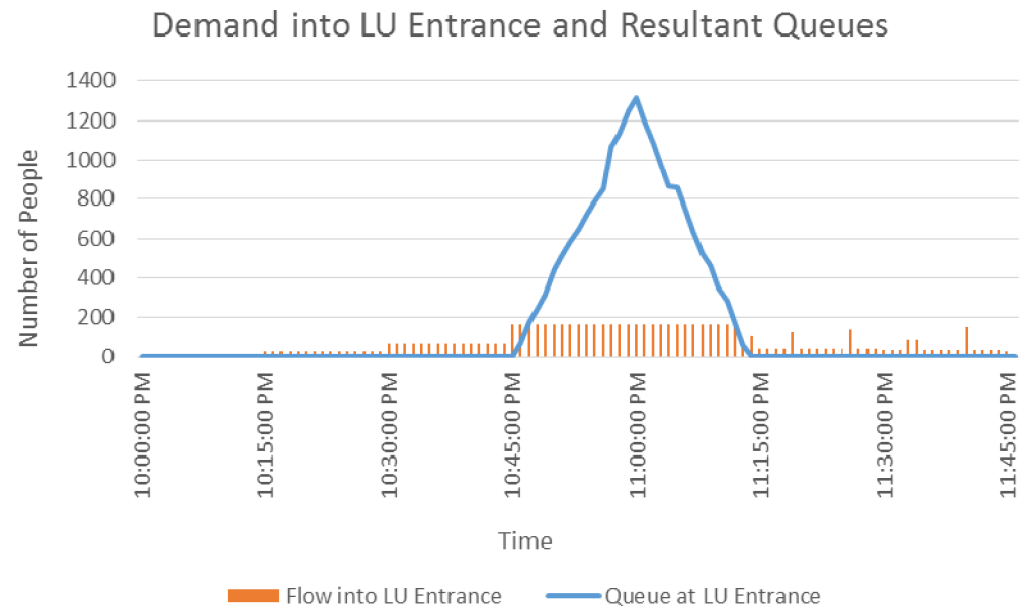


Å 12,600 attendees in total, all departing on the SB Victoria Line

- 6,750 arrive on foot from the Stadium
- 4,500 interchanging from NR train services from White Hart Lane
- 1,350 interchanging from Buses from the Stadium

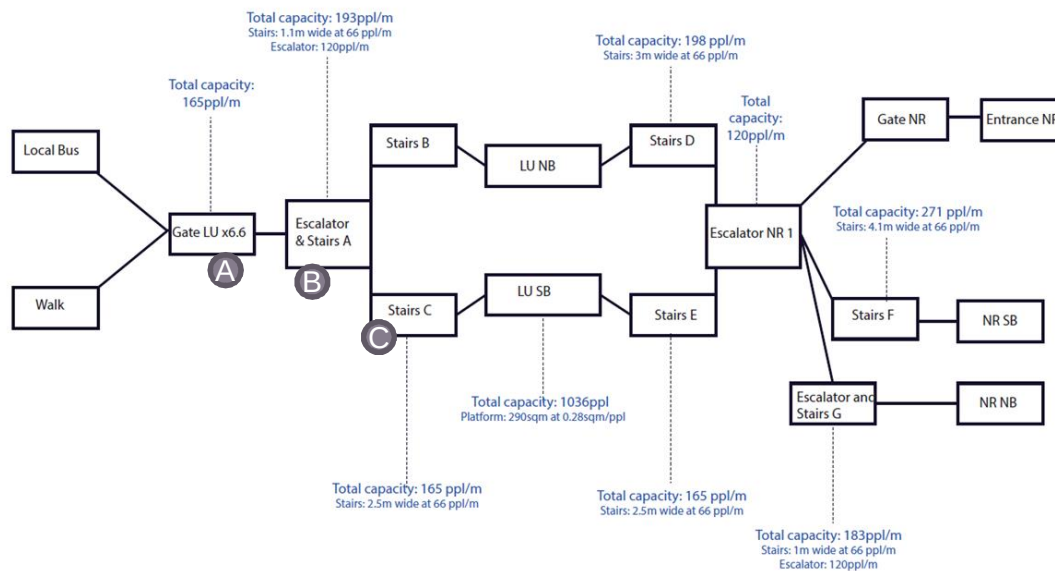
Seven Sisters i Departures i Main Entrance

- Å To ensure that queuing and congestion does not take place inside the station, we have assumed that access to the station from the High Road is regulated.
- Å Therefore, queues will form outside the station i requiring a management plan to be adopted. All street level entry is assumed to be via the northernmost access point.
- Å In this scenario, entry into the station would be regulated throughout at 165 people/minute (equivalent of 6 ATG + 1 WAG gateline). However, given the rate of arrival at the station, queues would form from 22:45 onwards.
- Å Maximum queue length: **1,312 people**
- Å The requirement to accommodate some level of queuing outside the station would be for approximately **28 minutes**.
- Å The maximum delay for any individual would be **8 minutes**.



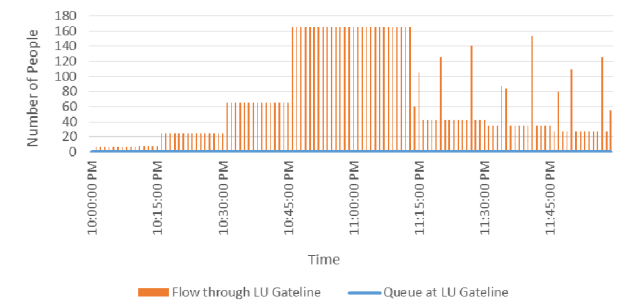
Seven Sisters i Departures i Other station elements

As demand is held outside the station to prevent queue formation inside, once people have entered their flow to the platform should not be impeded.



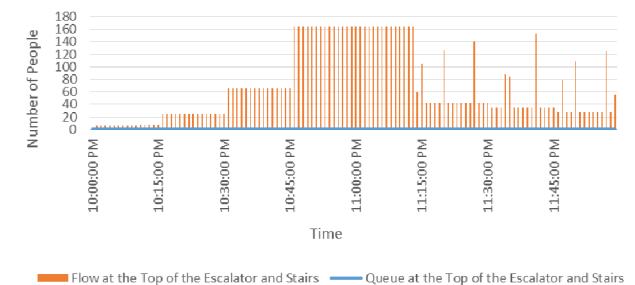
A

Demand at LU Gateline on High Road and Resultant Queues



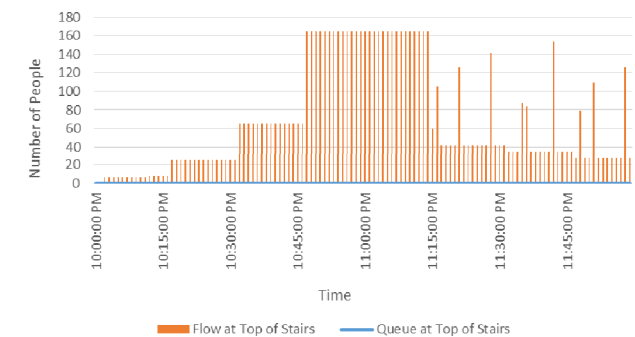
B

Demand at Top of Escalator/Stairs and Resultant Queues



C

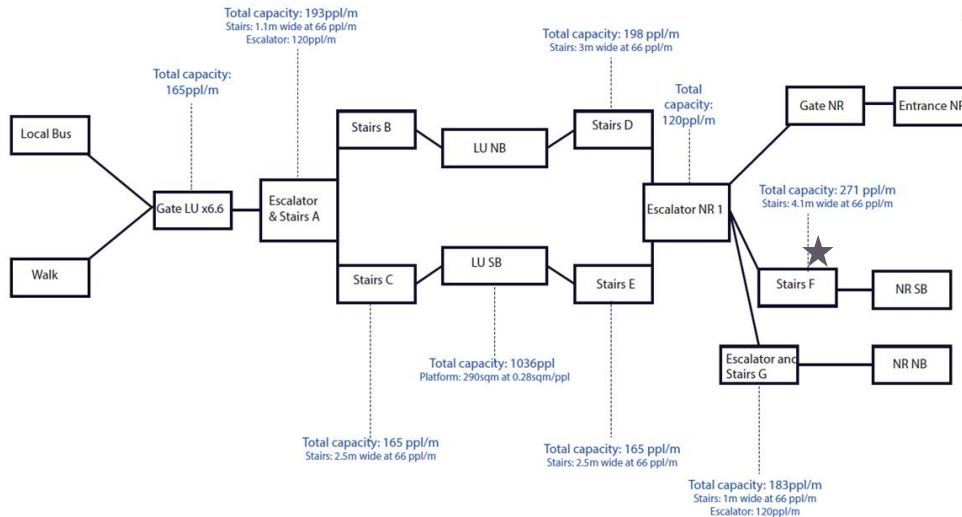
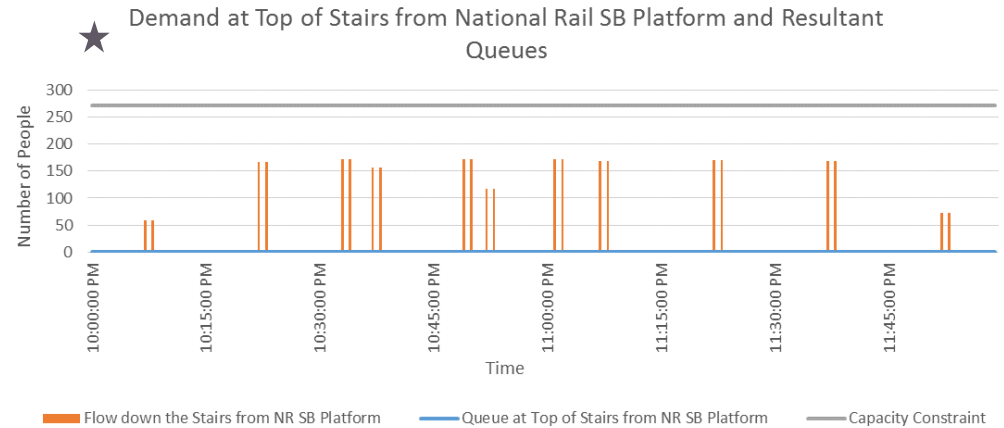
Demand at Top of Stairs and Resultant Queues



Seven Sisters i Departures i Stairs from NR Platform

⚠ Spectators interchanging from National Rail SB services (having boarded at WHL) onto Victoria Line services use different parts of the station to those arriving on foot or by bus.

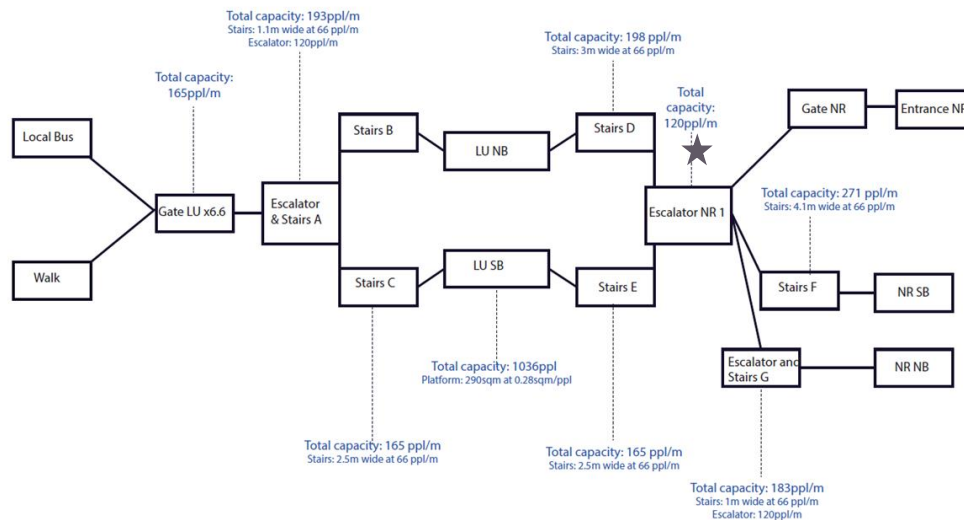
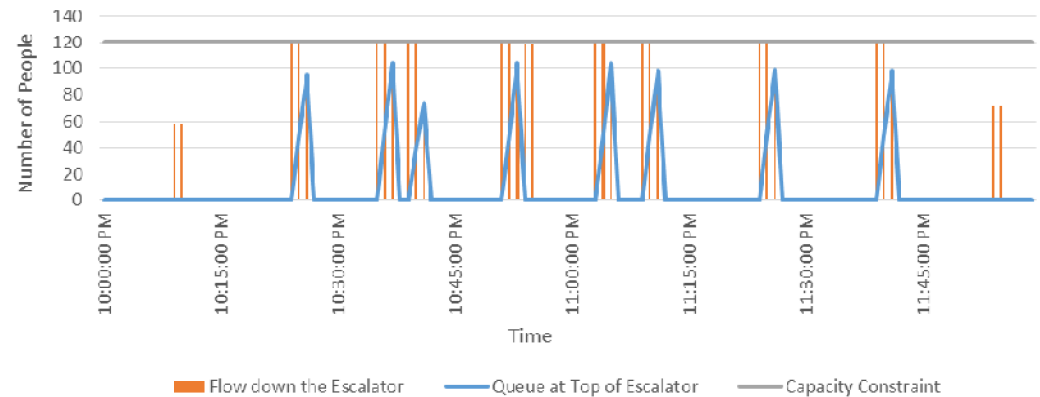
⚠ No queuing is expected.



Seven Sisters i Departures i Escalator from NR to LU

- After passing from the platform through the Network Rail elements of the station, interchangers will descend an escalator to the Victoria Line.
- Small, shuffling queues of circa 100 people are expected.
- Maximum waiting time is no more than 2 mins

★ Demand at Top of Escalator from National Rail and Resultant Queues

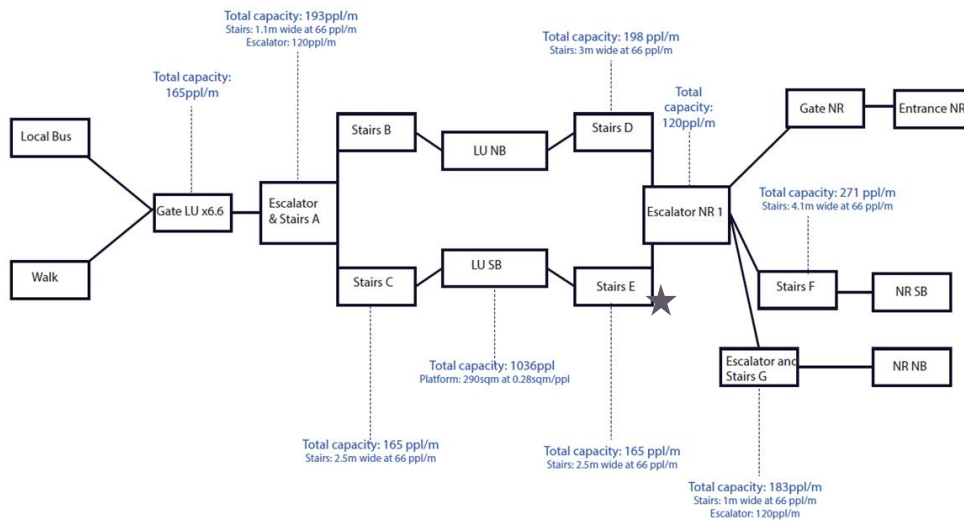
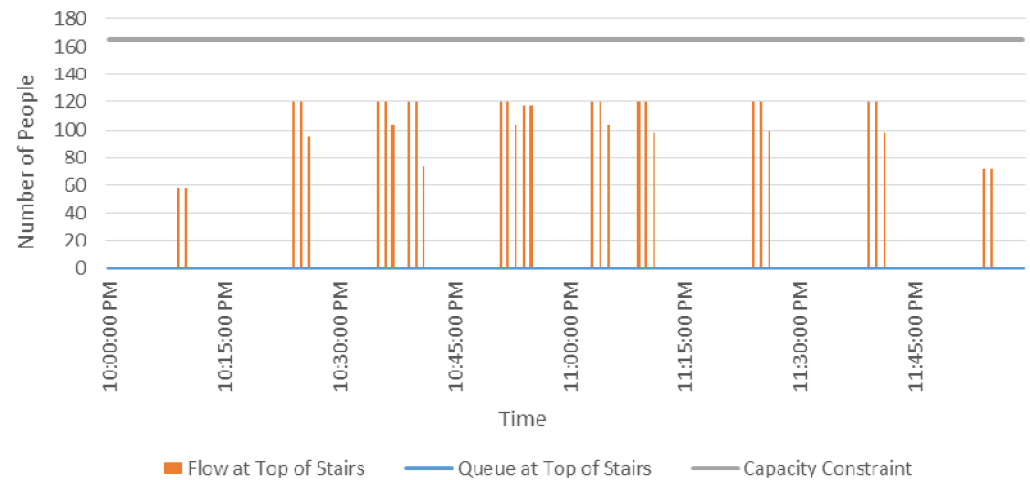


Seven Sisters i Departures - Interchange from NR to LU SB

⚠ At the base of the escalator, passengers descend further stairs to reach the Platform.

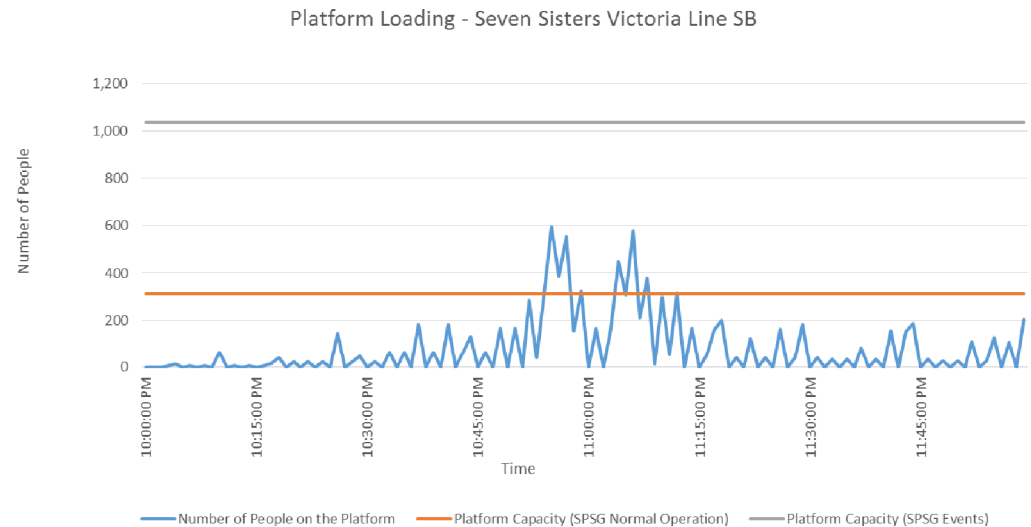
⚠ No queuing is expected.

★ Demand at Top of Stairs and Resultant Queues



Seven Sisters - Departures i Platform SB

- ⚠ The SB Victoria Line Platform will be fed by two entry points at either end of the Platform.
- ⚠ Under SPSG Special Events guidance, the Platform has capacity for approximately 1,000 people. As indicated in this assessment, the peak anticipated occupancy is 600 passengers.
- ⚠ Whilst this suggests that conditions on the Platform during the post-match should operate safely without management intervention, any delay in service of more than two minutes at peak times may require access to be controlled.
- The available capacity on trains takes into account background users and attendees boarding at Tottenham Hale. For all but two periods (22:55, and 23:05), it will be possible for all passengers arriving on the platform to board the next train.



Conclusions

- ⚠ During the pre-event period, the interchange flows between LU and NR is the most challenging flow. This is principally due to the coincidence of high attendee flows and few Northbound services. The assessment of the 55k scenario shows that there will be occasions where some people will be unable to board the first northbound train, however all will be able to board the subsequent train. No such delay exists for the 45k scenario.
- ⚠ During the post-match, assuming that the station infrastructure continues to operate at the same level of efficiency as has been observed in existing conditions, there will be some queuing outside the station on the High Road with entry flows managed to match the internal capacity of the route through to the Victoria Line Southbound Platforms. The analysis indicates that any delays experienced would be a matter of minutes although queues will be formed outside the station for up to 45 minutes.

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