

Northumberland Development Project

Stadium Major Event Day Transport Assessment and Travel Planning 2015

September 2015

**This document should be read in conjunction
with:**

***Northumberland Development Project
Transport Assessment Figures 2015***

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1 Executive Summary

This report is a revised version of a previous report submitted in May 2010 as part of planning application reference number HGY/2010/1000, which was given consent in September 2011. It makes up part of the Transport Assessment and presents forecasts the impact on transport networks of 'Major Events' held at the stadium; specifically football matches, NFL games and concerts.

The football scenarios are the most onerous in terms of numbers of spectators, although this is mitigated by the fact that football fans are generally more familiar with, and make more efficient use of, the transport network than those attending NFL games or concerts.

The transport strategy focuses on removing the barriers to sustainable travel, assisted by the provision of an expanded Event Day Controlled Parking Zone covering 716 hectares. There are also proposals to improve cycling, walking and public transport routes, increasing public transport capacity and using improved communication with spectators to encourage and balance use of the available public transport nodes.

The site is already well served by public transport in the form of buses, National Rail and the London Underground, with Seven Sisters and Tottenham Hale stations, located to the south of the development, acting as key transport interchanges. This level of provision, coupled with the management plans being promoted through the proposed stadium, will help to shape the way in which future spectators will choose to travel.

The proposed stadium and associated improved public realm will enable spectators to disperse much more efficiently than the existing stadium.

Assessments of National Rail and London Underground scenarios have demonstrated that post-event management at the relevant entry points will be required in order to safely regulate access, and a range of proposals will be prepared to allow this to be implemented.

The Coach Travel Strategy identifies a package of proposals that, as a longer-term goal, will enable up to 5% of home supporters to travel by coach, rising over time from the more conservative coach mode share of just 1.5% (weeknight) and 2% (weekend) that is assumed in the forecasts.

The concert scenario forecasts are closer to the limit of acceptable outcomes in terms of queues and delays. A commonly adopted threshold is that queues should last no more than 90 minute (e.g. at Wembley and the Emirates Stadium).

Further mitigation measures may also be agreed as part of the separate concert licensing process and are likely to be an extension of the current and proposed Major Event Day procedures.

This report has demonstrated that, with the proposed mitigation measures and transport management plans in place, there is sufficient capacity to safely and effectively transport the anticipated spectator demand to and from the stadium.

2 Introduction

2.1 Overview

This report is a revised version of a previous report submitted in May 2010 as part of planning application reference number HGY/2010/1000, which was given consent in September 2011. This chapter corresponds to Volume 4 of the previous submission, titled *Stadium Event Day Impact Assessment*.

Tim Spencer & Co have been appointed by Tottenham Athletic Football Club Limited (THFC) to provide Transport Planning advice for the revised plan.

As with the previous submission, the plan involves redevelopment of the Tottenham Hotspur Football Club stadium and surrounding land near White Hart Lane, London, this time with an improved public realm and an improved stadium design, developed with the benefit of new data on the underlying transport network.

Tim Spencer & Co and Movement Strategies have produced a set of reports to assess the impact of the proposed scheme on the surrounding transport and highway networks, in consultation with the London Borough of Haringey (LBH) and Transport for London (TfL).

This report makes up part of the Transport Assessment and presents forecasts of the Major Event Day impact of the proposed stadium and the capacity of the transport networks to carry the required loads.

This report presents the forecasting results for the three Major Event scenarios expected to be held at the stadium:

- Football Matches;
- NFL Matches; and
- Concerts.

Reference is made to a separate figures document provided with the TA, titled *Northumberland Development Project Transport Assessment Figures 2015*.

2.2 Development Specification

The development encompasses a site covering 8.97 hectares and comprises six components:

- The Stadium;
- The Tottenham Experience (including Warmington House);
- The Hotel;
- The Extreme Sports Building;

- The Residential Towers and Flexible Community / Office Space;
- The Community Health Centre.

The proposed stadium is expected to open in 2018. Plans showing the development proposals for the central and southern areas of the site are shown in Figures TA/4 and TA/5 of the external figures document, *Northumberland Development Project Transport Assessment Figures 2015*.

The full Northumberland Development Project development specification can be found in Appendix G.

In addition to the stadium itself, revised detailed highway designs for roads surrounding the stadium been developed by Buro Happold and will be implemented as part of the stadium development. Full details of the plans are included within the submission.

2.3 Structure of this report

This main body of this report presents a general overview of the transport planning issues, describes the transport strategy and the factors that influence it and summarises the forecasting approach and results.

Three stadium use scenarios are presented: football matches, NFL games and concerts. Football is the primary use, and in most cases presents the most onerous transport issues.

The three scenarios are presented in three separate chapters:

- Chapter 7 - Football Forecasts
- Chapter 8 - NFL Forecasts
- Chapter 9 - Concert Forecasts

The three scenario chapters contain some of the key assumptions specific to their respective scenarios; additional key assumptions that apply to all scenarios can be found in **Chapter 6 - Forecasting Approach and Assumptions**. Full descriptions of the forecasting approaches can be found in the corresponding appendices:

- Appendix D - Football Data Book;
- Appendix E - NFL Data Book;
- Appendix F - Concert Data Book.

A number of figures relating to this document are contained in a separate document provided with the Transport Assessment, titled *Northumberland Development Project Transport Assessment Figures 2015*. Figures contained in this separate document use a numbering system of the form TA/1 etc.

3 Existing Conditions

3.1 Site Location and Context

The development site is located in the London Borough of Haringey, northeast of Tottenham town centre and is bounded by the A1010 High Road (to the west), Northumberland Park (to the north), Worcester Avenue (to the east) and Park Lane (to the south). Paxton Road previously ran through the centre of the site and linked the High Road to Worcester Avenue. The location of the site (at a strategic and local level) can be seen in the separate figures document, *Major Event Day and Non-Major Event Day Transport Assessment Figures 2015* Figure TA/1. The local setting is shown in Figure TA/2.

The development site is currently split into three zones:

- The southern area (south of Paxton Road) is broadly made up of the THFC Stadium and associated facilities
- The middle area (north of Paxton Road) comprised the Wingate Trading Estate and consisted of light industrial units, offices and start up business units; and
- The northern area (south of Northumberland Park), which was predominantly light industrial and warehousing units.

The three site areas are shown in Figure TA/3.

3.2 Existing Stadium

There has been a stadium on the site for over one hundred years. The current stadium, with a capacity of 36,300, was constructed in 1982. There are around 25-30 matches per year, most of which fill the stadium close to capacity. Under Premier League rules, the Club is obliged to provide 5% of its stadium capacity (1,815 seats) for the use of away supporters. The current structure of the stadium is such that this requirement results in an actual provision of around 3,000 seats.

The stadium currently provides little in the way of event day facilities (such as bars or restaurants), nor does it provide entertainment to attract or retain spectators before or after the event. As a result, spectators arrive in the stadium building close to the start of the event and leave soon after the end.

3.3 Existing Movement Networks

3.3.1 Pedestrian

All of the streets surrounding the development site are accessible to pedestrians and have footpaths on both sides with a number of crossing facilities. Pedestrian crossing facilities on High Road are provided at the junctions with Northumberland Park, White Hart Lane and Park Lane, as well as at other locations along the street.

Pedestrians can access the site from all of the surrounding roads, including High Road, Park Lane, Paxton Road, Northumberland Park and Worcester Avenue. The main vehicle access to the stadium is provided via Bill Nicholson Way.

Facilities including retail, community facilities and bus stops are available on High Road within 5 minutes' walk of the site. White Hart Lane Station is within 10 minutes' walk of the site and a number of other retail, community and transport facilities (including Seven Sisters and Tottenham Hale stations) are situated on High Road within 30 minutes' walk of the site.

3.3.2 Cycling

There are two cycle routes adjacent to the site: one route runs east-west along Park Lane to the south of the site and connects from Watermead Way in the east to Green Lanes in the west; and the other provides a local north-south connection and along Worcester Avenue towards Edmonton in the north. Many locations within Haringey and surrounding boroughs to the east are able to reach the site within a 20-minute cycle journey.

There is ample space for cycle parking within the local area. Cycles were observed chained to railings, lamp columns and street furniture.

3.3.3 Rail

White Hart Lane, Bruce Grove, Seven Sisters, Northumberland Park and Tottenham Hale stations can all be accessed from the site. These stations are located in Travel Card Zone 3, National Rail services are currently operated by Abellio and London Overground. Seven Sisters and Tottenham Hale Stations are also served by the London Underground Victoria Line.

White Hart Lane is the closest station and is approximately 6 minutes' walk from the site. Bruce Grove station is one stop south of White Hart Lane Station and is 1.1km south of the stadium. Seven Sisters is one stop south of Bruce Grove Station, and approximately a 2.3km from the stadium. Northumberland Park is the second closest station, and is 0.6km to the east of the stadium. Tottenham Hale is approximately 2.2km to the south.

The locations of the nearby stations are shown in Figure TA/7 of the external figures document.

3.3.4 Underground

The closest London Underground stations to the site are Seven Sisters and Tottenham Hale, which are both located approximately 25 to 30 minutes' walk to the south. Both stations are served by the Victoria Line and have connections to the national rail network.

The locations of the Victoria Line stations relative to the site are shown in Figure TA/8 of the external figures document.

3.3.5 Bus

The development site is well served by bus routes from a number of neighbouring areas. Most routes can be accessed from bus stops on High Road although a few can also be accessed from Lansdowne Road to the south and Shelbourne Road to the east. Most of the bus routes connect the site with Seven Sisters rail and Underground station and central London.

The bus routes serving White Hart Lane are shown in the TfL Spider Map in Figure TA/9 of the external figures document.

3.3.6 Vehicles

Vehicle access is currently provided to the site from all of the surrounding roads, including High Road, Park Lane, Paxton Road, Northumberland Park and Worcester Avenue. The main vehicle access to the existing stadium is provided via Bill Nicholson Way.

The site is well located for the strategic road network. To the north, High Road connects with the North Circular (A406) and to the south it connects with the A10 at Bruce Grove. The A10 runs from Bishopsgate in the City of London north to the M11 south of Cambridge.

3.4 Spectator Questionnaires

Spectator surveys were carried out in 2003, 2007 and 2008 to allow THFC to assess how people travelled to and from matches, the kinds of facilities that people used before and after a match and those that would encourage them to spend longer in the area.

The results of the earlier surveys highlighted a perception amongst spectators of the stadium being inaccessible by public transport. As a result, in 2003, up to 62% of spectators were travelling to matches by car. Following the 2003 survey, an event day Controlled Parking Zone was introduced. In addition, there were matchday increases in local train frequencies and a programme of transport information provision was introduced through the THFC website. By 2008, the results showed that these measures had resulted in increased use of public transport and a decrease in car travel (reduced to between 36% and 43% for the final leg of the journey).

3.4.1 Mode Split

Mode splits were measured separately for weekday and weekend matches, with the 2008 results shown in Table 3-1 and Table 3-2, for weekdays and weekends respectively.

Mode	Arrival Mode		Departure Mode	
	People	%	People	%
Underground	4,321	12.0%	6,043	16.8%
Rail	12,626	35.1%	10,916	30.3%
Bus	4,179	11.6%	2,451	6.8%1
Car	13,054	36.3%	14,901	41.4%
Cycle	59	0.2%	58	0.2%

Coach	366	1.0%	277	0.8%
Taxi	357	1.0%	413	1.1%
Walked all the way	728	2.0%	547	1.5%
Motorcycle + Others	311	0.9%	396	1.1%
Total	36,000	100.0%	36,000	100.0%

Table 3-1 Weekday mode splits

Mode	Arrival Mode		Departure Mode	
	People	%	People	%
Underground	4,700	13.0%	6,632	18.4
Rail	11,213	31.1%	10,613	29.5%
Bus	3,735	10.4%	2035	5.7%
Car	14,969	41.6%	15,558	43.2%
Cycle	96	0.3%	96	0.3%
Coach	72	0.2%	24	0.1%
Taxi	292	0.8%	218	0.6%
Walked all the way	707	2.0%	536	1.5%
Motorcycle + Others	217	0.6%	287	0.8%
Total	36,000	100.0%	36,000	100.0%

Table 3-2 Weekend mode splits

3.4.2 Arrival and Departure Profiles

Around 85% of spectators arrive at the stadium in the 45 minutes before the start of the match, with up to 40% of spectators arriving in the final 15 minutes. There is a little variation depending on the day of the week, with the Sunday match survey showing slightly earlier arrivals. The arrival profiles are shown in Figure 3-1.

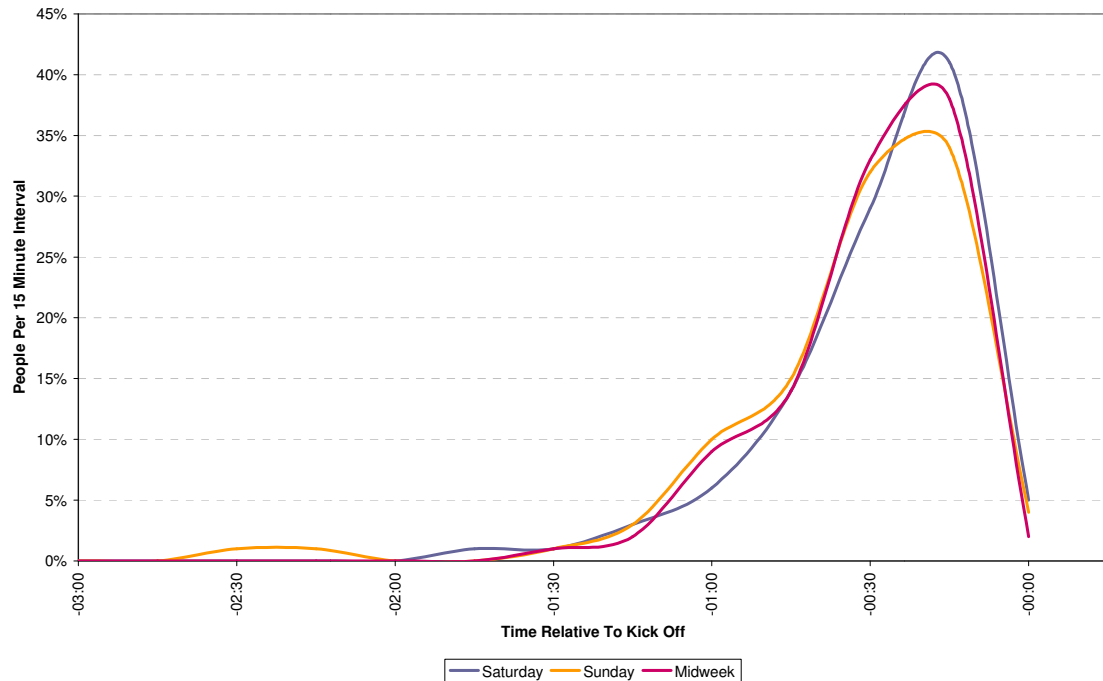


Figure 3-1 Arrival profiles

Departures show a similar pattern: around 85% leaving within the 45 minutes of the final whistle, with relatively few leaving before or after that time. The departure profiles are shown in Figure 3-2. No data is available for the Sunday match survey.

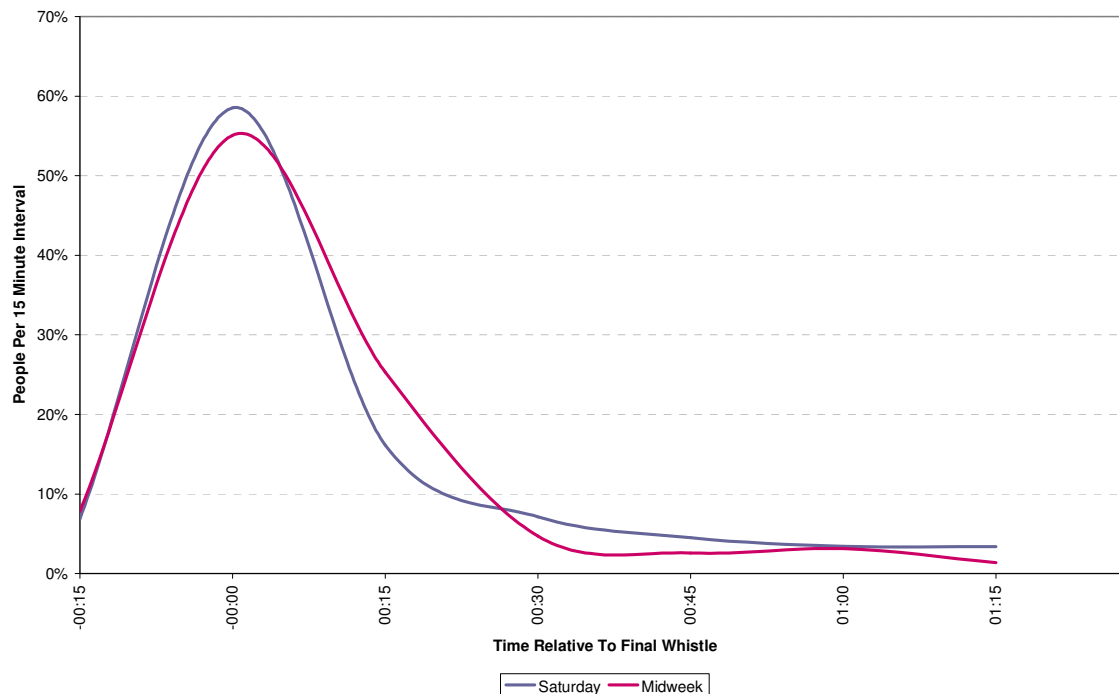


Figure 3-2 Departure profiles

3.5 Transport Surveys

3.5.1 Pedestrian

Pedestrian surveys were undertaken to understand the numbers of spectators and the direction of flow that could be expected at different parts of the local pedestrian network. The spectator analysis suggests that event day visitors to the site are willing to walk greater distances than are usually considered in public transport accessibility analysis.

3.5.2 Cycle

Surveys of the existing cycle infrastructure in 2010 did not find any formal cycle stands on site. Instead, people chained bicycles to railings, lamp columns and street furniture.

The cycle routes within Haringey are shown in Figure TA/11 of the external figures document.

3.5.3 Train

Station and train surveys indicated that mid-week event day services had the highest level of passenger demand, particularly for trains that coincided with the commuter peak. In the post-event surveys some short periods of increased crowding occurred, as would be expected. The results suggest that the mid-week event day represents a worst-case scenario.

3.5.4 Underground

Station and carriage surveys were carried out, for which the busiest times correlated closely with the train surveys.

3.5.5 Bus

Surveys of bus stop boarding and alighting indicated that commuter journeys led to high background demand on weekday evenings. On this basis, the weekday background demand provides suitable worst-case assumption for use in future forecasts. Analysis of Bus Origin Destination Survey (BODS) data has shown that area wide there is considerable capacity on the existing bus network.

3.5.6 Vehicle

High Road is currently closed for up to 30 minutes in the post-match period. The closures are put in place by the MPS in order to maintain separation between home and away fans. The proposed stadium allows better separation of supporters, which is expected to reduce the time for which High Road needs to be closed to traffic.

3.5.7 Parking

The current event day Controlled Parking Zone was implemented in 2014 and covers 221 hectares. A number of parking surveys were undertaken on event days in order to establish both current parking patterns following the introduction of the event day Controlled Parking Zone, as well as the future availability of parking spaces.

3.5.8 Coach Parking

The current situation sees coach passengers dropped off on High Road opposite Cedar Road before the event with the coaches then driven to West Road, where they are parked during the event. After the event, coaches can travel back to Worcester Avenue to pick up spectators. The existing arrangements are able to cope with the demand.

4 Policy

4.1 Introduction

There is a range of National, Regional and Local Policy Documents that outline the transport policy framework for developments. They aim to encourage long-term sustainable development, investment in transport and improved accessibility to non-car modes.

4.2 National Policy

The key national transport policy documents relevant to the proposed development are:

- National Planning Policy Framework (2012)
- Transport Evidence Bases In Plan Making And Decision Taking (2015)
- Travel Plans, Transport Assessments And Statements In Decision-Taking (2014)
- A written statement by the Secretary of State for Communities and Local Government (2015)

4.2.1 National Planning Policy Framework (2012)

The National Planning Policy Framework specifies a requirement for local authorities to promote sustainable transport by supporting development that facilitates the use of sustainable of transport. It also mandates that planning policies should aim for a balance of land uses in order to minimise journey lengths.

4.2.2 Transport evidence bases in plan making and decision taking (2015)

This document imposes requirements on the process Local Authorities must go through in preparing their Local Plan. It aims to ensure that the Local Plan promotes sustainability, accessibility, choice, safety and economic vitality.

4.2.3 Travel plans, transport assessments and statements in decision-taking (2014)

This document briefly states the core principles of transport assessment, summarising the more detailed guidance provided the Department for Transport, described in Section 4.5.

4.2.4 Statement by the Secretary of State for Communities and Local Government (2015)

A planning update was issued in a written statement by the Secretary of State for Communities and Local Government on 25th March 2015. It adds a requirement to the National Planning Policy Framework that local parking standards should only be imposed where there is “clear and compelling justification that it is necessary to manage their local road network”.

4.3 Regional Policy

There are two key regional policy documents relevant to transport for developments: the first is the London Plan, which is the strategic spatial planning document for London, the second is the current Mayor's Transport Strategy.

4.3.1 The London Plan (2015)

The London Plan was first published in 2004. It has been maintained and updated periodically since, most recently in March 2015. It provides a framework to assess future development in London with regard to the social, economic and environmental considerations. Throughout, it stresses the necessity for an integrated approach to development that enhances London's economic vitality and promotes public and other sustainable modes of transport. The most relevant policies include:

- Policy 2.8 - Outer London Transport
Stressing that the Mayor and London boroughs should strive for improved interconnectivity between transport modes, enhanced accessibility and improved conditions for sustainable modes of transport.
- Policy 4.5 - London's Visitor Infrastructure
Requiring that new visitor accommodation be provided in town centres and in locations with good public transport access.
- Policy 4.6 - Support for and enhancement of arts, culture, sport and entertainment
Supporting development of sport and entertainment venues on sites with good public transport access.
- Policy 6.9 - Cycling
Requiring that developments should provide cycling facilities and good quality cycling infrastructure with links to the existing network.
- Policy 6.10 - Walking
Requiring that developments provide high quality pedestrian environments.
- Policy 6.11 - Smoothing Traffic Flow and Tackling Congestions
Encouraging car sharing schemes and improved walking and cycle routes.
- Policy 6.13 - Parking
Specifying maximum parking standards and provision of electrical charging points, disabled spaces and cycle parking.

The policies contained in the London plan relate directly to developments as well as providing guidance to London boroughs for the preparation of Local Development Frameworks.

In May and June 2015, a consultation was conducted on further minor alterations to the London Plan's housing and parking standards. The only transport-related alteration proposed was to allow more generous parking standards for outer London boroughs with low Public Transport Accessibility Level (PTAL) scores. The alterations are due to be considered by an independent planning inspector and, if approved, will be adopted in October 2015.

4.3.2 Mayor's Transport Strategy (2010)

The latest version of the Mayor's Transport Strategy, published in 2010, was developed from a 2008 document, 'Way to Go'. It proposed enhanced capacity, connectivity and integration. It is a statutory document, developed alongside the London Plan and the Economic Development Strategy to support and shape the economic and social development of London.

The Mayor's Transport Strategy places considerable emphasis on regeneration and promotes the concept of 'streets for all', whereby street spaces are managed to maximise attractiveness and integration of sustainable transport modes. It aims in particular for modal shift towards cycling, walking and public transport.

4.4 Local Policy

The London Borough of Haringey has adopted a Unitary Development Plan and is in the process of developing a Local Development Framework. In terms of transport, LBH also has a range of other policies that aim to deliver more environmentally sustainable transport.

4.4.1 Haringey Local Development Framework (2006)

Haringey's Development Plan is composed of three documents: the London Plan (discussed above), the Haringey Local Plan, which was adopted in 2013, and the Saved Unitary Development Plan, which carries over a number of previously applicable policies.

The Local Plan is the local implementation of the regional and national guidance. It contains 18 policies, the most relevant of which is 'SP7: Transport', which commits the Council to ensuring that major developments are integrated with the transport network and to promoting public transport, walking, cycling and car sharing.

The relevant policies in the Saved Unitary Development Plan are:

- UD1: Planning Statements

Transport assessment should be produced where a development is likely to have a significant transport impact, and a Travel Plan will be required for employment, retail, education, leisure and service uses where there will be a significant traffic impact.

- M10: Parking for Development

Development proposals will be assessed against the development framework's defined parking standards.

Proposals that do not meet these standards will not normally be permitted.

Several of the policies that applied to the previous submission in 2010 were not saved when the Local Development Framework came into force. They were instead covered by other guidance or consolidated into new policies.

4.4.2 Additional LBH Policies

As part of the planning process, a series of other documents are produced by LBH, including Supplementary Planning Guidance nodes. Supplementary Planning Guidance 7a, which covers vehicle and pedestrian movement and highways and parking standards is still in place. Supplementary Planning Guidance documents 7b and 7c, which were in place at the time of the previous submission, were withdrawn in 2014 in favour of more recent documents such as the National Policy Framework, the London Plan, and the Local Plan.

4.5 Transport Policy

Transport for London has maintained a Transport Assessment Best Practice Guidance document since 2006. It is now maintained as a web-based document that is subject to iterative change. It covers specific methodology needed to demonstrate that developments fulfil the requirements of the London Plan.

4.6 Policy Overview

The policies and guidance documents are broadly coordinated. Local and regional policies reflect the general aims of national guidance but are more specific and relevant to the local setting.

For developments, the policies promote two overarching aims for transport: to promote non-car travel and to maintain free-flowing road networks.

4.6.1 Promoting Non-Car Travel

The ambition to reduce car travel and promote non-car travel is expressed in the policies through a number of recommended measures:

- Encouraging developments that are easily accessible by pedestrians, cycles and public transport;
- Encouraging local developments with local appeal that can enhance the numbers of local trips;
- Ensuring safe and secure pedestrian and cycle routes to and from developments and ensuring that existing routes are protected and improved;
- Encouraging development in areas with good public transport links;
- Actively promoting public transport through the Travel Plan;
- Application of parking standards and well-designed parking controls.

The transport strategy for the site places a significant emphasis on promoting non-car modes. Parking will be heavily constrained, the pedestrian environment will be improved and cycle parking provided. The Club will commit to various obligations through a new Section Agreement. These measures are discussed in more detail later in this assessment.

4.6.2 Minimising Road Network Impact

The policies stress the importance of maintaining a free-flowing road network. This is achieved by:

- Reducing the need for car travel;
- Enabling developments in well-chosen locations that minimise the need for car travel;
- Taking necessary measures to reduce the road network impacts.

5 Transport Strategy

5.1 Overview

Considerable progress was made with the implementation of the THFC transport strategy between 2010 and 2015.

The basic public transport infrastructure is already in place, with five railway stations (including Bruce Grove which is only lightly used) and up to 144 buses per hour serving the stadium area. There has been significant investment over recent years, particularly to the Victoria Line, which has already improved the quality and frequency of public transport serving the area. There is more investment to follow.

Many of the transport improvements planned in 2015-2018 were not committed to in 2010, when the planning application was determined by the LBH Planning Committee. The planned and proposed service improvements envisaged in 2010, along with renewed investment by TfL, Network Rail and Haringey Council, will deliver more than enough capacity for the increased number of supporters visiting the proposed stadium.

There has already been a significant shift in travel patterns to the stadium area. In 2003, over 60% of fans arrived by car. By 2014, for weekend fixtures, that figure had reduced to 41%, and the intention is to bring that number down to 23% for football matches in future.

The proposed stadium will be actively promoted as a 'Public Transport Destination', as has been achieved at Wembley Stadium. This will be achieved by service improvements, new shuttle bus links, better pedestrian connections, real-time travel information points, clear signage and regular transport updates on the THFC website, in printed programmes, and directly to fans from several sources, as set out in the Stadium Travel Plan and secured through a Section 106 agreement.

The Spurs Travel Plan was introduced in 2008 and was very highly rated when independently assessed by the Campaign for Better Transport. It forms the basis for all transport and station improvements upon stadium completion.

5.2 London Underground

The completion of the Victoria Line upgrade has already delivered faster and higher capacity trains, bringing major service improvements and ending the disruption that many supporters have faced for years.

London Underground will shortly introduce their new 'World Class' timetable which will make the Victoria Line the highest frequency railway in the UK. Trains will no longer stop short at Seven Sisters and all trains will run the full length of the line to Walthamstow Central via Tottenham Hale. The Victoria Line trains will run every 100 seconds each way before a midweek fixture.

5.3 London Overground

The White Hart Lane Station train service devolution to London Overground in 2015 will deliver high quality rolling stock (similar to the Metropolitan Line trains) and station improvements in a similar fashion to the North, East and West London Overground line improvements.

5.4 National Rail

The Network Rail scheme to introduce '4 tracking' in sections between Tottenham Hale and Broxbourne was at the earliest stage of project development in 2010. A '3 tracking' scheme is now being advanced for the section including Tottenham Hale and Northumberland Park Stations. This entails the reconstruction of Northumberland Park Station and significant frequency improvements for services to Stratford. Construction works should be complete well before the proposed stadium is finished. The current level crossing will be removed and replaced by an improved footbridge.

More efficient use will be made of White Hart Lane and Northumberland Park stations in future. The Club will work with the two new train operating companies to further improve Major Event Day services and make better use of the 8-car service capacity with new queue management systems in place assisted by Club 'Green Team' stewards.

5.5 Interchanges

Seven Sisters Station provides the key interchange between the tube and rail lines. In future, more use will be made of Tottenham Hale Station as well.

In 2010, there were no specific proposals for the improvement of the Seven Sisters Station interchange, whereas the plans are now well developed. The first part of the improvements, consisting of additional stairs between the southbound National Rail and the Victoria Line platforms, have already been completed. Further work will be undertaken as part of the London Overground devolution to improve the quality of the station interchange facilities for all passengers.

The upgrade of the Tottenham Hale Station was also at the earliest stage of development in 2010. The project now has full planning and funding approval and construction will commence in the near future.

In 2010, there were no proposals for White Hart Lane Station improvements. This project is now being developed by TfL, Network Rail and Haringey Council.

The passenger facilities at White Hart Lane Station will be improved by the construction of a new ticket hall below the central part of the station, wider platform access stairs plus two additional staircases to be made available on Major Event Days. A planning application for these is expected to be submitted later in 2015. Plans are being promoted by Haringey Council to link the station with the stadium by a new, more direct, route via Moselle Square.

5.6 Road Network

The removal of the Tottenham Hale Gyratory was a TfL Business Plan Commitment in 2010, but the detail was not fully known. By 2015, the project was substantially complete. The final stage involved the construction of a major bus station

at the Tottenham Hale transport interchange. The gyratory removal provides a simple 2-way traffic connection between the station and the stadium area.

5.7 Parking

The THFC commitment to an expanded Major Event Day Controlled Parking Zone, secured through a Section 106 agreement, will minimise the traffic impacts on local residents and businesses and will further discourage car use, subject to implementation by Haringey and Enfield Councils. The Haringey Controlled Parking Zone scheme is now two-thirds complete and the Enfield scheme will follow in the next few years.

5.8 Shuttle Buses

As described and secured through a Section 106 agreement, the Club will operate two new shuttle bus services. The first service will run from Alexandra Palace station via Wood Green. The model for this service is the Allianz Park service, which carries more than 3,000 Saracens supporters before and after games. A second service will provide a high frequency link between the upgraded Tottenham Hale interchange and the stadium area for premium ticket holders. This will relieve the pressure on the scheduled bus services to and from the Victoria Line at Seven Sisters Station.

5.9 Bus Diversions

Road closures have previously been in place for some 30 minutes following matches, requiring buses to be diverted in the post-match period. Highway works on junctions, planned by LB Haringey in 2010 in order to reduce the duration of closures, have now been completed, and TfL Buses have previously undertaken to reduce the bus diversion time. The result is that diversions are expected to end, in future, around 15 minutes after the road closure is lifted. There will also be increased use of the W3 and the new high frequency shuttle bus services that connect the stadium to the Piccadilly Line, as an alternative to using Seven Sisters.

The reconfiguration of seating for away supporters will make it easier to manage interactions between home and away supporters, reducing the need to divert public transport services, and the Club will continue to fine-tune its operation to improve the service for supporters and minimise disruption to local residents.

5.10 Pedestrian Network

The multiple stadium access points and the extensive public realm will make it easy for spectators to reach their preferred arrival and departure routes, and will provide easier access to alternative venues in the local area pre- and post-Major Event.

Pedestrian flows will be quickly dispersed into the wider street network, unlike stadiums such as Wembley, where major pedestrian flows dominate the local area. Carefully targeted investment in the local area will aim to assist the organised dispersal of pedestrian movements after a game. Measures include CCTV at strategically important locations, the removal of unnecessary obstructions in footways, comprehensive signage providing real time travel information and effective

stewarding. Further information on the pedestrian environment in the locality of the stadium is provided by the Pedestrian Environment Review System (PERS) Audit included within this submission.

Historically, the number of people choosing to walk or cycle has been low compared with many other football stadiums. This is partly because the stadium is served by a very high quality bus network, but may also result from previous anxieties regarding personal security and bike theft.

Around 5% of spectators live within 5km of the stadium. This suggests scope for a higher share of journeys to be made by cycle or on foot. This proportion could grow further with prioritisation to local residents in the season ticket allocation system, as happened at the Emirates Stadium, where 6.5% (or over 3,500) spectators now walk. Under the Section 106 agreement, approximately 5,000 local residents who register their interest with the Club will be offered season tickets with a preferential choice of seating, after existing season ticket holders' seats have been allocated.

5.11 Cycling

The construction of the new cycle superhighway, CS1, that connects the stadium (at Church Street) to Liverpool Street commenced in July 2015. The route avoids major roads and will create a new travel option for supporters who live south of the stadium. A large cycle park has been built in the northern development next to Lilywhite House.

Approximately 5% of spectators live within 5km of the site. Along with improved facilities and promotion of their availability, this provides scope for increased cycling mode share.

The Club will actively promote cycling by providing spectators with information on cycle routes and on the availability of secure cycle parking. The aim is to provide these in locations that can be easily accessed from each of the major approach routes that can also suit the needs of other buildings in the local area, such as stations, community buildings, recreational areas and the new retail and office developments.

The cycle strategy will be focussed on working with LB Haringey to develop a good provision of dispersed cycle parking facilities that can be securely managed on Major Event Days, minimising the interaction of cyclists and dense crowds.

THFC aim to:

- Actively promote cycle access to the local area on Major Event Days
- Provide Non Major Event Day cycle parking facilities
- Support the provision of dispersed cycle parking at a variety of locations within the local area that would also fulfil a Non Major Event Day demand for cycle parking

Full details of the cycle strategy will be discussed with LB Haringey and secured through a Section 106 agreement.

5.12 Travel Behaviour

THFC has undertaken extensive surveys of travel behaviour and established a good working partnership with Transport for London, Abellio, London Underground, London Overground, the bus operators and Haringey Council. In January 2008, THFC implemented a matchday travel plan strategy, in close working partnership with all the key transport operators, to support the introduction of the existing Controlled Parking Zone. This has led to both direct service improvements and a significant shift in travel patterns to the stadium.

Full Major Event Day and Non Major Event Day travel plans have been the subject of ongoing discussions with the London Borough of Haringey and TfL, and have been submitted as part of the planning application.

For comparison, reports on the monitoring programme at the Emirates Stadium have been provided in Appendix C.

5.13 Attraction and Retention

In future, all supporters will be actively encouraged to arrive earlier and stay later in the stadium area to take full advantage of the new facilities in and around the redeveloped stadium and to enjoy a new post-match events programme, reducing the pressure on transport services.

5.14 Mitigation Measures

A number of the mitigation measures that were planned in the 2010 submission have since been implemented, including:

- Updating and modifying the car parking restrictions in local streets on Major Event Days;
- Additional traffic suspension on Worcester Avenue

A range of additional measures are planned to encourage non-car travel and mitigate the impacts of Major Event Days.

The key measures are:

- Making improvements to footways and signage, providing enhanced facilities for pedestrians between the stations and stadium area.
- Actively promoting and prioritising tickets to local residents;
- Actively promoting and encouraging away fans to travel by coach, including implementation and management of segregated coach parking when necessary.

A number of mitigation measures, in particular, will be secured through a Section 106 agreement. These include:

- Implementation of the Stadium Travel Plan. Including the following components:
 - The Home Supporter Travel Initiative – a programme of communication with Home supporters to encourage non-car modes;
 - Retention of Visitor Measures – a programme of pre- and post-match entertainment (included in Appendix B).

- Achieving a designated modal split target of 77% spectators using non-car modes;
- Further extension of the event-day Controlled Parking Zone if required to achieve the mode split target;
- Implementation of a Major Event Day Monitoring Programme;
- Two shuttle bus services connecting the stadium to Alexandra Palace and Tottenham Hale stations;
- Improved signage for pedestrians extending as far as the transport interchanges;
- A Cycle Superhighway terminus;
- Provision of electric charging points at a number of the available car parking spaces.

6 Forecasting Approach and Assumptions

6.1 Overview

Demand and capacity forecasts for the development are calculated by estimating unconstrained demand, before applying capacity forecasts for the relevant transport modes. This process is illustrated in Figure 6-1.

Figure 6-1 Forecasting Process

The demand forecasts are based primarily on the numbers of spectators moving between identified origins and destinations in the local area (the 'origin-destination matrix'), and the timings of those movements.

The origin-destination matrix is in turn based on four primary inputs:

- Spectator numbers;
- Splits between entry and exit points;

- Assignment of spectators to modes of transport; and
- Numbers of spectators spending time in the local area.

The timing of spectator movements is based on:

- Arrival and departure profiles;
- Walking routes; and
- Time spent at local area destinations.

These assumptions, combined, give rise to 'unconstrained' spectator demand, as shown in Figure 6-2.

Capacity forecasts are developed for all forms of public transport: National Rail and London Overground, TfL Buses, and London Underground. In all cases, these are based on special Major Event Day service levels and timetables, and forecasts of non-spectator background demand. For National Rail and London Underground, the overall capacities also depend on station capacity forecasts. This process is illustrated in Figure 6-3.

Figure 6-2 Demand Forecasting

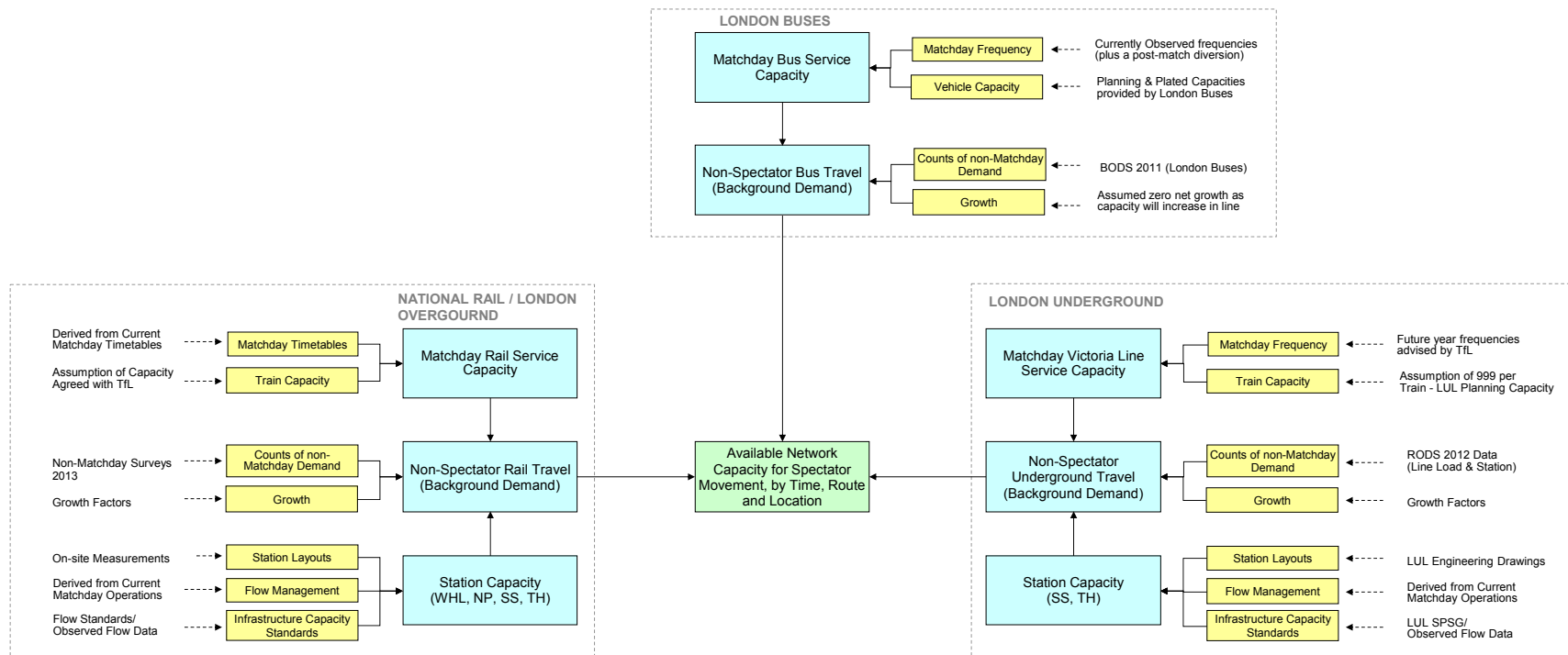


Figure 6-3 Capacity Forecasting

6.2 Pedestrian Network

6.2.1 Geographical Scope

The geographical scope of the pedestrian network that has been assessed is determined by the set of public transport nodes primarily used by spectators on Major Event Days. This is informed by studies undertaken from 2008 to 2014 to identify travel conditions associated with the current stadium.

The geographical scope of the forecasts is shown in Figure 6-4 below.

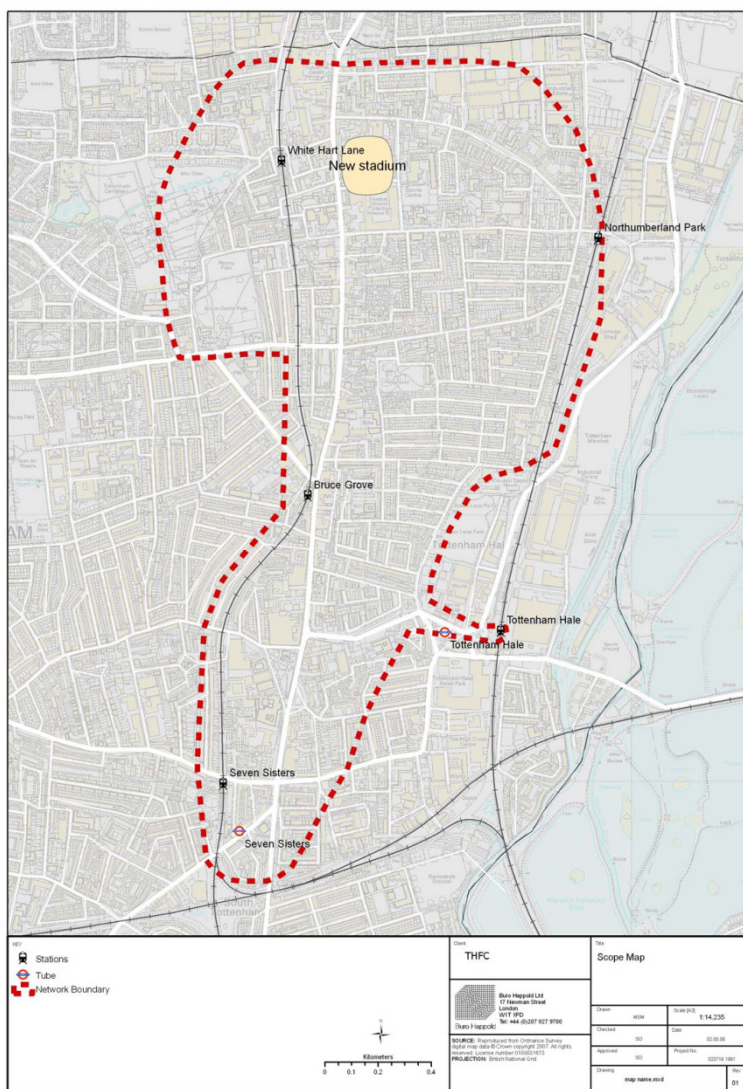


Figure 6-4 Geographical Scope of Demand Forecasts

Separate modules have been generated to assess the demand inside White Hart Lane, Northumberland Park, Tottenham Hale and Seven Sisters Stations. Although the various modules are not linked, the assumptions used and demand volumes and patterns are consistently applied across each.

Whilst some pedestrian journeys start or end outside this area, for the purpose of demand forecasts, journeys are assumed to start or finish at points on the extremity of this area.

6.2.2 Time Coverage

The initial model covered Major Event Day scenarios, with events taking place on a Saturday afternoon or midweek evening. The surveys undertaken in 2008 highlighted the small differences between Saturday, Sunday and Midweek football matches. Additional surveys in 2014 have confirmed that the 2008 patterns remain valid.

The forecasts cover the pre-match and post-match periods, from 3 hours before kick-off until 3 hours after the final whistle.

6.2.3 Nodes and Links

The network of walking routes is based on Buro Happold's GIS Library. Preliminary drawings of the stadium layout and surrounding Masterplan, available at the time the network was defined, were used to construct the model. Figure 6-5 shows an excerpt of the modelled network.

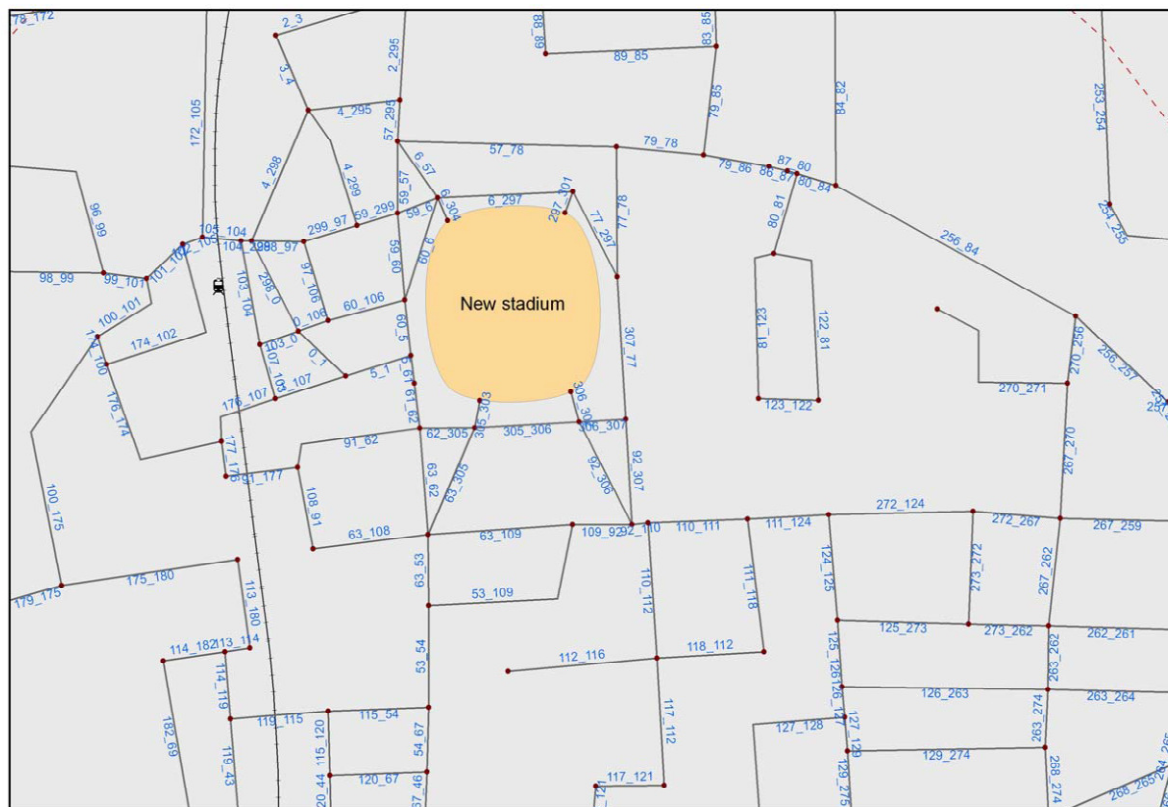


Figure 6-5 Excerpt of the Node and Link approach to Network Definition

6.2.4 Network Capacity

The link lengths, obtained from the GIS Library, enable an estimation of walk times. The pedestrian crossing infrastructure is not represented; it is instead assumed that pedestrians can follow any route unimpeded by vehicular traffic.

Pavement widths have been captured using detailed mapping of the local area, with Masterplan and detailed design drawings used to provide dimensions on parts of the network that are subject to proposed changes. Mode-specific capacity considerations are outlined in later sections of this document.

6.2.5 Walk Speeds

For the purpose of the demand forecasts, all spectators are assumed to walk at a speed of 1.5 m/s on walkways. This assumes a negligible gradient across the network. This differs from the value used by TfL in station planning of 1.3 m/s, reflecting the observation that football spectators generally walk faster than the population as a whole.

When on stairs, the equivalent figure is assumed to be 1 m/s.

6.2.6 Flow Rates & Walkway Capacities

The following flow rates for spectators are assumed:

Outside Stations

- Flow rate on walkways with one-way flows: 66 people/minute/metre width
- Flow rate on walkways with multi-directional flows: 49 p/min/m
- Edge effects: 0.3 metres per edge

6.3 Bus Network

The stadium is served by the bus routes shown in Figure 6-6. Plated capacity of buses is 87 people per bus. TfL planning advice proposes a more conservative assumption of 70 people per bus.

Background demand has been taken from TfL Bus passenger Origin and Destination Survey (BODS) 2011, with relative bus capacity factors applied for periods where BODS data is unavailable.

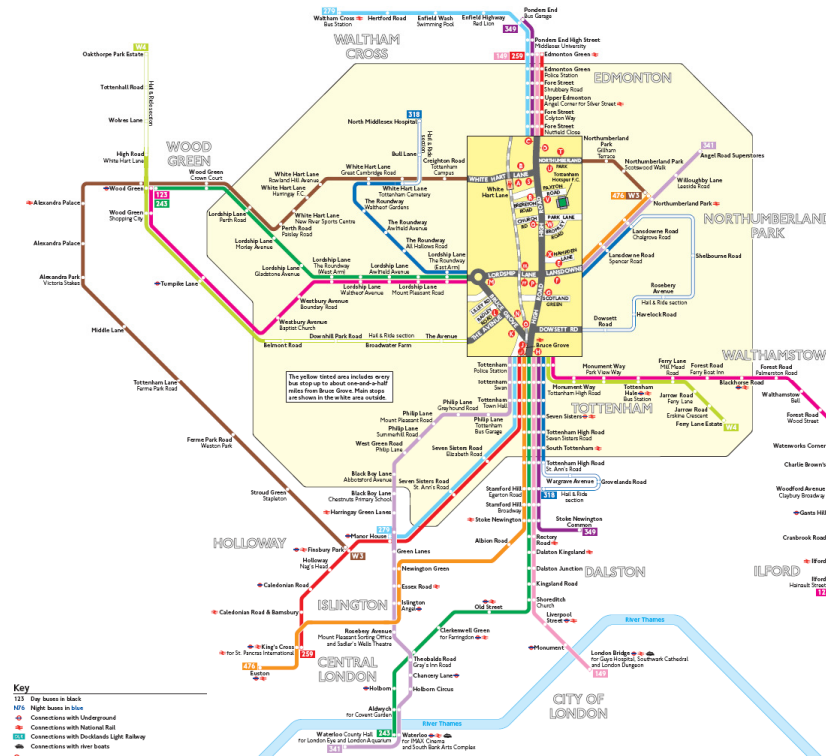


Figure 6-6 Bus Routes serving the White Hart Lane and Bruce Grove area (Source: Transport for London Buses, February 2008)

6.4 Rail Network

There are a number of rail stations within the vicinity of White Hart Lane Stadium:

- White Hart Lane (National Rail);
- Northumberland Park (National Rail);
- Bruce Grove (National Rail);
- Seven Sisters (National Rail and London Underground Victoria Line);
- Tottenham Hale (National Rail and London Underground Victoria Line).

For demand forecasting, it is assumed that spectators travelling by rail will use White Hart Lane, Northumberland Park, Seven Sisters or Tottenham Hale Stations. Bruce Grove is served by the same trains as White Hart Lane, but is further from the stadium and therefore unlikely to be heavily used.

White Hart Lane Station is on the same line as Seven Sisters, so it is assumed that any spectators using these services will use White Hart Lane due to its proximity to the ground. Similarly, Northumberland Park is on the same line as Tottenham Hale, but substantially closer to the stadium. Therefore, all attendees travelling via Seven Sisters and Tottenham Hale are assumed to be Victoria Line passengers rather than National Rail passengers.

Upon arrival at White Hart Lane, all spectators are assumed to walk from the station along White Hart Lane towards High Road, and then circulate via the 'shortest' route to the stadium entrance gates. For other rail stations, the shortest distance is assumed.

During the immediate post-event period, it is assumed that attendees walking to White Hart Lane Station will take different routes depending on their direction of travel and use different station entrances according to the direction of onwards travel. Northbound travellers are assumed to approach from High Road via White Hart Lane and southbound travellers are assumed to approach via Whitehall Street and Love Lane.

6.5 Taxi

A taxi rank to serve the stadium will be made available as part of the new Masterplan. Spectators dropped off before the match or picked up after the match by car are included in those modelled as using taxis.

Those visiting destinations in the local area before or after events are most likely to be dropped off or picked up at the pre- or post-event venues, travelling between those venues and the stadium on foot. The assumed split between the ten identified areas of pre-Major Event attractions and post-Major Event destinations is the same as that used for the all other attendees.

6.6 Parking

In the 2010 submission, the stadium had 319 parking spaces and access to a further 727 spaces in the immediate vicinity of the stadium. The proposed NDP Stadium has an increased capacity for 822 parking spaces. However, this increase is more than

offset by the implementation of the London Borough of Haringey's regeneration plans, which will re-develop 870 off-street parking spaces in the surrounding local area, leading to a net decrease in parking availability in the local area.

Furthermore, the stadium features a removable grass pitch which, when removed, is inserted into a 'pitch pocket' in the car park, reducing the number of spaces by 217 to just 518.

Blue Badge parking in the stadium is increasing under the proposal from 58 in the 2010 submission to 150 in the current proposal, of which 90 will be wheelchair accessible.

A diagram showing the 2010 off-street parking availability is included in Appendix H; sites 15 and 18, shown on that diagram, will disappear with the High Road West master plan implementation.

7 Football Forecasts

7.1 High-Level Assumptions

This section contains the key assumptions specific to the football forecasts. A full description of the football forecasts is detailed in the Football Data Book in Appendix D.

The assumed gross seating capacity of the proposed stadium is for 61,000, of whom 95.08% will be Home fans and 4.92% Away fans.

The assumed match kick-off and final whistle times for weekday matches are shown in Table 7-1.

	Weekday	Weekend
Kick-off	20:00	15:00
Final Whistle	21:50	16:50

Table 7-1 Match Timing

For the purpose of forecasting, a worst-case assumption is adopted that all spectators will be inside the stadium gate-lines from the time of kick-off and not leave until the time of the final whistle. In reality, some number of spectators arrive late and leave early, meaning the reality will be less onerous than is forecast under this assumption.

The demand forecasts are generated in 15-minute time intervals, based on assumed arrival and departure profiles.

The assumed arrival and departure profiles, shown in Table 7-2 and Table 7-3 respectively, reflect the moment a spectator passes the stadium gateline between the stadium and the public highway. They are derived from profiles recorded at White Hart Lane during March 2008 and profiles recorded at the Emirates Stadium during the 2006 season. They are applied irrespective of mode of transport used and whether or not spectators visit other locations in the local area before or after the match.

Minutes before kick-off	Proportion of Spectators Arriving - Midweek Evening
0-15	30.0%
15-30	25.0%
30-45	15.0%
45-60	10.0%
60-75	10.0%
75-90	10.0%

Table 7-2 Assumed Spectator Arrival Profiles at Stadium Gatelines (Midweek Evening)

Minutes after final whistle	Proportions of Spectators Departing - Midweek evening
0-15	75%
15-30	10%
30-45	10%
45-60	5%
60-75	0%
75-90	0%

Table 7-3 Assumed Spectator Departure Profiles from Stadium Gatelines (Midweek Evening)

Assumptions for both arrival and departure profiles are based on a combination of past behaviour and forecasts of levels of attraction and retention that have been achieved at other stadiums, through the measures detailed in Appendix B.

A proportion of spectators spend time in the local area before and after matches. Based on surveys undertaken in March 2008, the pre-match lengths of stay shown in Table 7-4 have been assumed, applied to home and away fans regardless of the final mode of transport.

Minutes spent at pre-match destinations	Proportion of Spectators spending time in the Local Area
0-15	3.50%
15-30	15.40%
30-45	19.50%
45-60	15.90%
60-75	10.50%
75-90	11.00%
90 - 105	8.30%
105 - 120	6.70%
120 - 135	9.20%

Table 7-4 Assumed Times spent by Spectators at pre-match destinations (Midweek Evening)

Although post-match lengths of stay were not recorded in the March 2008 survey, the main rationale for people to do so is to allow crowds to dissipate before attempting to travel, so it is reasonable to assume they will stay until crowds have indeed dissipated. For forecasting, spectators who stay in the local area are assumed to spend 90 minutes at their post-match destinations in order to achieve this aim. 30% of home fans and 5% of away fans are assumed to spend time in the local area after the match.

Surveys undertaken in 2008 indicate that the most popular pre- and post-match destinations are pubs, cafés and restaurants in the local area. The full list was distilled into ten representative locations, with spectators assumed to be distributed across them according to their popularity.

Unlike at some other Premiership grounds, there is no specific pub identified as an “away fan pub”; Away fans are instead expected choose a similar distribution to Home fans such as the Irish Centre.

Extensive measures have been undertaken to ensure a substantial mode shift away from cars and towards walking, cycling and public transport. These are outlined in more detail in Chapter 5. The resulting mode split of Home and Away fans on arrival is as shown in Table 7-5 (assuming non-London opposition for the Away fan mode splits). The mode splits recorded in the March 2008 spectator surveys are shown for comparison.

Mode	Assumed Home Fan Mode Split - Arrival	Home Fan Mode Split v. Chelsea (19 th March 08)	Assumed Away Fan Mode Split - Arrival	Away Fan Mode Split v. Chelsea (19 th March 08)
Coach	1.5%	0.4%	16.0%	0.0%
Local Bus	10.5%	11.7%	13.0%	9.7%
<i>of whom interchange at SS</i>	5.5%		10.0%	
Taxi	1.7%	0.9%	0.0%	1.7%
Walk	3.0%	2.0%	0.0%	5.1%
Cycle	1.0%	0.2%	0.0%	0.0%
Rail to WHL	21.0%	17.9%	26.5%	26.9%
Rail to NP	15.8%	14.0%	8.5%	7.2%
Tube to SS, then Walk	11.3%	11.3%	22.5%	29.4%
Tube to TH, then Walk	5.2%	1.8%	2.5%	1.3%
Car	19.5%	39.6%	11.0%	18.8%
Motorcycle	0.0%	0.2%	0.0%	0.0%
Shuttle Bus	9.5 %	0.0%	0.0%	0.0%

Table 7-5 Assumed Home Spectator Final Mode Split on Arrival

Forecast mode splits for Home and Away fans on departure are shown in Table 7-6, with recorded mode splits from May 2014 spectator surveys for comparison.

Mode	Assumed Home Fan Modal Split - Departures	Home Fan Mode Split v. Chelsea (19 th March 08)	Assumed Away Fan Modal Split – Departures
Coach	1.5%	0.1%	16.0%
Local Bus	8.0%	6.9%	13.0%
<i>of whom interchange at SS</i>	5.0%		10.0%
Taxi	1.5%	1.1%	0.0%
Walk	3.0%	1.4%	0.0%
Cycle	1.0%	0.2%	0.0%
Rail from WHL	20.0%	15.5%	26.5%
Rail from NP	14.0%	12.0%	8.5%
Walk to SS, then Tube	10.5%	13.6%	22.5%
Walk to TH, then Tube	9.5%	3.4%	2.5%
Car	23.0%	45.6%	10.0%
Motorcycle	0.0%	0.2%	0.0%
Shuttle Bus	8%	0%	0.0%

Table 7-6 Assumed Home Spectator Final Mode Split on Departure, with actual mode splits recorded in May 2014

Table 7-7 sets out the assumed direction of travel for spectators arriving at the National Rail stations.

Station	Split of Demand -Midweek Evening	
	From Central London (incl. those interchanging at TH and SVS)	From the North
White Hart Lane NR	63% (of whom 31% interchange from Victoria Line at Seven Sisters)	37%
Northumberland Park NR	53% (of whom 17% interchange from Victoria Line at Tottenham Hale)	47%

Table 7-7 Assumed Proportions of Spectator Arrivals by Rail from each Direction

For departing passengers, Table 7-8 shows the assumed direction of travel post-match, based on the findings of surveys and observations made during matches in March 2008, for both Home and Away fans.

Station	Split of Demand – Midweek Evening	
	To Central London (inc. those interchanging at TH and SS)	To the North
White Hart Lane NR	60% (of whom 35% interchange to Victoria Line at SS)	40%
Northumberland Park NR	50% (of whom 21% interchange to Victoria Line at TH)	50%

Table 7-8 Assumed Proportions of Spectator Departures by Rail from each Direction

7.2 Walking

For matches at the existing stadium, walking constitutes around 1.4% - 2% of the mode share.

Under the proposals, walking to the stadium will be encouraged through a range of measures, most notably:

- Priority season and match tickets for local residents will ensure that more spectators have to travel only short distances to matches;
- Improved information will be provided to spectators through a range of sources, as described in the Stadium Travel Plan.
- A PERS audit of the footways around the stadium and stations has been undertaken, with upgrades and widening of footways on High Road identified as ways of encouraging walking;
- The new stadium involves significant improvements to the public realm in the immediate vicinity of the stadium.

The changes are expected to result in an increase in the number of spectators to around 3% in future.

Capacity assessments have been carried out on the most heavily used routes, which connect the stadium to the transport interchanges. Flows on the remainder of the network will be much less and pedestrians will easily dissipate into the surrounding streets. Further details on the measures taken to encourage walking can be found in Section 5.10.

7.3 Cycling

Currently, very few Home fans cycle to matches. Those that do make use of lampposts, railings and street furniture for cycle parking.

Under the proposal, substantial improvements will be made to the provision of cycle parking, cycle routes and cycling information provided to Spectators. In addition, priority ticketing for local residents will make cycling a feasible option for a larger proportion of spectators.

The key changes include:

- Increased availability of cycle parking facilities around the site in safe locations;
- Improved cycle routes, such as the new Cycle Superhighway and terminus on the stadium site;
- Priority tickets and season tickets for local residents, committed through a Section 106 obligation;
- Provision of better information on cycle routes and cycle parking through the Stadium Travel Plan.

These changes are expected to result in an increase in cycling to around 1% for Home fans. Further information on the cycling strategy can be found in Section 5.11.

7.4 National Rail

Surveys of matches at the existing stadium have found that around 27% to 32% of Home spectators travel to matches by rail, via White Hart Lane or Northumberland Park stations.

The new stadium proposals entail significant efforts to encourage mode shift away from cars and towards rail and other modes of public transport. The measures involve restricting car parking availability through the expanded Controlled Parking Zone, improved information about public transport, and improvements to Major Event Day services on the rail network. These measures are described in more detail in Chapter 5 of this document, in the Stadium Travel Plan, and in the associated Section 106 obligations.

The measures are expected to increase rail mode share to around 34% to 37% at future events.

This proportional increase, combined with the absolute increase in stadium capacity, brings a large overall increase in the number of passengers using the rail network. These additional passengers are accommodated through service improvements, station upgrades and better balancing between the available services and stations.

7.4.1 White Hart Lane

The capacity of White Hart Lane Station has been assessed based on assumptions that are detailed fully in Appendix D, with full results found in Appendix I.

White Hart Lane is expected to accommodate around 21% of all spectators in the pre-match period, around 37% of whom arrive from the north, with the remainder from the south.

The principal capacity constraints on both platforms are the 3m staircases to street level. Whereas the southbound platform has 15-minute headways and can easily clear the platform between trains, the northbound platform have occasional shorter headways of just 5 to 8 minutes pre-match. The platform clearance time is 6.5 minutes for the busiest train, meaning the clearance time can exceed the train headway for the busiest trains. However, the station is currently undergoing a redesign, expected to increase its platform capacity above the 166 people/min/m that would be required to clear the platform within the headway time for the busiest train.

In the post-event period, queueing is anticipated outside the station for access to both platforms. For weekday events:

- Queuing outside the station for northbound services will last for 21 minutes with a maximum wait of 22 minutes from arrival at the back of the queue to boarding a train;
- Queuing for southbound services will last 32 minutes with a maximum individual wait of 29 minutes.

For weekend matches, results are slightly different due to different background demand and train headways:

- Queuing outside the station for northbound services will last for 12 minutes with a maximum wait of to board a train of 32 minutes;
- Queuing outside the station for southbound services will last for 56 minutes with a maximum 29-minute individual wait time.

Queues outside the station will be managed and stewarded throughout their duration.

The maximum queues are comparable with those forecast under the previous 2010 submission, and certainly within the range measured at other stadiums, such as Emirates (provided in Appendix C). On this basis, these are deemed to be within acceptable limits.

7.4.2 Northumberland Park

The capacity of Northumberland Park Station has been assessed based on assumptions detailed fully in Appendix D, with detailed analysis found in Appendix I. The assessment assumes the existing station layout and current matchday timetable, with all trains operating with eight cars and that the Stratford-Stansted service uplifted to four trains per hour. Background demand patterns were provided by Abellio.

In the midweek post-match scenario, queues are forecast to form outside the station for access to the northbound platform. The maximum queue length is 463 people. The duration of queueing is 23 minutes with the maximum wait for any individual being 19 minutes from arrival to boarding.

Queuing for the southbound platform is expected to last for 27 minutes, with a maximum queue length of 576 people and a maximum wait time for any individual of 16 minutes.

In the weekend pre-event scenario, queueing for the northbound platform will last for 33 minutes, with a maximum length of 1,057 people and a maximum individual wait of 22 minutes. Queuing for the southbound platform will last for 35 minutes, with a maximum queue length of 1,099 people and a maximum individual wait time of 26 minutes.

As with White Hart Line, the queue lengths and durations are well within the bounds found to be acceptable during monitoring at Emirates, and on that basis are deemed to be acceptable.

7.5 London Underground

Two Underground stations, Seven Sisters and Tottenham Hale, provide access to the Victoria Line, both also providing an interchange with National Rail and London Underground services. In the existing situation around 16% to 17% of spectators walk to the London Underground services, mainly to Seven Sisters.

The new stadium proposals entail significant efforts to encourage mode shift away from cars and towards London Underground and other modes of public transport. These measures involve restricting car parking availability through the expanded Controlled Parking Zone, improved information about public transport service, and improvements to Major Event Day services on the Victoria Line.

The measures are expected to increase the walk to London Underground mode share from its current level to around 17% to 21% at future events.

This increased mode share, combined with the increase in stadium capacity, brings a significant increase in the absolute number of passengers using the Victoria Line. However, the peak demand is reduced through attraction and retention measures, and the impact is further mitigated by better balancing demand between stations and services, and can be accommodated more easily with the expected improvements in services, station upgrades and better queue management and stewarding.

Details of the measures and improvements can be found in Chapter 5 of this document, in the Stadium Travel Plan, and in the associated Section 106 agreement.

7.5.1 Seven Sisters

Seven Sisters provides an interchange between London Underground and National Rail services. The SPSG special events guidance proposes conservative flow rates that, based on observations and surveys at Seven Sisters Station, are regularly exceeded in reality.

Observation of spectator throughput at the home match against Portsmouth on 23rd March, 2008 found flow rates of 162 people per minute entering the station, with 90% of these travelling on the southbound line. Both London Underground staff and British Transport Police suggested at the time that observations were typical for matchdays and, in agreement with TfL, these higher flow rates and capacities have been used for analysis.

Sensitivity analysis was completed using the SPSG flow rates, and can be found in Appendix I.

Weekday pre-match	Constraints at LU/ NR interchange
Weekday post-match	Queues managed outside station from 22:25 to 22:55
Weekend pre-match	No capacity constraints
Weekend post-match	Queues managed outside station from 17:30 to 17:39

Table 7-9 Seven Sisters Results

During the weekday pre-match period, vertical circulation elements provide sufficient capacity to accommodate all flows without causing delays. Interchanges between London Underground and National Rail services will be busy. Peak platform loading will reach up to 1,000 people and some passengers may have to wait for a train to pass before boarding.

To prevent congestion inside the station during the midweek post-match period, access to Seven Sisters via the High Road entrance will be regulated on Major Event Days. Entry to the station of 165 people per minute can be maintained using six ATGs and one Wide Access Gate (WAG), and queues are expected to form outside the station from 22:25 for approximately 30 minutes, with a maximum length of 62 people and a maximum individual waiting time of less than one minute.

Spectators interchanging from the National Rail southbound line onto the Victoria Line services use different parts of the station and so no queueing is anticipated on stairs from the National Rail platform. Queueing is expected on the escalator descending to the Victoria Line, expected to reach around 250 people at its maximum, but would clear before the arrival of the next train. Delays for an individual are anticipated to be less than three minutes.

No queueing is expected in the National Rail to London Underground southbound interchange. The London Underground southbound platform demand is expected to be within its capacity.

During the weekend pre-match period, all station vertical circulation elements will provide sufficient capacity for background and spectator flows. Weekend background demand is lower than during weekdays and the demand on the northbound platform, with peak loading of fewer than 300 passengers, will be well within its capacity.

As with the weekday scenario, flows into the station during the post-match period will be restricted at the High Road entrance to 165 people per minute. Queues will form outside the station from 17:30 for approximately nine minutes, with a maximum queue of 109 people and a maximum individual waiting time of less than one minute.

Passengers interchanging from the National Rail platform will be able to clear the platform within two minutes of trains arriving. Queues of around 50 people will form at the head of the escalator linking to the Victoria Line. The maximum delay per individual would be less than two minutes and queues will clear before arrival of the following train. No queueing is anticipated at the base of the escalator. The southbound platform is expected to operate safely without management intervention.

7.5.2 Tottenham Hale

During the weekday pre-match period, the most significant constraint is the vertical circulation from the London Underground platforms. Recent observations indicate that queues of up to one minute form at the escalators at the busiest times. Queues will be mitigated through increased frequency of the Victoria Line Service, which by 2016 is planned to reach 36 trains per hour in both directions during the midweek match period. Space at the base of the stairs can accommodate 40 people queueing. This analysis suggests that some queueing can be expected for up to 45 minutes (with use of stairs) or 2 hours (without use of stairs) prior to a midweek event.

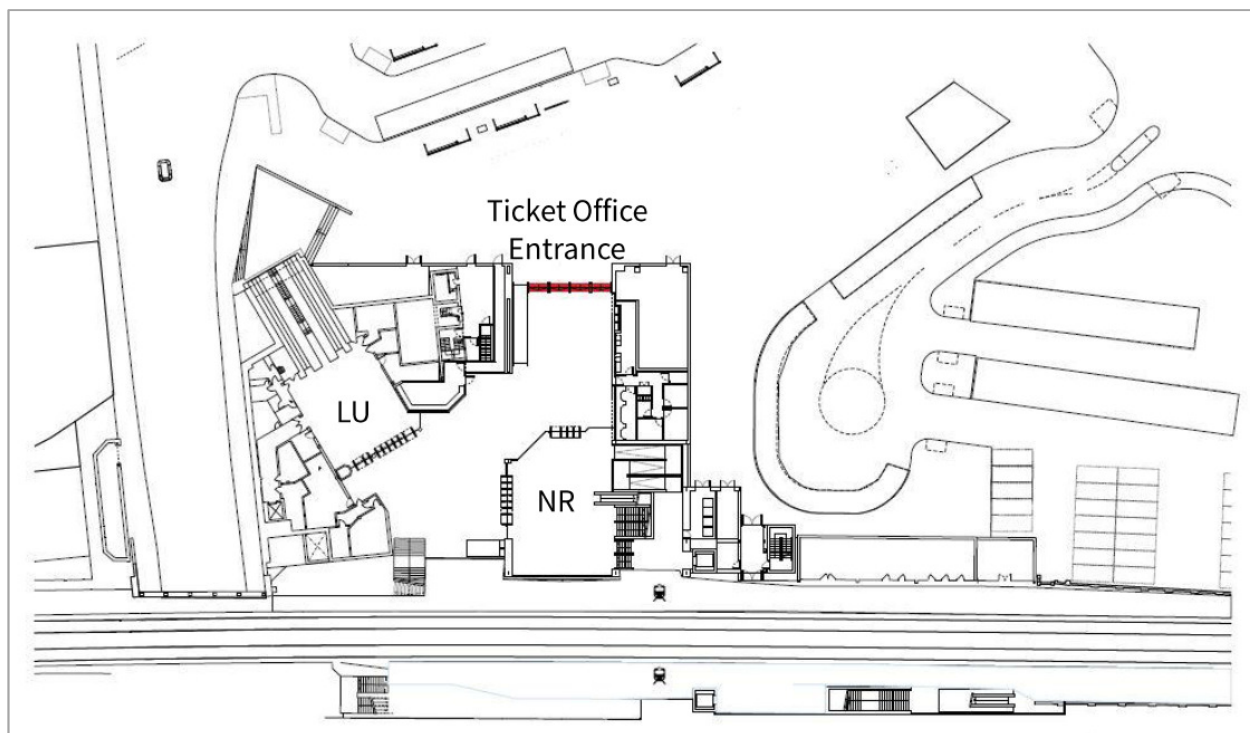


Figure 7-1 Assumed Tottenham Hale layout in 2021

Weekday post-match access to the station is via four automated ticket gates, with sufficient capacity to accommodate all entry flows, assuming maximum shuttle bus frequency during peak times.

Post-match connections from the Northumberland Park service transferring to the Victoria Line is via five automated ticket gates. These have sufficient capacity to enable alighting passengers to clear the gates within three minutes, with only short-lived queuing at the gates. Sufficient space for short term queuing is available within the reconfigured concourse. No capacity issues are anticipated for the Northumberland Park service.

The current entrance to the ticket office provides sufficient capacity to accommodate all flows entering the station. Modification of this entrance, adding a series of individual doors, will add flexibility for staff to manage queues outside the station.

Access to the London Underground is via six automated ticket gates and one wide aisle gate. Some queuing is anticipated at the gates for 29 minutes, with a maximum size of approximately 900 people and a maximum delay for any individual of six minutes. Most passengers will experience no delay or a delay of less than one minute. Both London Underground platforms will operate below capacity, with all passengers boarding the first train after they arrive at the platform.

The weekend scenario is accommodated more comfortably than the midweek scenario due to the lower background demand and lower numbers of spectators using this route. The peak weekend pre-match arrival occurs between 13:15 and 13:30. The

station has sufficient capacity for all spectators and background traffic during this period, with no queuing at the base of stairs or escalators.

No delays are anticipated at the National Rail gateline in the post-match period at weekends. All those alighting are able to clear the line within two minutes of train arrival. Passengers boarding the National Rail service at Northumberland Park will be able to board the next train after arrival with no capacity issues on the platform. Trains are anticipated to leave Northumberland Park at capacity. The number of people alighting at Tottenham Hale (to interchange to London Underground) exceeds those wishing to board, allowing sufficient capacity on the trains to carry all passengers wishing to board.

The ticket office provides sufficient capacity to accommodate all flows entering the station during this period. Entry to the Victoria Line is controlled by six automated ticket gates and a wide aisle gate. Their capacity is matched to the vertical circulation capacity, preventing queues at the head of escalators and stairs. Some queuing at the ticket gates is anticipated for 24 minutes. Maximum queue size is expected to be 566 people with a maximum individual wait to be less than four minutes. The majority of passengers will not experience any delay. Platforms in both directions will operate below capacity. Passengers are expected to be able to board the first train after arrival at the platform.

7.6 Shuttle Bus

7.6.1 Overview

Two shuttle bus services will operate on Major Event Days: one from Tottenham Hale Station and one from Alexandra Palace Station.

In most cases, limited delays are experienced on the shuttle buses, with the longest delays occurring during pickups from the stadium post-match. No individual is expected to have to wait more than ten minutes to use the service. However, the ability to deliver these services with minimal queuing will be driven by the operator, who has not yet been contracted. Operational requirements will be specified at that time.

7.6.2 Tottenham Hale Shuttle Bus Service

The Tottenham Hale shuttle bus is designed to be a premium service, in line with the hospitality proposals for the proposed stadium. The route for the service can be seen in Figure 7-2. As the service is aimed at those with access to hospitality suites, these spectators will have a different profile than those using other modes of transport.

The operational configuration of the services will be discussed and agreed with TfL at a later stage, once THFC has contracted with a specific operator. The key assumption is regarding availability of pick-up and drop-off areas at Tottenham Hale, where proximity and visibility will be key to the delivery of a premium service. The drop offs and vehicle turns can be accommodated in both the High Road and Park Lane, as shown in the highway design information provided with this application.

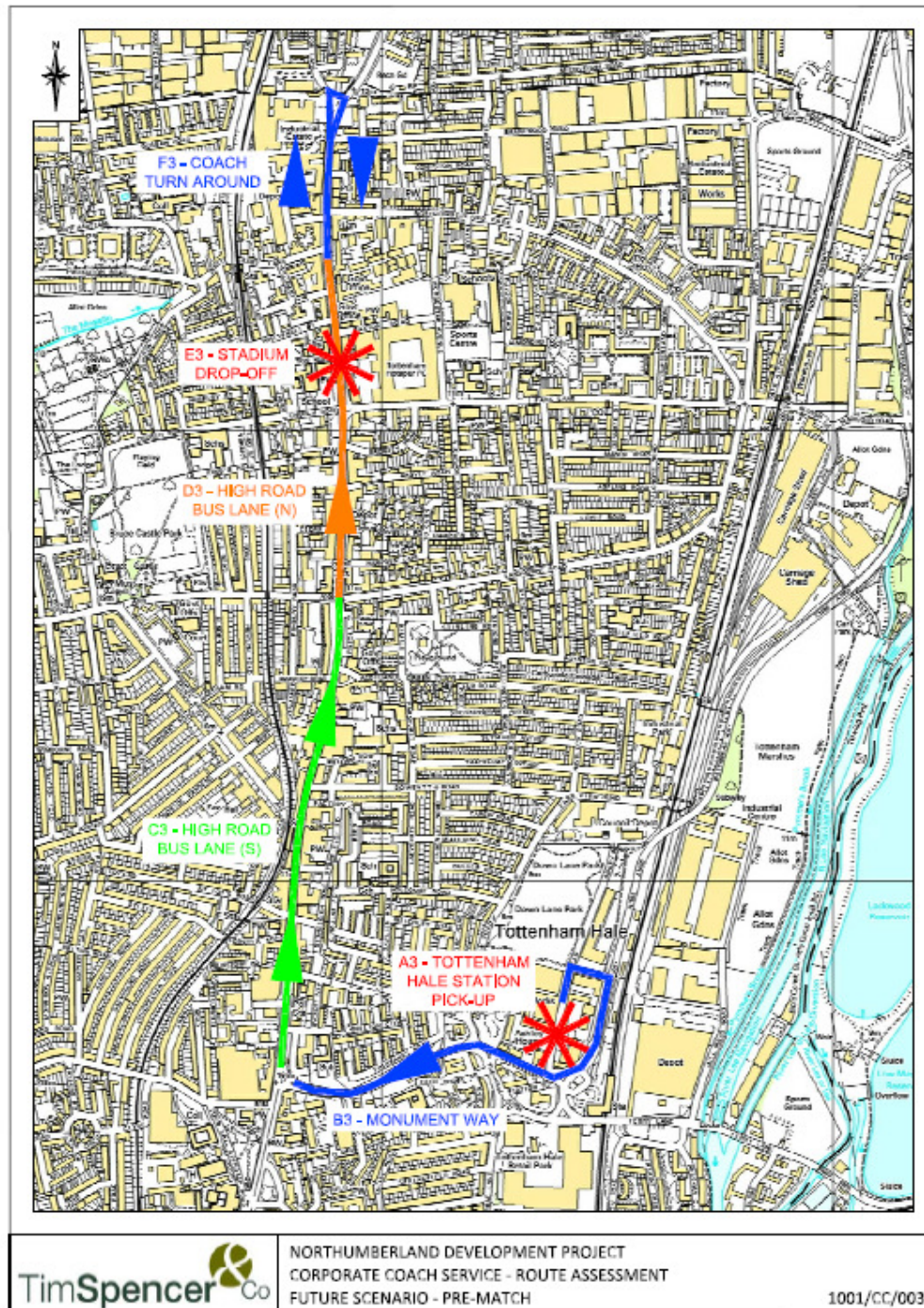


Figure 7-2 Possible Shuttle bus route serving Tottenham Hale Station

7.6.3 Alexandra Palace Shuttle Bus Service

The Alexandra Palace shuttle bus is designed to be a standard service, intended to capture spectators travelling on rail routes whose alternative route would be to interchange in at Finsbury Park and arrive via Seven Sisters or Tottenham Hale.

All services will pick up at both Alexandra Palace and Wood Green, generating 75% and 25% of shuttle bus demand, respectively. The shuttle bus route is shown in Figure 7-3.



Figure 7-3 Possible Shuttle bus route serving Alexandra Palace and Wood Green Stations

The operational configuration of the services will be discussed and agreed with TfL at a later stage, once THFC has contracted with a specific operator. Assumptions regarding loading, unloading and turnaround times will be verified with the operator once selected.

7.7 Bus

7.7.1 Overview

Road closures on High Road, leading to bus diversions, mean that bus stops immediately outside the stadium are not currently available for spectators for at least 30 minutes after the road closure is lifted. Discussions with TfL Buses in 2008 led to the creation of a new plan to reduce the time for which bus diversions are in place. With a reduced diversion time, it will be possible for passengers to wait at the most convenient bus stop for their journey until the service recommences, rather than move to stops further from the stadium. Services are in future expected to resume normal routes within 15 minutes of High Road being reopened.

The usage of the various routes was derived from spectator surveys taken in 2008, as shown in Table 7-10:

Node	Bus Routes Covered	Proportion of Bus Arrivals
61	149, 259, 279, 349	55.2%
57	W3	10.5%
51	318, 341, 476	13.2%
26	123, 243, W4	15.8%
58	34, 444	5.3%

Table 7-10 Assumed Split of Demand by Bus Stop – Arrivals

During the midday pre-match period, a shortfall in capacity may occur on the four routes travelling along High Road between 18:30 and 19:00 (149, 259, 279 and 349). However, the forecasts are based on the conservative assumption that just 85% of the plated capacity will be used. Observations of current behaviour suggest that the full plated capacity of buses will in fact be used during this period. If use of the full plated capacity is assumed, the shortfall is eliminated.

In the post-match scenario, there may be a shortfall in capacity on the same four routes between 22:30 and 23:45. However, as with the pre-match period, this capacity shortfall will be significantly reduced if full plated capacity is utilised. As most trips are to Seven Sisters Station, which is only a short walk from the stadium, a number of spectators are likely to walk to the station instead, further reducing this impact.

In the weekend pre-match period, a shortfall is anticipated between 12:45 and 14:45 on routes 149, 259, 279 and 349. However, as in the midweek, this shortfall is significantly reduced when capacity is fully utilised. As the shortfall occurs more than one hour before kick-off, there is plenty of time to walk the short distance to the stadium and a number of spectators are expected

to choose this option. A small post-match capacity shortfall may also occur between 18:30 and 18:45. However, the queue does not exceed 100 people, with a maximum individual wait of less than 10 minutes.

No capacity issues have been identified on other services.

7.8 Coach

Coach parking requirements are highly variable and are heavily dependent on the requirements of Away team supporters. Using conservative assumptions, the total coach demand is forecasted to be less than 30 per game in 2018. Parking to meet this demand will be accommodated in the industrial area. Access to this site is granted via Leaside Road, Watermead Way and the A406. None of these roads is residential.

On the rare occasion that overflow capacity is required, this can be accommodated on Pretoria Road. Similar arrangements are in place at other large stadiums with overflow capacity only required a few times over the course of a calendar year.

7.9 Car

Car mode share has in the past been as high as 60% for Home spectators. A major focus of the transport strategy for the stadium is to try to reduce the number of spectators driving to matches. This will be achieved through a variety of measures to encourage sustainable modes, improve public transport capacity and service levels and discourage driving. The primary tool used to discourage driving is the expansion of the Event Day Controlled Parking Zone, which decreases the availability of parking spaces close to the stadium. The range of measures is described in more detail in Chapter 5.

In future, the number of people driving to events is forecast to drop to around 23%. The club is committed to achieving car mode split targets through obligations in a Section 106 agreement with the possibility to expand the CPZ further if it proves to be necessary to achieving this objective.

The car mode share includes passengers as well as drivers, and is calculated based on parking spaces within the site, available spaces on-street and off-street in the local area, and the expected occupancy of vehicles. Several scenarios representing a range of spectator numbers have been examined and the average number of spectators from this analysis has been used for assessment. The figures can be seen in Table 7-11.

On Street Parking (Old)	On Street Parking (New)	Off Street Parking (Old)	Off Street Parking (New)	Total Parking	Average Occupancy of Vehicles	Total People	Proportion of Spectators
1,350	900	1,800	1,675	5,725	2.4	13,740	22.5%

Table 7-11 Spectators travelling by car

7.10 Taxi

A taxi rank to serve the stadium will be made available as part of the new Masterplan. Spectators dropped off before the match or picked up after the match by car are included in those modelled as using taxis.

Those visiting destinations in the local area before or after events are most likely to be dropped off or picked up at the pre-Event or post-Event venues, travelling between those venues and the stadium on foot. The assumed split between the ten pre- and post-match destinations is the same as that used for the all other attendees.

The number of spectators travelling by taxi, at a maximum of just 1.7%, is not expected to have a major impact on other modes of transport.

7.11 Conclusion

Encouraging sustainable forms of transport forms a key component of the transport strategy for football matches held at the stadium. Cycling and walking will be actively promoted by the inclusion of new facilities designed to accommodate flows and by the improvement of existing routes. The construction of the new Cycle Superhighway and safe cycle parking locations will encourage and support this. As well as facilitating a sustainable and environmentally friendly method of travelling to games, measures to promote cycling and walking will relieve pressure on other transport services.

National Rail services at Northumberland Park and White Hart Lane will accommodate the majority spectators to the matches without capacity constraints. There are short periods of peak demand where some capacity constraints are anticipated. However, these will be short-lived and can be controlled using available platform space with minimal disruption. Management of queues outside stations during the post-match period will also ensure flows inside the station are safe and utilise the available capacity efficiently. In most cases, any delays to passengers during peak times will be brief and existing services will be unaffected. The redesign of White Hart Lane station, which is currently under way, is expected to increase capacity, particularly for passengers alighting at the station and using the vertical circulation to reach street level.

London Underground services at Seven Sisters and Tottenham Hale stations are managed in a similar way to the National Rail services, with only short periods of effective capacity constraints. As with National Rail services, these flow restrictions will be brief and managed using existing platform capacities. Peak post-match demand will be managed by regulating queues outside stations for short periods.

Bus travel is accommodated through the existing bus network and via shuttle bus services connecting the stadium to Tottenham Hale and Alexandra Palace. Bus services are anticipated to run smoothly with only limited capacity constraints running for short periods in peak times. These constraints are likely to be mitigated by the fact that some spectators travelling to Seven Sisters and Tottenham Hale are likely to opt walk the short distance in the event of queues.

Coach parking can be comfortably accommodated using parking arrangements. Space for overflow capacity exists on the rare occasions it may be required. The car mode split will be heavily reduced through use of the Controlled Parking Zone to restrict

driving and a range of other measures to encourage use of public transport. Car use overall will be reduced substantially under the proposed plan. On that basis, there will be no adverse impact on traffic compared with the 2010 submission.

8 NFL Forecasts

8.1 High Level Assumptions

This section contains the key assumptions specific to the NFL scenario. A full description of the assumptions applied to the NFL forecasts are described in the NFL Data Book in Appendix E.

THFC has successfully developed a strong national support base. Both regular THFC attendees and NFL season ticket holders have very similar home location distributions. However, significantly more NFL spectators will travel longer distances to attend the games. Consequently, staging of NFL games at the proposed stadium will not create any challenges not already being addressed by the Club in implementation of its proposed stadium transport strategy.

The main difference between the football and NFL forecast is that the NFL games will take place on a Sunday, with assumed start and finish times of 14:30 and 18:00, respectively.

The arrival profiles, shown in Table 8-1, reflect the time at which spectators enter through gatelines, not the time at which spectators take their seat. These assumed arrival profiles have been derived from observations of NFL games at Wembley Stadium in 2014. The arrival profiles of football (Table 7-2) and NFL (Table 8-1) forecasts are very similar.

Minutes Before Kick-Off	Proportion of Spectators Arriving – Sunday Afternoon
0-15	15.0%
15-30	35.0%
30-45	20.0%
45-60	10.0%
60-75	10.0%
75-90	5.0%

Table 8-1 Assumed Spectator Arrival Profiles at the Stadium Gatelines (Sunday Afternoon)

The assumed departure profiles, shown in Table 8-2, reflect the times at which spectators pass out of the stadium building and onto the public highway. This profile has been generated on the basis of retention measures that will be in place to encourage spectators to remain in the stadium during the post-match period. In comparison to the football forecast (Table 7-3), in which

there is a 75% departure peak 0-15 minutes after the final whistle, there is a much lower departure peak of 40% 15-30 minutes after the final whistle for the NFL forecast, indicating a more dispersed profile post-match.

Minutes after Final Whistle	Proportion of Spectators Leaving – Sunday Afternoon
0-15	5.0%
15-30	40.0%
30-45	15.0%
45-60	10.0%
60-75	10.0%
75-90	0.0%

Table 8-2 Assumed Spectator Departure Profiles from the Stadium Turnstiles

With respect to the time that NFL spectators spend in the local area pre- and post-match, assumptions are based on those obtained for the football forecast (High-Level Assumptions, section 7.1), the details of which can be found in the Football Data Book in Appendix D. Approximately 40% of spectators attending the NFL match are assumed to arrive early to spend time in the local area, and 20% are assumed to spend time in the local area after the match before travelling home.

In total 50% of the pre-Event and post-Event activity is expected to occur at tailor-made NFL fan parks in the local area. The Fan Parks have been factored into the travel demand and pedestrian flow forecasts. The Fan Parks will require subsequent approvals from LBH.

The assumed mode split for NFL spectators on arrival is shown in Table 8-3. In line with the football scenario, extensive measures will be implemented to ensure a mode shift away from cars and towards walking, cycling and public transport, as outlined in Chapter 5. In total 15% of spectators are expected to arrive by car, with the majority arriving by rail and tube services. Similar to the football Home fans (Table 7-5), 1% will cycle and walk.

Mode	In time for Kick-off or Early?	
Cycle	Direct to Stadium	0.6%
Cycle	Arrives in local area early	0.4%
Walk	Direct to Stadium	0.6%
Walk	Arrives in local area early	0.4%
Tube to Seven Sisters, then Walk	Direct to Stadium	9.0%
Tube to Seven Sisters, then Walk	Arrives in local area early	6.0%
Tube to Seven Sisters, then Bus	Direct to Stadium	4.2%
Tube to Seven Sisters, then Bus	Arrives in local area early	2.8%
Rail to White Hart Lane	Direct to Stadium	13.8%
Rail to White Hart Lane	Arrives in local area early	9.2%
Rail to Northumberland Park	Direct to Stadium	6.6%
Rail to Northumberland Park	Arrives in local area early	4.4%
Car Driver/Passenger	Direct to Stadium	9.0%
Car Driver/Passenger	Arrives in local area early	6.0%
Bus	Direct to Stadium	1.2%
Bus	Arrives in local area early	0.8%
Coach	Direct to Stadium	3.0%
Coach	Arrives in local area early	2.0%
Taxi	Direct to Stadium	1.2%
Taxi	Arrives in local area early	0.8%
Alexandra Palace Shuttle Bus	Direct to Stadium	2.0%
Alexandra Palace Shuttle Bus	Arrives in local area early	1.6%
Tottenham Hale Shuttle Bus	Direct to Stadium	2.4%
Tottenham Hale Shuttle Bus	Arrives in local area early	1.6%
Tube to Tottenham Hale, then Walk	Direct to Stadium	6.0%
Tube to Tottenham Hale, then Walk	Arrives in local area early	4.0%

Table 8-3 Assumed Spectator Mode Split on Arrival and Proportion of Spectator Types (Arrival Sunday Afternoon)

The assumed mode split of NFL spectators on departure is shown in Table 8-4, below. Again, there are no significant differences between this and the Home or Away fan football forecasts (Table 7-6) that should raise concerns.

Description		Proportion of Total
Mode	In time for Kick-off or Early?	
Cycle	Leave directly	0.8%
Cycle	Stays in local area post-match	0.2%
Walk	Leave directly	1.2%
Walk	Stays in local area post-match	0.3%
Walk to Seven Sisters Tube	Leave directly	11.2%
Walk to Seven Sisters Tube	Stays in local area post-match	2.8%
Bus to Seven Sisters Tube	Leave directly	2.4%
Bus to Seven Sisters Tube	Stays in local area post-match	0.6%
Rail from White Hart Lane	Leave directly	15.2%
Rail from White Hart Lane	Stays in local area post-match	3.8%
Rail from Northumberland Park	Leave directly	13.6%
Rail from Northumberland Park	Stays in local area post-match	3.4%
Car Driver/Passenger	Leave directly	12.0%
Car Driver/Passenger	Stays in local area post-match	3.0%
Bus	Leave directly	1.6%
Bus	Stays in local area post-match	0.4%
Coach	Leave directly	4.0%
Coach	Stays in local area post-match	1.0%
Taxi	Leave directly	1.2%
Taxi	Stays in local area post-match	0.3%
Alexandra Palace Shuttle Bus	Leave directly	4.00%
Alexandra Palace Shuttle Bus	Stays in local area post-match	1.00%
Tottenham Hale Shuttle Bus	Leave directly	2.69%
Tottenham Hale Shuttle Bus	Stays in local area post-match	0.34%
Walk to Tottenham Hale Tube	Leave directly	9.6%
Walk to Tottenham Hale Tube	Stays in local area post-match	2.4%

Table 8-4 Assumed Spectator Mode Split on Departure and Proportion of Spectator Types (Arrival Sunday Afternoon)

Additional assumptions have been generated in relation to the direction of travel of NFL spectators arriving by rail. Table 8-5 and Table 8-6 set out the assumed division of demand upon arrival and departure at each station, respectively. When compared to the football scenario (Table 7-7 and Table 7-8), the percentage of NFL spectators arriving to and departing from Central London to White Hart Lane and Northumberland Park is higher. This reflects a difference in NFL supporter travel, which is less localised and more widespread across the country. As detailed in the sections below however, measures can be put in place to reduce the impact of these constraints accordingly, to ensure minimal disruption to travel.

Station	Split of Demand ARRIVALS – Sunday Afternoon	
	From Central London (incl. those interchanging at TH and SVS)	From The North
White Hart Lane NR	78.3% (of whom 35% interchange from Victoria Line at Seven Sisters)	21.7%
Northumberland Park NR	72.7% (of whom 36% interchange from Victoria Line at Tottenham Hale)	27.3%

Table 8-5 Assumed Proportions of Spectator Arrivals by Rail from Each Direction

Station	Split of Demand DEPARTURES – Sunday Afternoon	
	To Central London (incl. those interchanging at TH and SVS)	To The North
White Hart Lane NR	20.8% (of whom 37% interchange to Victoria Line at Seven Sisters)	79.2%
Northumberland Park NR	25.0% (of whom 41% interchange to Victoria Line at Tottenham Hale)	75.0%

Table 8-6 Assumed Proportions of Spectator Departures by Rail from Each Direction

8.2 Walking

With 1% and 1.5% of NFL spectators walking to and from the games, respectively, this figure is comparable to the number of spectators walking to the weekday football games. The detailed improvement measures for this mode are highlighted in section 7.2.

8.3 Cycling

With just 1% of NFL spectators cycling to and from the games, this figure is also comparable to the number of spectators cycling to the weekday football games. The detailed improvement measures for this mode are highlighted in section 7.3.

8.4 National Rail

Based on previous surveys and the assumptions made from these for the NFL games (Table 8-3 and Table 8-4), approximately 36% of spectators travel by rail via White Hart Lane or Northumberland Park.

8.4.1 White Hart Lane

A more detailed description of the assumptions for the assessment of the capacity of White Hart Lane station for the NFL games can be found in Appendix J.

White Hart Lane is expected to accommodate around 22% of all NFL spectators in the pre-match period, around 5% of whom arrive from the north, with the remainder from the south.

Given that northbound trains arriving at Seven Sisters will be partially loaded with background travellers and spectators travelling to White Hart Lane from Central London, there will be capacity constraints between 12:15 PM and 13:30 PM. As there is a finite train capacity, a potential issue for consideration is the occupancy of the northbound National Rail platform during this period.

As stated previously, TfL standard advice is to assume trains will not exceed 85% of their plated capacity. However, higher loadings are regularly observed on this route. When trains are assumed to be fully loaded on this route, as is currently the case, peak loading of the platform is between 700 and 800 passengers. Although some passengers on this platform may have to wait for one service to pass before being able to board, the queues will not be excessive.

During the post-match period, about 19% of spectators will depart White Hart Lane Station between 5:45 PM and 8.00 PM, around 5% of whom will depart to the north, with the remainder to the south.

Queues of up to 809 passengers are anticipated to form outside the station for access to the southbound platform. The platform loading will be capped at 859 people, matching the train capacity, assuming that new Class 378 rolling stock is still in use. It is anticipated that the replacement of this rolling stock will be completed in 2019. Controlled flows into the station will therefore take place in order to ensure platform capacity is not exceeded.

No queues are expected on the northbound platform, as demand does not exceed capacity.

8.4.2 Northumberland Park

A more detailed description of the assumptions for the assessment of the capacity of Northumberland Park station for the NFL games can be found in Appendix J.

Northumberland Park station is expected to accommodate about 11% of all NFL spectators in the pre-match period, around 3% of whom will arrive from the North, with the remainder from the south. There are no significant conflicts anticipated between spectator demand and available rail capacity either northbound or southbound at Northumberland Park.

During the post-match period, about 17% of spectators are forecast to depart Northumberland Park station between 5:45 PM and 8:00 PM with 33% to the north and the remainder to the south. The queuing anticipated for northbound services from Northumberland Park station is minimal, with a maximum queue length of 65 people, maximum queue duration of 1 minute and maximum delay of 16 minutes between arriving and boarding the train. Some queues are anticipated to form outside the station for access to the southbound platform. The maximum queue length will be 577 people with a queue duration of 29 minutes and delay of 14 minutes.

8.5 London Underground

8.5.1 Seven Sisters

An overview of the Seven Sisters station, including associated assumptions and key surveys, is provided in Football Forecasts (section 7.5.1). More detailed analysis of the Seven Sisters station for NFL games can be found in Appendix J.

The Seven Sisters interchange will accommodate about 30% of NFL spectators, who will arrive on the Victoria Line between 10:30 AM and 2:15 PM. Of these, 50% will exit the station and walk to the stadium, 27% will interchange to National Rail trains to White Hart Lane and 23% will interchange onto local buses to the stadium.

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

National Rail services arriving at Seven Sisters will already be partially loaded with background travellers and spectators travelling to White Hart Lane from Central London. As is the case for other stations, TfL standard advice is to assume trains will not exceed 85% of their plated capacity, which would lead to queues. However, higher loadings are regularly observed on this route, and in discussion with TfL, a full train capacity of 1,020 has been assumed. This leads to platform loadings of up to 570 people, which can be accommodated at a reasonable density. In this scenario, for all but two periods (12:30 and 13:30), all passengers will be able to board the first train after they arrive on the platform. It is also important to highlight that the transfer to London Overground has resulted in greater levels of station staffing on major event days at this station.

During the post-match period, about 24% of NFL spectators will depart from Seven Sisters on the southbound Victoria Line. Of these passengers, 58% will arrive on foot from the stadium, 29% will interchange from National Rail train services from White Hart Lane and 13% will interchange from buses from the stadium.

To ensure that queuing and congestion do not take place inside the station, access to the station from High Road will be regulated. Queues will form outside the station and will be controlled with queue management and stewarding outside the station. All street level entry is assumed to be via the northernmost access point.

In this scenario, entry into the station would be regulated throughout at 165 people/minute (equivalent of 6 automated ticket gates and 1 wide aisle gate). However, given the rate of arrival at the station, some queues would form from 18:15 PM. The maximum queue length would be 154 people with the requirement to accommodate some level of queuing outside the station for approximately 15 minutes. The maximum delay for any individual would be less than one minute. Demand is held outside the station to prevent queue formation inside, meaning that, upon entry through the ticket gates, passengers are able to walk directly to their platform unimpeded.

During the post-match period, spectators interchanging from National Rail to shuttle bus services (having boarded at White Hart Lane, WHL) onto the Victoria Line services use different parts of the station to those arriving on foot or by bus, so no queuing is expected.

After passing from the platform through the Network Rail elements of the station, interchanging passengers will descend an escalator to the Victoria Line. Small, shuffling queues of around 100 people are expected at the top of the escalator. Delays incurred will be less than 1 minute at the head of the escalator.

When interchanging from National Rail to London Underground southbound services, at the base of the escalator, passengers descend further stairs to reach the platform, with no queuing is expected. The southbound Victoria Line platform will be fed by two entry points at either end. The platform has capacity for approximately 1,000 people and as indicated in this assessment, the peak anticipated occupancy would be 400 passengers. This suggests that conditions on the platform during the post-match are 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 spectators boarding at Tottenham Hale. For all but three time slots (18:15, 18:30 and 19:19 PM), it will be possible for all passengers arriving on the platform to board the next train.

8.5.2 Tottenham Hale

An overview of the Tottenham Hale Station, including associated assumptions and key surveys, is provided in the Football Forecasts (section 7.5.2). More detailed analysis of Tottenham Hale station for NFL games can be found in Appendix J.

Tottenham Hale interchange is expected to accommodate about 18% of NFL spectators during the pre-match period between 10:30 AM and 2.15 PM. Of these, 56% will exit the station and walk to the stadium, 22% will interchange onto a THFC shuttle bus, and 22% will interchange onto National Rail services to Northumberland Park.

With respect to vertical circulation from the Victoria Line, the demand exceeds escalator capacity on several occasions, creating small, shuffling queues of up to 40 people that remain within the reservoir area capacity at the bottom of the escalator. The

peak period for this would be between 1:00 PM and 2:15 PM. Queuing would be avoided if the stair capacity were fully used in addition to the escalator, although observations suggest that this is not the natural behaviour given the steepness of the stairs. This would therefore need to be managed with encouragement of stair usage.

During the post-match period, about 23% of NFL spectators will arrive at Tottenham Hale Station between 5.45 PM and 8:15 PM. Of these, about 61% will arrive on foot from the stadium, 30% interchange from National Rail train services from Northumberland Park, and 17% will interchange from THFC shuttle bus services

Assuming four entry gates and five exit gates for the National Rail gateline, a small queue is anticipated at the exit gateline with peak entry flows forecast between 6:15 PM and 7:00 PM. All passengers alighting from National Rail services will be able to clear the gateline within two minutes of the train's arrival.

Some passengers alighting from the shuttle bus will board National Rail services arriving from Northumberland Park. Analysis shows that all of these spectators will be able to board the next available train after their arrival. Although trains will leave Northumberland Park 'at capacity', the number of people alighting at Tottenham Hale (to interchange to London Underground) exceeds those wishing to board, leaving sufficient capacity for those boarding. The number of people waiting on the platform to board will peak at 65, so no capacity issue is anticipated.

Entrance to the ticket office provides sufficient capacity to accommodate all flows entering the station. Entry into the London Underground part of the station would be via six automated ticket gates and one wide aisle gate. This matches the vertical circulation capacity within the station, and therefore prevents any queue forming at the head of the stairs/escalator or in the gateline run-off area. This requires use of the stairs, in addition to the escalators, for vertical circulation. Some queuing is anticipated at the gateline with a maximum queue duration of 22 minutes, a maximum queue size of 399 people and a maximum delay of 3 minutes. The majority of passengers will not experience any delay.

As highlighted previously, each London Underground platform has capacity for approximately 1,000 people. The peak anticipated occupancy at Tottenham Hale is approximately 220 passengers for southbound services and 120 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 will operate safely without management intervention. In both directions, all passengers would be expected to board the first train after arriving on the platform.

8.6 Shuttle Bus

An overview of the shuttle bus services is provided in Football Forecasts (section 7.6). For the purpose of this section, the potential performance of the shuttle bus service for the NFL scenario is proxy to the football forecast.

8.6.1 Tottenham Hale Shuttle Bus Service

About 4% of NFL spectators are forecast to use the Tottenham Hale shuttle bus service between 10:30 AM and 2:00 PM, about 20% of whom will interchange from National Rail services and 80% will interchange from London Underground services.

For pre-match shuttle buses, it is assumed there will be 50 passengers per coach, with a two-minute loading time and three-minute shuttle bus frequency. On this basis, the queue duration will be 50 minutes, with a maximum queue length of 65 people and maximum individual waiting time of 6 minutes.

During the post-match period, 4% of NFL spectators are forecast to use the Tottenham Hale shuttle bus service between 6:00 PM and 8:00 PM, about 20% of whom will interchange to National Rail services and 80% will interchange to London Underground services

For post-match shuttle bus queue analysis, it is assumed there will be 50 people per coach, with a two-minute loading time and initial two-minute shuttle bus frequency (for 24 minutes) then three-minute frequency. Based on this, the queue duration will last for 9 minutes, with a maximum queue length of 23 people and maximum individual waiting time of 2 minutes. This flatter demand reflects the profile expected of the premium NFL spectators who are the target of the Tottenham Hale shuttle bus services.

8.6.2 Alexandra Palace Shuttle Bus Service

During the pre-match period, about 4% of NFL spectators are forecast to use the Alexandra Palace shuttle bus service between 10:30 AM and 2:00 PM, about 25% of whom will interchange from Wood Green station and 75% of whom will interchange from Alexandra Palace station.

It is assumed there will be 67 passengers per coach (75% of capacity), with a two-minute loading time and three-minute shuttle bus frequency. On this basis, the queue duration will be negligible, with a maximum queue length of 14 people and maximum waiting time of three minutes.

During the post-match period, about 4% of NFL spectators are forecast to use the Alexandra Palace shuttle bus service between 6:00 PM and 8:15 PM, 25% of whom will interchange to Wood Green station and 75% of whom will interchange to Alexandra Palace station.

It is assumed there will be 90 passengers per coach (100% of capacity), with a two-minute loading time and initial two-minute then three-minute shuttle bus frequency. On this basis, the queue duration will be 42 minutes, with a maximum queue length of 196 people and maximum waiting time of 6 minutes.

The shuttle bus service will play an important role during NFL games in reducing the spectator impact on other parts of the network, most notably the Seven Sisters/Tottenham Hale axis. The frequencies and capacities highlighted have been generated to provide the 'best fit' with anticipated demand for the football scenario, and show that in most instances limited delays would be experienced. The longest delays would be associated with post-match clearance, but in the scenario assessed, this is no more than a 6-minute delay for any individual. The ability to deliver these frequencies with minimal queuing will be driven by the efficiency of the operation and the operator, who is yet to be contracted. Operational space requirements will need to be negotiated at that time.

8.7 Bus

An overview of bus services for the THFC stadium is found in sections 6.3 and 7.7. With respect to the NFL scenario, the following information has been devised.

During the pre-match period, northbound flows on High Road have the option to use four bus routes (149, 259, 279 and 349). Most spectators are expected to interchange onto buses at Seven Sisters, although some spectators will travel on local buses from further south. Analysis suggests there may be a shortfall in capacity between 11:45 AM and 2:00 PM. However, if full plated capacity is used (and current matchday behaviour suggests that this will be the case), this capacity shortfall will be significantly reduced. It may be that interventions are put in place at Seven Sisters during this period to encourage efficient boarding and use of capacity. If there is a short-lived capacity shortfall, spectators unable to board buses may choose to walk to the stadium instead.

During the post-match period, southbound flows on High Road have the option to use the same four bus routes. Most spectators are expected to interchange at the Seven Sisters Station, although some spectators will travel further south on local buses. This analysis suggests that there will be no shortfalls in capacity and that every spectator will be able to board the first bus, except at 7:30 PM.

8.8 Coach

Coach management for NFL games will be similar the football scenario described in section 7.8.

8.9 Car

Car travel and parking measures for NFL games will be similar to those used for football matches as detailed in section 7.9.

8.10 Taxi

Taxi pick-up and drop-off points will be available and are described in more detail in section 6.5.

8.11 Conclusion

In staging NFL games at the new stadium, there will be no additional transport strategy challenges to those already being addressed by the Club. Similar to the weekday football matches, Sunday NFL spectators will be encouraged to walk, cycle or use the extensive London transport system comprised of National Rail, London Underground and London bus services.

Although the London transport system will be less burdened on a Sunday by low work commuter travel, constraints on these systems will still arise with respect to spectator flows, platform capacities, queue lengths, queue durations and delays. Having identified where and when these constraints arise however, they can be managed effectively and kept to a minimum so that spectator delays will be only a matter of minutes, whilst ensuring high levels of safety for spectator travel to and from the NFL games.

9 Concert Forecasts

This chapter considers the future demand conditions associated with the use of the stadium for concerts. Full details of assumptions can be found in the Concert Data Book in Appendix F, with detailed analysis found in Appendix K.

9.1 Introduction

It is anticipated that the new stadium will be used as a venue for other major events, including concerts. Scheduling of concerts at the new stadium requires a separate licensing process, so will be covered in more detail at the time of that application. The management requirements associated with the staging of concerts are slightly different to those associated with football matches, as the behaviour of visitors is likely to differ.

This section presents the factors that have been used to derive a forecast of visitor travel patterns associated with a concert at the new stadium. As the current stadium does not currently host non-football major events, the assumptions are based on evidence from other stadiums. The profile of visitors' behaviour has been derived from a review of profiles recorded for concerts taking place at other London venues.

Forecasts have been developed for a concert scenario with projections for both 45,000 visitors and 55,000 visitors. The objective is to understand the transport-related challenges that may be associated with a concert; in particular, where they differ from those expected on a match-day.

The forecast has been generated and analysed using the same tools as the match-day scenarios. The key assumptions are:

- Venue capacity of 45,000 or 55,000, depending on the layout of the concert;
- The concert will take place on a Saturday evening; and
- The main act will take the stage at 8:00 PM and finish at 10:00 PM with no supporting acts.

The assumption that there are no supporting acts creates more acute arrival and departure profiles that would be expected in reality, leading to robust worst-case forecasts.

The transport demand assessment has not been fully optimised, as was the case with the Football scenario, because attendees are expected to have far less local knowledge. The results do show variances between the four stations which would be reduced by optimisation of the demand forecasts and this would be the subject of further analysis as part of the preparation of the Event Management Plan that would be a licensing requirement of LBH. Given that many spectators would wish to use the Victoria Line this could be managed through recommended route for different stadium exit points.

9.1.1 Arrival and Departure Profiles

It is assumed that:

- All attendees are in the stadium by the time the main act takes to the stage; and

- The stadium arrival profile is applied irrespective of mode of transport used, and whether or not attendees are visiting other locations in the local area prior to the event.

The expected arrival profile for concerts is shown in Table 9-1, reflecting the moment attendees enter the stadium from the local area. The arrival profile is relatively even, with a steady flow of visitors into the stadium between 90 and 15 minutes before the concert begins.

Minutes before kick-off	Proportion of spectators arriving - Saturday Evening
0-15 minutes before kick-off	2.5%
15-30 minutes before kick-off	10.0%
30-45 minutes before kick-off	12.5%
45-60 minutes before kick-off	12.5%
60-75 minutes before kick-off	12.5%
75-90 minutes before kick-off	12.5%
90-105 minutes before kick-off	12.5%
105-120 minutes before kick-off	7.5%
120-135 minutes before kick-off	7.5%
135-150 minutes before kick-off	10.0%

Table 9-1 Assumed Attendee Arrival Profile at the stadium

The stadium departure profile is shown in Table 9-2, again reflecting the moment attendees pass the gatelines back onto the public highway. This model takes into account some early departures, which tend to be a key feature of concerts. The departure profile has a peak in the first 15 minutes after the end of the concert.

Minutes after End of Concert	Proportion of spectators leaving Saturday Evening
15-30 minutes before end	5%
0-15 minutes before end	15%
0-15 minutes after end	65%
15-30 minutes after end	8%
30-45 minutes after end	8%
45-60 minutes after end	0%

Table 9-2 Assumed Attendee Departure Profile from the stadium

9.1.2 Distribution of Entrances and Exits

As shown on proposed plans, there will be four points of access to the stadium concourse, one at each corner. The ticketing operation leads to the assumption that demand will be distributed between the four access points on both arrival and departure, with circulation occurring outside the stadium. The assumptions shown in Table 9-3 below are applied to attendees travelling by every mode.

Stadium Entry / Exit	Proportion of spectators using each Entrance ON ARRIVAL	Proportion of spectators using each Entrance ON DEPARTURE
North East	18.2%	18.2%
South East	32.2%	32.2%
South West	32.2%	32.2%
North West	17.8%	17.8%

Table 9-3 Assumed Distribution of Demand between Stadium Entrances and Exits

9.1.3 Mode Split and Time in Local Area

Mode splits for attendees arriving and departing from the stadium are shown in Table 9-4 and Table 9-5 respectively, subdivided according to whether they spend time in the local area. Only 10% of spectators would arrive in private cars with an average occupancy of 3 per vehicle. This forecast is based on research at the Emirates Stadium where the outcome is even less car use.

Mode	Direct or early arrival	Proportion of Total
Cycle	Direct to stadium	1%
Cycle	Arrives in local area early	0%
Walk	Direct to stadium	2%
Walk	Arrives in local area early	1%
Tube to Seven Sisters, then Walk	Direct to stadium	10%
Tube to Seven Sisters, then Walk	Arrives in local area early	4%
Tube to Seven Sisters, then Bus	Direct to stadium	5%
Tube to Seven Sisters, then Bus	Arrives in local area early	2%
Rail to White Hart Lane	Direct to stadium	17%
Rail to White Hart Lane	Arrives in local area early	7%
Rail to Northumberland Park	Direct to stadium	12%
Rail to Northumberland Park	Arrives in local area early	5%
Car Driver/Passenger	Direct to stadium	7%
Car Driver/Passenger	Arrives in local area early	3%
Bus	Direct to stadium	2%
Bus	Arrives in local area early	1%
Coach	Direct to stadium	1%
Coach	Arrives in local area early	0%
Taxi	Direct to stadium	2%
Taxi	Arrives in local area early	1%
Alexandra Palace Shuttle Bus	Direct to stadium	1%
Alexandra Palace Shuttle Bus	Arrives in local area early	3%
Tottenham Hale Shuttle Bus	Direct to stadium	3%
Tottenham Hale Shuttle Bus	Arrives in local area early	1%
Tube to Tottenham Hale, then Walk	Direct to stadium	6%
Tube to Tottenham Hale, then Walk	Arrives in local area early	3%

Table 9-4 Arrival Mode Split for 45,000 Capacity Scenario

Mode	Direct or early arrival	Proportion of Total
Cycle	Leave directly	0.9%
Cycle	Stays in local area post-match	0.2%
Walk	Leave directly	2.1%
Walk	Stays in local area post-match	0.4%
Walk to Seven Sisters Tube	Leave directly	12.8%
Walk to Seven Sisters Tube	Stays in local area post-match	2.3%
Bus to Seven Sisters Tube	Leave directly	2.6%
Bus to Seven Sisters Tube	Stays in local area post-match	0.5%
Rail from White Hart Lane	Leave directly	21.3%
Rail from White Hart Lane	Stays in local area post-match	3.8%
Rail from Northumberland Park	Leave directly	15.3%
Rail from Northumberland Park	Stays in local area post-match	2.7%
Car Driver/Passenger	Leave directly	8.5%
Car Driver/Passenger	Stays in local area post-match	1.5%
Bus	Leave directly	2.6%
Bus	Stays in local area post-match	0.5%
Coach	Leave directly	1.3%
Coach	Stays in local area post-match	0.2%
Taxi	Leave directly	1.7%
Taxi	Stays in local area post-match	0.3%
Alexandra Palace Shuttle Bus	Leave directly	3%
Alexandra Palace Shuttle Bus	Stays in local area post-match	0%
Tottenham Hale Shuttle Bus	Leave directly	2.6%
Tottenham Hale Shuttle Bus	Stays in local area post-match	0.5%
Walk to Tottenham Hale Tube	Leave directly	11.1%
Walk to Tottenham Hale Tube	Stays in local area post-match	2.0%

Table 9-5Departure Mode Split

An additional concert scenario for 55,000 attendees has been produced. Whilst arrival assumptions remain the same as for the 45,000 attendees' scenario, there would be increased pressure on the rail network. Therefore, the mode split for departure is expected to change in favour of an increased capacity shuttle bus service. This is shown in Table 9-6 below:

Mode	Direct or early arrival	Proportion of Total
Cycle	Leave directly	0.9%
Cycle	Stays in local area post-match	0.2%
Walk	Leave directly	2.1%
Walk	Stays in local area post-match	0.4%
Walk to Seven Sisters Tube	Leave directly	12.8%
Walk to Seven Sisters Tube	Stays in local area post-match	2.3%
Bus to Seven Sisters Tube	Leave directly	2.6%
Bus to Seven Sisters Tube	Stays in local area post-match	0.5%
Rail from White Hart Lane	Leave directly	17.9%
Rail from White Hart Lane	Stays in local area post-match	3.2%
Rail from Northumberland Park	Leave directly	15.3%
Rail from Northumberland Park	Stays in local area post-match	2.7%
Car Driver/Passenger	Leave directly	8.5%
Car Driver/Passenger	Stays in local area post-match	1.5%
Bus	Leave directly	2.6%
Bus	Stays in local area post-match	0.5%
Coach	Leave directly	1.3%
Coach	Stays in local area post-match	0.2%
Taxi	Leave directly	1.7%
Taxi	Stays in local area post-match	0.3%
Alexandra Palace Shuttle Bus	Leave directly	5.1%
Alexandra Palace Shuttle Bus	Stays in local area post-match	0.9%
Tottenham Hale Shuttle Bus	Leave directly	2.6%
Tottenham Hale Shuttle Bus	Stays in local area post-match	0.5%
Walk to Tottenham Hale Tube	Leave directly	11.9%
Walk to Tottenham Hale Tube	Stays in local area post-match	2.1%

Table 9-6 Departure Mode Split for 55,000 Capacity Scenario

9.2 National Rail

The two National Rail stations that will accommodate concertgoers are Northumberland Park and White Hart Lane. The splits between these two stations are shown in Table 9-7 and Table 9-8.

Station	Split of Demand - Saturday Evening	
	From Central London (incl. those interchanging at TH and SVS)	From North
White Hart Lane NR	66.7%	33.3%
Northumberland Park NR	64.7%	35.3%

Table 9-7 Assumed Proportions of Attendee Arrivals by Rail from each Direction

Station	Split of Demand - Saturday Evening	
	To Central London (incl. those interchanging at TH and SVS)	To North
White Hart Lane NR	68.0%	32.0%
Northumberland Park NR	66.7%	33.3%

Table 9-8 Assumed Proportions of Attendee Departures by Rail from each Direction 45,000 Attendee Scenario

9.2.1 Northumberland Park Station

The majority of attendees will travel towards central London from this station.

In the departure scenario for 55,000 attendees, 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 access to the platform would need to be controlled. The maximum queue size would be 2,031 spectators. The longest delay for any individual from the time they arrive at the station to boarding a southbound train is 47 minutes. As is the case for football matches, this would be controlled with queue management and stewarding at the station, and will be more fully discussed as part of the separate licensing process for concerts.

9.2.2 White Hart Lane Station

In the departure scenario for 55,000 attendees, queues are anticipated to form outside the station for access to the southbound platform. 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. The queue will clear in approximately 65 minutes.

Likewise, for the 45,000-capacity scenario, queues are anticipated to form, although slightly smaller and with a shorter maximum wait time of 26 minutes and with the queue clearing completely in approximately 45 minutes.

The key factor affecting the clearance rate and the size of queue is the available train capacity. Again, the queue management and stewarding procedures will be resolved more fully as part of the separate licensing process for concerts.

9.2.3 Conclusions

Station capacities are not exceeded for arrivals in either of the two scenarios for stadium capacity,

For departures, with 55,000 attendees, 47% of attendees will wait for 10 minutes or less at White Hart Lane station to travel southbound, while only 3% will wait for 26 – 30 minutes. There is no wait to travel northbound from this station. At Northumberland Park station, 30% of attendees will wait for 10 minutes or less, while 25% will wait for more than 30 minutes travelling southbound. The strain on the northbound trains will be less than this, with 70% of attendees waiting for less than 10 minutes. Crowd management either outside the station or at the ticket office will be an extension of the current plan in place to deal with pre- and post-match conditions at Tottenham Hotspur matches.

In departure for the 45,000 capacity scenario, 49% of attendees will wait for 10 minutes or less at White Hart Lane station to travel southbound, while only 2% of attendees will wait for more than 21 minutes. There is no delay to northbound travel. At Northumberland Park Station, 48% of attendees will wait for 10 minutes or less, while 1% of attendees will wait for more than 30 minutes. This will not require crowd management, providing vertical circulation routes are well utilised.

9.3 London Underground

The two London Underground stations that will accommodate concertgoers are the Seven Sisters Interchange and Tottenham Hale Interchange.

Crowd management will be an extension of the current plan in place to deal with pre- and post-match conditions at football matches.

9.3.1 Seven Sisters Interchange

During the pre-event period, the interchange flow between London Underground and National Rail is the most challenging. This is principally due to the coincidence of high attendee flows and Event Day northbound services. The assessment of the 55,000-attendee scenario shows there are occasions where some people will be unable to board the first northbound train. However, all waiting passengers will be able to board the subsequent train. No such delay exists for the 45,000 scenario.

During the post-event period, 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 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. In the departure scenario for 55,000 attendees, there are some shortfalls of capacity at both stations. To ensure that queuing and congestion does not take place inside the station, access to the station from High Road will be regulated, requiring a management plan to be adopted.

9.3.2 Tottenham Hale Interchange

The projection for flow rates through this station are based on actual spectator throughputs at Seven Sisters station. Crowd management will be an extension of the current plan in place to deal with pre- and post-match conditions at football matches.

In the arrival scenario for both 55,000 and 45,000 attendees, and 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 the departure scenario for 55,000 attendees, trains will leave Northumberland Park 'at capacity', and the number of people alighting at Tottenham Hale (to interchange to London Underground) will exceed those wishing to board. The number of people waiting on the platform to board will peak at approximately 80, so no capacity issues are anticipated. The maximum delay for any individual will be 15 minutes, with a queue duration of 63 minutes.

It is anticipated that entry to the ticket office will be controlled to match the gateline capacity so that the queues can be managed outside the building, preventing potential obstruction to interchange flows that could occur without this measure.

9.3.3 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 more than 20% in the period up to the forecast year of 2021.

During the pre-concert 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-concert period, queuing is anticipated at the entrance to the station for those arriving on foot or by shuttle bus. Again, vertical circulation is the key constraining factor.

The peak queue in the 55,000-attendee scenario would be 2,031 people and some crowd management is therefore required. However, it is not anticipated that any individual would be delayed for more than 15 minutes. Crowd management will be an extension of the current plan in place to deal with pre- and post-match conditions at football matches.

9.4 Shuttle Bus

There are two shuttle bus services operating to and from the stadium, providing connections to Tottenham Hale and Alexandra Palace stations.

The shuttle bus service plays an important role in the transport mix, helping to balance demand and reducing the impact on other parts of the network, most notably the Seven Sisters/Tottenham Hale axis.

The frequencies and capacities highlighted have been generated to provide the 'best fit' with the anticipated demand on Major Event days, and are considered in the light of the concert scenarios. In most instances, limited delays would be experienced, with most attendees able to catch the first service. The most significant queues would be for the Alexandra Palace shuttle bus in the post-event period.

The ability to deliver these frequencies with minimal queuing will be driven by the efficiency of the operation and the operator, who has not yet been contracted. Operational space requirements would need to be negotiated at that time.

9.5 Bus

If full planned capacity is used (and current Major Event Day behaviour suggests that this could be the case), any capacity shortfall will be significantly reduced. It may be that interventions are put in place at Seven Sisters during this period to encourage efficient boarding and use of capacity. If there is a short-lived capacity shortfall, and it is more than 30 minutes before the event starts, attendees unable to board buses may choose to walk to the stadium instead.

In the 55,000-attendee scenario, there is a small shortfall in arrivals. However, if managed efficiently as suggested above, this will be significantly reduced. If interventions at Seven Sisters are put in place during the periods of peak use, the shortfall will be short-lived. As it will occur more than 30 minutes before the event starts, attendees unable to board buses have time to walk to the stadium instead, if they so choose.

In the 45,000-attendee scenario, there is available capacity to accommodate all attendees, although this may rely on interventions in place at Seven Sisters during peak use periods to encourage efficient boarding and use of capacity.

There is no shortfall in capacity for departures in either the 55,000 or 45,000 capacity scenarios.

9.6 Conclusions

Most attendees (72%) will arrive between 15 – 105 minutes before the start of the concert. The flow of attendees is consistent throughout this period. National Rail and London Underground services will experience the greatest proportion of attendees arriving directly to the stadium. In the 55,000-attendee scenario, Tottenham Hale Station will experience queues at the bottom of the escalator, and there are possible shortfalls in capacity for the shuttle bus for one hour (18:30 – 19:30). This would not

translate into a risk to safety. In both of these, delays to attendees may be reduced by effective operational loading and capacity management.

Although there are minor shortfalls in capacity, this would not translate into a risk to safety or station operations.

Most attendees (65%) will depart the stadium within 15 minutes of the end of the concert. Because of this acute demand, there will be greater strain on all modes of transportation. National Rail and London Underground would experience the greatest proportions of attendees departing. However, this does not translate to a risk to safety or station operations. Crowd management will be an extension of the current plan in place to deal with pre-Event and post-Event conditions at football matches.

In the 55,000-capacity scenario, the greatest delays would take place on the National Rail and London Underground. Seven Sisters Station would experience a queue lasting 40 minutes, with no individual waiting more than 13 minutes. Tottenham Hale would experience a queue for 63 minutes, with no individual waiting more than 15 minutes. Northumberland Road would experience a queue for 90 minutes, with 80% of individuals waiting less than 20 minutes. White Hart lane would experience a queue for 65 minutes, with 90% of individuals waiting less than 20 minutes. Where queues exist, they can be managed with queue management and stewarding measures, details of which will be resolved as part of a separate concert licensing process, but is likely to be an extension of the current plans in place to deal with pre- and post-match conditions at football matches.

In neither of the two capacity scenarios do any of the capacity constraints translate into a risk to safety or station operations.

10 Conclusion

This report considers the range of transport issues associated with the redevelopment of the THFC Stadium, located in the northeast of the London Borough of Haringey. The proposed scheme comprises a new 61,000-capacity stadium with provision for a range of new facilities that will enhance the Major Event Day experience for spectators.

The transport strategy has been developed within a framework of national, regional and local planning policies and guidance. National guidance sets the general objectives, with regional and local policies defining the more specific guidance relevant to the local setting.

The development of the stadium has been founded on a transport strategy that focuses on removing the barriers to sustainable travel, assisted by the provision of an expanded Major Event Day Controlled Parking Zone, covering 716 hectares.

The trip generation associated with the regenerated stadium proposals was established using assessments of the local transport capacities, existing transport surveys, matchday questionnaires and validated using experience from Emirates Stadium, which has similar characteristics and is located 4 miles away. In addition, the effect of improving the onsite facilities is shown to attract and retain spectators, so that they arrive early and remain on site following an event. This reduces the peak demands normally associated with arriving and departing spectators.

The proposed policies promote two main aims for transport: to promote non-car travel and to maintain free-flowing road networks. The proposed stadium achieves these aims through a broad set of measures aimed at encouraging local trips: constraining parking through the expanded Controlled Parking Zone, improving cycling, walking and public transport routes, increasing public transport capacity, and using improved communication with spectators to encourage and balance use of the available public transport nodes.

The site is already well served by public transport in the form of buses, National Rail and London Underground, with Seven Sisters and Tottenham Hale Stations, located to the south of the development, acting as key transport interchanges. This level of provision, coupled with the management plans being promoted to be associated with each of the uses of the proposed stadium, will help to shape the way in which future spectators choose to travel.

The proposed stadium and associated improved public realm will, with stewarding and effective management, be able to disperse spectators much more efficiently than the existing stadium, such that the inconvenience of the High Road closure can be reduced. Bus diversions are currently in place for at least 30 minutes, which is partly the result of away fans being located in the prominent southwest corner of the site at present. The proposed stadium will see the seating reconfigured, making it easier to segregate fans and further reducing the need for road closures.

Assessments of National Rail and London Underground scenarios have demonstrated that post-event management at the relevant entry points will be required in order to safely regulate access, and a range of proposals have been reported to allow this to be implemented. Improvements to station facilities will also support increased numbers.

The TfL London Travel Report 2007 presents statistics indicating that, with bus service trends continuing, future services will be sufficient to meet the proposed demand for bus services to and from Seven Sisters Station. New stops, changes to bus stop locations, a new diversion route and junction improvements will all serve to additionally support the increased demand.

The Coach Travel Strategy will identify a package of proposals that, as a longer-term goal, will make it possible for up to 5% of home supporters to travel by coach, rising over time from the currently proposed 1.5% mode share for a weeknight fixture. This provides a scenario within which many of the impacts on other modes could be reduced.

The concert scenario presents a case whereby the National Rail and London Underground stations experience queues that will require stewarding measures, details of which will be finalised as part of a separate concert licensing process. The procedures are likely to be an extension of those implemented for football matches.

Work on the Transport Assessment has included both generalised demand forecasting and more detailed mode-by-mode analysis of the capacity of the public transport routes and capability of existing and future networks to carry the increased demand that is expected.

This report has demonstrated that with the proposed mitigation measures and transport management plans in place, previously agreed in principle between THFC, the London Borough of Haringey, Transport for London, and the Metropolitan and British Transport Police Services, there is sufficient capacity to safely and effectively transport the anticipated spectator demand to and from the 61,000 capacity stadium.

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