

Water Resources

- 3.8.6 According to the Environment Agency, most of the site lies within an Outer Groundwater Protection Zone. The vast majority of the site is in Flood Zone 1 with small areas along the western boundary in Flood Zone 2.
- 3.8.7 The site area located within Flood Zone 1 comprises land assessed as having less than 1 in 1000 annual probability of river or sea flooding in any year. However, immediately to the west of Tottenham High Road is the culverted Moselle Brook, which is assessed as being in Flood Zone 2, i.e. having between a 1 in 100 and 1 in 1000 annual probability of river flooding (the light blue on Figure 3.3). The Brook flows eastwards from Tottenham Cemetery through a series of culverts before ultimately flowing into the River Lea to the east of the Project Site.

3.9 The Baseline

- 3.9.1 The assessment has been based on the comparison of qualitative and where possible quantitative predicted impacts compared with existing baseline environmental conditions. Any significant changes expected in future baselines due to environmental trends will also be described qualitatively, or in certain cases calculated as quantitative future baseline to allow meaningful future year assessment. These future year baselines can take account of cumulative developments not yet built although in the planning system. These approaches are explained in further detail in the relevant chapters concerned.
- 3.9.2 The consented planning baseline of the site is that which has been granted planning consent. A number of planning consents have been granted on this site as set out below.

Application Number	Description of Development
HGY/2010/1000	The original " NDP planning permission " which secured part full and part outline planning permission for the redevelopment of the NDP site for a new football stadium and associated non-football development to the north and south of the new stadium site. This permission was granted on 20 th September 2011.
HGY/2011/2350	The " Northern Development permission " which secured a new full planning permission for the northern element of the NDP site, comprising foodstore, education, stadium-related and showroom/brand centre uses. This permission was granted on 29th March 2012.
HGY/2011/2351	The " Southern Development permission ", referenced HGY/2011/3251, which secured a new outline planning permission for the southern part of the NDP site for residential, college, health club and centre and office uses. This permission was granted on 29th March 2012.
HGY/2015/0964	The " Stadium Basement permission " which secured a minor material amendment to the "NDP Planning Permission" for a new basement level beneath the approved stadium, to accommodate changes to the proposed basement and ground floor layouts, and the removal of certain conditions. This permission was granted on the 08th July 2015.

- 3.9.3 A summary of the planning applications listed above can be found in the Planning Statement which

accompanies the planning application documentation.

The Consented Position

3.9.4 The current planning permissions are considered as being contextually relevant to the assessment of the revised proposals for the Project. In particular planning permission (which remains capable of being built out) has been granted for:

- A Stadium with a 56,250 capacity with a typical season of 26 matches, plus an additional 4 non-football events per year at near capacity attendance of around 56,000 people;
- A total of 319 car parking spaces (18% wheelchair accessible) associated with the Stadium;
- Up to 285 residential units within 4 blocks (36 storeys);
- Up to 15,000 sqm of floorspace for health centre and/or health club and/or college uses;
- Circa. 4,800 sqm of Stadium back of house / storage areas and 1,500 sqm of VIP lobby / reception areas associated with the car parking;
- Podium up to 25.500m above AOD (minimum of 0m above AOD);
- Residential blocks 1 and 4 at a maximum height of 47.89m above AOD (minimum of 23.28m above AOD); and
- Residential blocks 2 and 3 at a maximum height of 57.49m above AOD (minimum of 23.28m above AOD).

Future Baseline & Assessment Scenarios

3.9.5 The ES is required to assess potential impacts on the existing baseline environment. It is also a requirement in the Regulations to assess the future baseline conditions. The baseline conditions are defined as the existing state of the environment (Section 3.9). Future baseline conditions are how it may develop in the future with the Project and with certain committed developments.

3.9.6 Future baseline conditions have been considered by identifying the developments (and other land use/environmental changes) that are likely to happen over the same time period as the Project. This approach to defining the future baseline conditions has been used to address the requirements under Schedule 4, Regulation 2 (1) in the Town and Country Planning (EIA) Regulations (As Amended) (2015) to consider cumulative effects.

Cumulative Assessment

3.9.7 Schedule 4 of the EIA Regulations requires that the cumulative effects of the Project should be included within the ES.

3.9.8 The EIA Regulations does not set out a methodology for cumulative impact assessment. However, in many cases the broad methods employed for Sustainability Appraisal (SA) and Strategic Environmental Assessment (SEA) can be used. The European Commission has also produced a 'Study on the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' (May 1999). These methodologies are generally qualitative since many of the interactions are too complex to robustly model quantitatively.

3.9.9 European guidance on cumulative impacts (Document EC DH XI) "Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions" (May 1999) defines cumulative impacts

as “impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project”.

3.9.10 The guidance goes on to state that:

“Activities in the past, present and future can all have a bearing on the project being assessment and will influence the time frame set for the EIA. Setting time frame “boundaries” will allow for the inclusion of past and future developments which could lead to indirect or cumulative impacts or impact interactions.....

In practical terms the extent of the assessment in terms of how far into the past and into the future will be dependent upon the availability and quality of information. Past activities can often be identified from historical maps, present activities from current maps and future development activities from development plans.....

In setting the future time boundary it is suggested that in general beyond 5 years there is too much uncertainty associated with most development proposals.....

.....It is only reasonable to consider current events and those that will take place in the foreseeable future. Furthermore, the assessment can only be based on the date that is readily available. There needs to be a cut off point at which it can be said that the impacts cannot be reasonably attributed to the project.”

3.9.11 The cumulative impact assessment will be considered in the following categories:

- Combined Effects of Individual Impacts - (arising from the project on a potential receptor. For example noise and dust on a single receptor.); and
- Combined Effects with Other Developments.

Combined Effects of Individual Impacts

3.9.12 Combined effects on individual receptors have been assessed and are set out within Chapter 19, Table 19.2. The residual impacts that have been identified by each discipline have been analysed to identify receptors that may be impacted by combined effects from, for example, Air Quality and Noise.

3.9.13 Where a single receptor has been identified as being impacted by combined effects, this exercise has assessed the potential residual impacts on single receptor.

Combined Effects with Other Development

3.9.14 In respect of potential cumulative effects with other developments the Planning Practice Guidance (Paragraph 24) states the following:

“Each application (or request for a screening opinion) should be considered on its own merits. There are occasions where other existing or approved development may be relevant in determining whether significant effects are likely as a consequence of a proposed development. The local planning authorities

should always have regard to the possible cumulative effects arising from any existing or approved development. There could also be circumstances where two or more applications for development should be considered together. For example, where the applications in question are not directly in competition with one another, so that both or all of them might be approved, and where the overall combined environmental impact of the proposals might be greater or have different effects than the sum of their separate parts."

- 3.9.15 Therefore it is considered that that a robust cumulative assessment will account for any existing or approved developments (i.e. anything with planning permission) and any application which could give rise to cumulative impacts.
- 3.9.16 The scope of committed developments to be assessed within the cumulative assessment will be based on a criteria set out in each technical topic, if relevant.
- 3.9.17 On the 16 June 2015, the Council provided a list of major applications (10+ units / 1000+sqm floorspace) in the N17 postcode (Tottenham, South Tottenham and Haringey) that had been approved in the last 5 years or pending. The list covered all applications within a 1 mile radius of the Project Site. In addition to this, details of 3 significant major applications were included that were outside of the N17 postcode. This information was subsequently compiled into a schedule and mapped out which has been included within Appendix 3.2.
- 3.9.18 The schedule and map were issued to the technical consultant team for their consideration to scope in or out the committed developments that would be included within their assessment. This is based on their standard practices and using their professional judgement. Some of the developments identified had already been captured within the 2015 traffic survey, and therefore it is considered unnecessary to assess them further within the cumulative impact assessment.
- 3.9.19 A summary of Appendix 3.2 is set out in Table 3.1 below:

Table 3.1: Summary of Cumulative Developments

Reference Number	Project Description	Topics that have included the developments within their assessments
HGY/2008/2220	Demolition of existing buildings and erection of 4 storey building comprising 366 sqm of retail floorspace plus Kingdom Hall with 34 flats, plus 17 car spaces and 44 cycle spaces.	No Potential Cumulative Impact Identified
HGY/2009/1122	Demolition of existing building behind retained facade and erection of a four storey building, retail / commercial unit; a three storey building; 4 two storey houses.	Cultural Heritage
HGY/2009/1532	Retention of the existing structural frame comprising Scotland Green House, rebuilding of the front and rear elevations, adding a fourth storey to the existing building and erection of a new four storey building to the front of the site to provide 42 residential units and one commercial unit.	Cultural Heritage and Townscape and Visual
HGY/2009/2123	Demolition of Broadwater Farm Primary School and William C Harvey Special School, and redevelopment of the site to provide a purpose-built two storey inclusive learning centre (520 places, primary age).	No Potential Cumulative Impact Identified
HGY/2009/2140	Demolition of existing buildings (500 White Hart Lane and Hubert House) and erection of new steel clad light industrial unit.	No Potential Cumulative Impact Identified
HGY/2010/0201	Demolition of existing buildings and erection of 3 storey buildings to provide 175 sqm of retail floorspace and 39 residential units.	Cultural Heritage and Townscape and Visual
HGY/2010/1000 HGY/2013/1973 HGY/2013/1976 HGY/2015/0797 HGY/2015/0964	Demolition and comprehensive redevelopment of a stadium, with hotel, retail, museum, offices and housing.	Cultural Heritage and Townscape and Visual
HGY/2010/1897 HGY/2010/1427 HGY/2010/1897 HGY/2015/0795 HGY/2015/0798	HGY/2010/1897: Demolition of all structures for the development of up to 1210 residential units, student accommodation, office, hotel, retail, a health centre, a health club, crèche, and a primary school. Building blocks ranging in height from 1 to 18 storeys. HGY/2010/1427: Erection of two 10-storey blocks to provide 140 flats. HGY/2010/2090: Erection of a part 7, part 10 and part 12 storey building to comprise student accommodation (524 bed spaces). HGY/2015/0795: Approval of reserved matters for 194 residential units, 1600 sqm of retail floorspace.	Townscape and Visual
HGY/2011/0814 HGY/2014/0055	Development comprising of construction of three industrial buildings accommodating a total of 13,251 sqm (142,629 sqft) of gross employment floorspace.	No Potential Cumulative Impact Identified
HGY/2011/2302	Redevelopment of site comprising of single storey food store with 88 vehicle parking spaces.	Cultural Heritage
HGY/2012/0427	Erection of 4 storey building (plus basement) to provide A1 retail use at ground and basement levels and 26 residential units.	Cultural Heritage and Townscape and Visual
HGY/2012/0563	Conversion of Grade II listed building to provide 9 residential units and erection of a new building to the rear to accommodate 4 self contained flats.	No Potential Cumulative Impact Identified
HGY/2012/2128	Comprehensive redevelopment of the Brook House, including the erection of a 22 storey building providing 100 residential units and 190 sqm of commercial floorspace, two buildings of 6 and 9 storeys respectively providing 101 residential units and a part 2/part 5 storey building comprising a 2,388 sqm 2 form entry primary school and 21 residential units.	No Potential Cumulative Impact Identified
HGY/2013/0155 HGY/2015/1098	Partial demolition of existing buildings, retaining existing historical facade, construction of student accommodation over 3 and 4 floors to provide 64 student rooms and amenities areas.	No Potential Cumulative Impact Identified

HGY/2013/0745	Erection of 4 storey building comprising 3 commercial units and 16 residential units.	No Potential Cumulative Impact Identified
HGY/2013/1792 HGY/2014/1648 HGY/2013/1792	Demolition of Unit 11, Mowlem Trading Estate, resurfacing of trading estate service road, relocation of electricity substation and redevelopment of land fronting Watermead way.	No Potential Cumulative Impact Identified
HGY/2013/2465	Redevelopment of the site to provide a new four storey building housing 50 extra care residential units (Use Class C3).	No Potential Cumulative Impact Identified
HGY/2013/2610	Works to extend the operational railway station at Tottenham Hale.	No Potential Cumulative Impact Identified
HGY/2014/0498	A 96 bed hotel (Class C1) including a 146sqm restaurant/bar, 3 disabled car parking spaces and 6 dedicated cycle spaces.	Air Quality, Noise and Transport
HGY/2014/1041	Demolition of side and rear extensions. Conversion of part ground, first and second floors into four flats.	Air Quality, Noise and Transport
HGY/2014/1080	Redevelopment of the site to provide a new four storey building housing 52 extra care residential units (Use Class C3).	Air Quality, Noise and Transport

- 3.9.20 With regards to the cumulative assessment of multiple development, it is difficult to determine the exact level of significance that can be attributed to multiple development, particularly where those developments have not been subject to an EIA. As such, in the absence of EIA for multiple developments, assessments have to be conducted based on professional judgement.

High Road West

- 3.9.21 The Council and the Greater London Authority ("GLA") are working on a 20-year regeneration programme for Tottenham, which is focussed on delivering in excess of 10,000 new homes in the wider area. The plan includes the regeneration and redevelopment of the large housing estate known as High Road West. Whilst High Road West is not defined as cumulative development as set out above, in pre-applications with the Council they expressed a strong desire for High Road West to be considered within the ES with regards to the potential for Transport and Air Quality impacts.
- 3.9.22 The overall High Road West site allocation has been masterplanned for comprehensive redevelopment creating a mixed use neighbourhood including a new public realm linking White Hart Lane Station and the redeveloped football stadium as well as an expanded local shopping centre for the High Road.
- 3.9.23 The site requirements as set out within the Council's and GLA's regeneration plan states that there will be:
- A minimum of 1,400 new home with a mix of tenure, type and unit size;
 - Creation of a new connection between White Hart Lane Station, the High Road and redeveloped football stadium;
 - An increase in the quality and quantity of community facilities;
 - Sympathetic development to heritage assets which should seek to enhance the overall viability and attractiveness of future investment for heritage buildings in the area;
 - New transport improvements delivered including new entrance to White Hart Lane Station
- 3.9.24 The Council has prepared a masterplan for the area which was consulted on and later adopted on 16 December 2014. This masterplan sets out that the development will deliver approximately 1,200 units. However, taking into account the demolition of 297 units and the development of Brook House delivering 222 units, the total number of units is 1,125. However planning permission has not yet been granted for

the High Road West scheme.

- 3.9.25 In the absence of a planning permission (or a planning application) High Road West has only been taken into consideration within the cumulative impact assessment of Air Quality, Noise and Traffic matters as it is only possible to make reasonable assumptions in respect of these topics. A sensitivity test was undertaken for Traffic chapter based on the masterplan area delivering 1,125 units, which has been taken into account within the Air Quality and Noise assessments.

Construction Compound - Cumulative Development Consideration

- 3.9.26 The current position that has been assessed is for materials to be transported to and from the Project Site from the A1010 via the M25. However, a temporary Construction Compound at White Hart Lane Depot, 46-48 White Hart Lane, N17 8DP has been proposed as an option by the Club to support the construction phase of the Stadium (Phase 1 and 2). A separate planning application will be submitted for this proposal simultaneously with this application.
- 3.9.27 The potential quantitative effects that may arise from pursuing the option of the use Construction Compound have been considered with regard to Air Quality, Noise and Traffic impacts. In particular impacts that may arise from construction vehicle trips to and from the Construction Compound and Project Site and associated impacts on the A1010 have been considered. The ES assesses impacts in these topic areas both with and without the use of the Compound. It is considered that the Construction Compound is unlikely to give rise to significant impacts within the remit of any other disciplines.
- 3.9.28 The site may be utilised as a temporary construction compound that could potentially allow the construction of the Stadium to be undertaken more efficiently. The site would principally provide the following facilities:
- Site Reception;
 - Site Management Offices;
 - Welfare Facilities;
 - Material Storage Area; and
 - Concrete Batching Plant.
- 3.9.29 The site would be secured by 2.4m hoarding and manned 24 hours a day.

4. Description of the Project

4.1 The Need for the Project

- 4.1.1 The Club has already secured the necessary approvals to enable the development of a new stadium and associated developments on the Project Site. However, this process has taken over 7 years, during which time there has been a change in the Club's requirements (including technical requirements and specifications for a world class stadium).
- 4.1.2 In the intervening period the context for development and regeneration in the local and wider area has changed. The Council and the GLA are tasked with facilitating the regeneration of Tottenham with a focus on delivering in excess of 10,000 new homes in the wider area over a 20 year period. This is level of regeneration that was not anticipated at the time of the inception of consented applications and therefore this Project seeks to respond to the changing context.
- 4.1.3 The Club appointed a new design team with Populous appointed for their specialism in stadium and sports related development and Allies & Morrison appointed for the experience in residential buildings.
- 4.1.4 Key factors in the need for the for the Project include:
- The need to place the stadium in its heritage context in a more holistic manner;
 - The need to improve crowd safety;
 - The need to expand the multi use nature of the stadium, and
 - The need to improve the overall viability of the Project.

4.2 The Planning Application

- 4.2.1 The planning application includes the Project Site as shown on Drawing POP-4494-PLN-GA-0119-00 which illustrates both the Planning Application Boundary (Appendix 1.1). The planning application is a hybrid application in that it contains both full and outline elements – the outline elements are shown edged green on Drawings POP-4494-PLN-GA-0120-00 to POP-4494-PLN-GA-0140-00.
- 4.2.2 As well as the planning application a Listed Building Consent application has been submitted in relation to work to Warrington House.
- 4.2.3 As set out in the Planning Application, the description of the Project is as follows:
- 4.2.4 "Proposed demolition and comprehensive phased redevelopment for stadium (Class D2) with hotel (Class C1), Tottenham Experience (sui generis), sports centre (Class D2); community (Class D1) and / or offices (Class B1); housing (Class C3); and health centre (Class D1) together with associated facilities including the construction of new and altered roads, footways; public and private open spaces; landscaping and related works. Details of "appearance" and "landscape" are reserved in relation to the residential buildings and associated community and / or office building. Details of "appearance" and "scale" are reserved in relation to the sports centre building. Details of "appearance" are reserved in relation to the health centre building."

- 4.2.5 *Appearance* (the aspects of a building or place which determine the visual impression it makes, excluding the external built form of the development) and *Landscape* have been reserved in relation to the residential towers. Matters submitted for detailed approval include *Layout* (where the blocks sit on the site and relation to other buildings), *Scale* (the height, width and length of each building proposed in relation to its surroundings) and *Access*.
- 4.2.6 *Appearance*, *Landscape* and *Scale* have been reserved in relation to the Sports Centre and the Community Health Building. Matters submitted for detailed approval include *Layout* and *Access* (where the building is accessed from the street and Podium).
- 4.2.7 Full planning permission is sought for the Stadium, the Tottenham Experience and the Hotel. Outline permission is sought for the Residential, Sports Centre and the Community Health Building.

Full Permission	Outline Permission
Stadium (Inc. Podium)	Residential (Inc. Plinth)
Tottenham Experience Centre	Sports Centre
Hotel	Community Health Building

4.3 The Project

- 4.3.1 The Project involves the comprehensive redevelopment of the Project Site, including demolition of the existing Stadium and a number of other buildings, with the exception of Warrington House. See Paragraph 4.3.13 for further detail.
- 4.3.2 The below Tables set out the details of each development component of the Project. The development components are the following:
- The Stadium (including the Podium);
 - The Tottenham Experience (including Warrington House);
 - The Hotel;
 - The Sports Centre;
 - The Community Health Building; and
 - The Residential Towers and Flexible Community / Office Space within the Plinth.

1. Stadium	
Description	The Project will see a number of changes to that of the existing and consented Stadium. It has been proposed to enhance the Stadium's capacity from the consented scheme by 4,850 with the height increasing by 4m. The existing Stadium has a capacity of 36,284 and is approximately 22-24m in height. As well as the Stadium being used to host THFC matches, the Stadium has been designed to accommodate a number of concerts and non-football related events throughout the year including NFL matches. There will be a 'Skywalk' at the top of the Stadium which will be an attraction for supporters and tourists/visitors.

Total Floorspace (GIA) sqm	119,945
Maximum Height	48m to the eaves from pavement level (High Street) Maximum height of roof is 59.154 AOD
Capacity (seats)	The headline stadium capacity figure of the purposes of this EIA is 61,000 , which is based upon the number of seats that can be sold. In common with all sports stadia, the precise capacity will vary from event to event depending upon the configuration adopted for each event. When account is taken of media seats and seats associated with playing staff, the operational capacity will rise to 61,461.
Events	Annually, there will be 30 Football Matches (THFC events) (typically, but not limited to). In addition, there will be a total of 16 non-THFC events per annum comprising: ▪ 10 Other Major Events (at least 2 of which will be NFL matches); and ▪ 6 Concerts.
Car Parking	822 spaces comprising: ▪ 732 standard spaces ▪ 90 fully accessible spaces ▪ 60 blue badge spaces Access and egress from Worcester Avenue.
Cycle Parking	Already included as part of the Lilywhite House development
Lighting	Floodlighting will be provided to meet the requirements for English Premier League football and Category 3 recommendations for high definition television (HDTV), with 1,650 lux vertical illuminance value in the direction of the main fixed cameras in the West stand, and a 1,200 lux in direction of secondary fixed cameras in the East stand. Intermediate levels of illuminance will also be provided for reserve fixtures and training, while enhancements will be included for UEFA Champions League (Group Stage) and American Football (NFL) matches. Floodlighting lamps will be fixed to the secondary roof trusses around the pitch on all sides, angled to ensure the players, spectators and broadcasters are not subjected to unacceptable levels of glare. The field of play floodlighting is highly directional and is located within the roof and below the eaves line, so light spill to the surrounding area will be minimised.
Screens	The internal HDTV screens are as follows: The South screens (2no.) will be 29.05m x 10.9m and the 2no. screens to the north are 22m x 8.25m. The main TV camera gantry is at the front of the upper tier west and secondary cameras distributed as required by EPL and UEFA Champions League.

	The external screen is a low res LED stick and/or puck system incorporated into the Perforated Aluminium Cladding panels on the west elevation, with dimensions of 8.2m high and 15 wide. Beyond the screen dimensions the LEDs produce a lighting effect covering a proportion of the perforated panels on the west elevation.
Podium	The podium will be 4 storeys (Including 2 basement levels). All residents and visitors will have access to the play and other outdoor amenity spaces on the podium level of the Stadium, as well as a piazza outside the Stadium entrances. The podium and other areas of public realm have been designed to connect the site with its surrounding area. The podium and other area of public realm will be designed to manage crowd movements on match days (enabling the Stadium to meet its 8 minute evacuation time providing an area for supporters to converge) with the provision of new public spaces. On non-match days there will be complete permeability across the site between the High Road and Worcester Avenue. With the exception of the north-east service access, there will be complete public access around the Stadium.

2. Tottenham Experience

Description	The Tottenham Experience incorporates the existing Grade II Warminster House. This building will be accessed from High Road and will comprise a shop for Spurs merchandise and a showroom/museum of the football clubs history and achievements.
Total Floorspace (GIA) sqm	4,311
Floorspace Breakdown (GIA) sqm	Megastore – 1,955 Museum – 728 Café – 260 Cinema – 400 Ticket Office – 242 Skywalk Change and Reception – 100
Maximum Height	14.1m above ground 25.1 AOD
Storeys	3
Car Parking	No car parking spaces will be allocated for the Tottenham Experience
Cycle Parking	Already included as part of the Lilywhite House development

3. Hotel

Description	A hotel will be located on the corner of Park Lane and High Road (south-western corner of the site). As with the Sports
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	Centre, the hotel will be accessible from both levels off Park Lane and the Podium.
Total Floorspace (GIA) sqm	18,820
Units	180 hotel bedrooms 49 serviced apartments
Maximum Height	89.2m above ground 100 AOD
Storeys	23
Car Parking	Approximately 76 car parking spaces will be allocated for the Hotel (68 standard spaces and 8 fully accessible spaces)
Cycle Parking	6 racks for 12 cycles in the Hotel basement

4. Sports Centre

Description	A Sports Centre will be located to the west of the residential blocks fronting Park Lane and will be accessible from the different levels from both Park Lane and the podium. This includes a Multi-Use Games Area (MUGA), and an indoor/outdoor extreme sports facility with climbing walls and a diving pool. A gym associated with the Extreme Sports centre will provide further local recreation facilities, accessed both from street level and the podium adjacent to the westernmost Tower D.
Total Floorspace (GIA) sqm	2,100
Maximum Height	51.2m above ground 62m AOD
Storeys	7
Car Parking	No car parking spaces will be allocated for the Sports Centre
Cycle Parking	8 racks for 16 cycles along Park Lane

5. Community Health Building

Description	The Project includes a building to the north-east of the site that will accommodate a Health Centre. The ground floor of this building will be used for servicing of the Stadium. Levels 1 and 2 will be used as a community health centre. The roof of this building will accommodate plant for the Stadium which will include generators and air vents.
Total Floorspace (GIA) sqm	2,000
Maximum Height	21m above ground level 31.8m AOD
Storeys	2
Car Parking	No car parking spaces will be allocated for the Community Health Building

Cycle Parking	6 racks for 12 cycles at north end of Worcester Avenue
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6. Residential					
Description	The Project comprise a cluster of four residential towers of varying height above a three storey plinth in the southeast corner of the Stadium redevelopment site. 25m x 25m and 25m x 30m masonry clad rectangular towers with recessed balconies are proposed. The tallest Tower C in the centre of the group is set back from both Park Lane and Worcester Avenue to minimise the visual impact and overshadowing of the immediate setting. Each flat has been designed with a private inset or semi-recessed balcony. Additionally, the Project includes private and semi-private open space for the residents. Rooftop 'sky gardens' are proposed within the chamfered roof form at the tops of each tower, providing external amenity space for all residents to enjoy. In addition to 5 townhouses, a total of 580 units will be split across blocks A, B, C and D set out in the below table. All Apartments with the exception of 2 no. Studio units and 3 no. 2 Bed units have private balconies or wintergardens; Area calculation as follows: 5m2 min (for studio or 1bed) + 1m2 per each additional occupant in unit. There will be Community and / or Office space at ground, first and second floor (within the Plinth, as per consented scheme). Car parking and cycle parking spaces will be accommodated over first, ground, basement and lower basement levels of the Plinth.				
Flexible Community Office Use Floorspace (GIA) (Sqm)	3,897 over ground, first and second floor				
Communal Amenity Space / Playspace	There will be a total of 2,695 sqm of Community Amenity Space, which is inclusive of playspace: Residential Plinth: 1,835sqm* Roof Gardens: 860sqm** <i>*Includes 866sqm of green space</i> <i>**Includes 250sqm of green roof space</i>				
Brown Roof	1,090 sqm				
Total No. of Units	585 (including 5 x 3bed Townhouses)				
Indicative Unit Mix					
Block	Studio	1 Bed	2 Bed	3 Bed	Total
A	4	69	88	6	167
B	6	49	30	6	91
C	4	101	120	6	231
D	6	49	30	6	91
Total	16	250	288	31	580

Maximum Height	Tower A: 94m above ground (104,620m AOD) Tower B: 67m above ground (78,220m AOD) Tower C: 121m above ground (131,020m AOD) Tower D: 69m above ground (80,220 AOD)
Storeys	Tower A: 24 (27 above ground) Tower B: 16 (19 above ground) Tower C: 32 (35 above ground) Tower D: 16 (19 above ground)
Car Parking	243 (216 standard and 27 Blue Badge Holders). In addition, there will be 31 motorcycle parking spaces. In total, there will be 0.47 parking spaces per dwelling.
Cycle Parking	882
Plinth	The plinth will be 4 levels (including 2 lower basement levels). Courtyard roof gardens are provided at raised plinth level, which will incorporate local play space and landscaped outdoor garden spaces (Drawing No. 1007-SK_002 in Appendix 1.1 set out details of Amenity Space and Ecological planting). There will be up to 3,897 sqm (GIA) of commercial floorspace located partially at ground and first floor level, with the substantive element at second floor level. Access from the Plinth down to basement levels provides access for residents to recycling and refuse storage spaces, plant rooms and car and cycle parking areas. Additionally, a members' club with a bar, lounge and spa facility for residents and local neighbours is proposed at Plinth level 2. This will be accessed directly from street and main podium levels, and will feature landscaped courtyards providing daylight and planted spaces. Courtyard roof gardens are provided at raised plinth level, which will incorporate local play space and landscaped outdoor garden spaces.

4.3.3 All Application Drawings are set out within Appendix 1.1 which includes the relevant drawing schedules.

4.3.4 In summary, the Project will deliver the following floorspaces:

Land Use	Use Class	Area GIA (sqm)	Units
Leisure (including stadium)	D2	122,000	n/a
Residential	C3	49,000	585 (max)
Sui Generis / Tottenham Experience	Sui Generis	4,311	n/a
Business	B1	4,000 (max)	n/a
Community and Culture	D1	4,000 (max)	n/a

Hotel / Serviced Apartments	C1	18,820	925
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Fan Zones

- 4.3.5 During NFL events, Fan Zones are anticipated to be set up which will be in situ before, during and after the match. The public and ticket holders will be able to congregate in these areas which will accommodate a number of facilities including food and beverage, potentially music and family friendly events.
- 4.3.6 It is currently anticipated that one of these Fan Zones will be hosted on the Southern Podium, and other locations are being investigated by the Club and Haringey Council. The delivery of these Fan Zones will be subject to the grant of appropriate licenses, and where necessary separate planning permission (although they may constitute permitted development).
- 4.3.7 Further details of the Fan Zones (including the hours of operation, likely number of attendees and range of activities) are unknown at the time of submitting this planning application, therefore it has not been possible to assess these areas as part of the ES. However, given the temporary nature and type of facilities being investigated, it is not anticipated that they will have the potential to give rise to significant effects. When further information is made available, these areas can be taken into further consideration, for example, through an EIA Screening where appropriate.
- 4.3.8 Further details of the Fan Zones are set out within Section 6.9 of the Design and Access Statement.

Public Realm / Landscaping

- 4.3.9 The public realm stretches around all sides of the Project site, connecting the stadium with the other buildings in the Southern Development and the community health centre. The landscaping arrangements includes new streetscapes running along the perimeter of the site as well as areas of podium to the north and south of the Stadium. The south podium incorporates a new public square intended to host a variety of sports and community uses, as well as connecting the wider regeneration areas to the east and west of the site.
- 4.3.10 The Southern Podium will incorporate a number of features, including a Multi-use hardcourt zone, tiered planter benches, a water feature, abseiling 'landing pad' and a nature garden.
- 4.3.11 New trees and landscaping will be incorporated along High Road, Park Lane, Worcester Avenue, Square and podium levels. The materials that will be used throughout the public realm will include (but will not be limited to) York Stone, Granite and resin bound gravel.
- 4.3.12 Details of the landscaping are illustrated on Drawing No. POP-4494-PLN-GA-8000 (Appendix 1.1), and are set out within Chapter 13 of the Design and Access Statement that has been submitted with this planning application.

Heritage Assets

- 4.3.13 It is proposed that Number 744 High Road (Warnington House) will be retained as part of the Project. Numbers 750 High Road (formerly Valentino's Nightclub), 748 High Road (Redhouse Coffee Palace) and 746 High Road (Edmonton Dispensary) are proposed to be demolished. Number 750 High Road is a

public house with all floors of the property in this use. Number 748 High Road includes a coffee shop at ground floor with club meeting room and administrative offices above. Numbers 746 and 744 High Road are used by the Club as offices ancillary to the Stadium. Number 744 High Road (Warmington House) is a Grade II listed building. Numbers 746, 748, 750 are locally listed buildings.

- 4.3.14 Further justification for the loss of the 3 locally listed buildings is set out within the Crown Safety Matrix, a detailed assessment undertaken by Movement Strategies on behalf of THFC (Appendix 4.5) and also within the Planning and Heritage Statement forming part of the planning application. This is discussed in further detail in this Statement.

Accessibility

Pedestrians and Cyclists

- 4.3.15 Pedestrian improvements are focussed on the provision of large open spaces around the Stadium which increase the permeability of the Project Site compared with the existing situation. However improved crossing facilities are proposed at the Northumberland Park / High Road junction and at the Park Lane / High Road junction; these are described below. Improvements are also proposed to Worcester Avenue as part of the landscaping proposals for the Project and these are described in the next section.
- 4.3.16 The Project will result in changes to the cycling network and facilities. These include the removal of Paxton Road from the centre of the site, resulting in the loss of a cycling route. However, there will be an increase in the number of lanes on Northumberland Park adding capacity to the street and secure, covered cycle parking facilities across the site. This will result in a significant increase in cycle parking provision. Cycle access to the buildings and the site will be provided from High Road, Northumberland Park, Worcester Avenue and Park Lane.

Highway Arrangements

- 4.3.17 Paxton Road and Bill Nicholson Way (together with two small sections of the High Road) were stopped up earlier in 2015. Access to the Project Site will be provided from High Road, Northumberland Park, Worcester Avenue and Park Lane. There will be an overall reduction in vehicular accesses across the site.
- 4.3.18 A new junction will be created to establish an access point into the basement for the Stadium and Hotel car parking. A servicing access point will be created at the north-east of the Stadium providing an access point for service vehicles. Furthermore, a new junction will be created on Worcester Avenue to create an access into the car park in the lower levels of the Plinth.
- 4.3.19 There will be the creation of two new pedestrian crossings across High Road opposite Moselle Place and Brereton Road.

4.4 Sustainability

- 4.4.1 A Sustainability Statement has been submitted with this ES (Appendix 4.1) which sets out the objectives and deliverables for the construction and operation of the Project in order to communicate the measures implemented to ensure sustainable development.

4.4.2 To ensure sustainable development, the specification of new construction materials will prioritise those with minimal environmental impact associated with their use and that are economically feasible. Where possible and appropriate, the Project will aspire to meet the following targets:

- Use of environmentally sensitive, non-toxic building materials;
- Use of materials and products that have low Volatile Organic Compounds (VOC);
- Use of insulation materials and refrigerants with low Global Warming Potential (GWP);
- Use of insulation materials and refrigerant with zero Ozone Depletion Potential (ODP);
- Minimising use of new aggregates whilst promoting the use of recycled crushed aggregates (RCA);
- Specifying materials that are graded B-upwards in the BRE Green Guide to Specification; and
- No use of materials proscribed in the Montreal Protocol.

4.4.3 In addition to the above, the Project will commit to the following:

- All contractors will develop and implement a Construction Environmental Management Plan for each site (see Section 5.6);
- All contractors will develop and implement a Construction Waste Management Plan for each site (see Section 5.7);
- All sites will be registered under the Considerate Constructors Scheme; and
- All demolition work will adhere to The ICE Demolition Protocol.

4.4.4 To further ensure sustainable development, all major non-domestic developments will achieve a 'Very Good' rating as a minimum under the most up-to-date BREEAM or equivalent scheme. The report states that the BREEAM 2014 New Construction (NC) will be used to assess the non-domestic buildings within the Project individually.

4.4.5 Further to the above, the Sustainability Report summarises how the environmental sustainability objectives for the Project will be delivered by a series of strategies addressing the various environmental issues. The report summarises the conclusion of the individual technical reports that have been submitted with this ES, which includes the Energy Strategy, Water Strategy and Utilities Report that are summarised in Sections 4.4 to 4.7 of this ES.

4.5 Energy

4.5.1 In accordance with relevant policies, energy efficiency of the Project has been achieved through following the energy hierarchy. The approach aims to minimise energy consumption from the outset through the use of low energy, passive measures and efficiency systems before the deployment of low and zero carbon technologies.

4.5.2 The key components of the strategy are illustrated below, while a full detailed description can be found in the Energy Statement which accompanies this document. This includes the renewable and low carbon energy assessment and Part L energy modelling results. Further details are set out within Appendix 4.2.

4.6 Water

4.6.1 The proposed water strategy shall follow a hierarchical structure to minimise the potential impacts of the

Project on the local natural resources and existing infrastructure. The approach taken is to reduce water demand as far as possible at source, before considering efficient fixtures and fittings, efficient distribution and alternative sources for lower grade uses. Importantly, given the nature of the site, the strategy will also tie in with a site-wide sustainable drainage strategy which incorporates the use of sustainable drainage systems (SUDS).

4.6.2 A summary of the measures that will be taken to reduce the Projects water demand are set out below, however further information is set out within Appendix 4.3:

- Improved Efficiency at Point of Use: As illustrated in Table 4.2 of the Sustainability Report (Appendix 4.1), the NDP proposes to use water efficient fittings that are overall, significantly more effective than the guidance given by BREEAM; and
- Increase system efficiency: Improvements in the design and distribution of the water system can reduce leakages and losses across site. Intelligent design that reduces the number of dead legs and minimises overall distribution lengths shall be sought, whilst additional features such as flow restrictors and pressure reducing valves will be considered. The use of metering for all substantial uses and leak detection linked to a Building Management System (BMS) will be encouraged to enable close monitoring and management of water use.

Drainage

4.6.3 The site currently drains to separate surface water and foul sewers. The Project will maintain the separation and connect into these networks. Local network upgrades will be made on Worcester Avenue with the addition of a new sewer. This is important in terms of managing the impact of the increase in discharge as a result of the increase in Stadium capacity. The installation of water efficient fittings will further minimise the increase in discharge volume.

4.6.4 The surface water drainage of the site will aim to improve the existing situation through the introduction of SUDS across the site. This will provide attenuation of storm water to reduce the flood risk to the downstream catchments as well as to the Project itself.

4.6.5 As a result of this approach the site-wide surface water discharge will be reduced from the current rate of 284l/ha/s to 150 l/ha/s. The surface water drainage strategy has been approved in principle by the EA, Thames Water Utilities (TWUL) and Haringey Council.

4.6.6 The foul drainage of the Project will connect into the existing network and upgrades will be provided to ensure that the systems do not back up and avoid exceeding existing network capacity. The Stadium will drain into the High Road sewer to the west, the hotel and residential development to the South to Park Lane. The foul water drainage strategy will require a pumped system and has been approved in principle by TWUL.

4.6.7 Extensive consultation, has taken place between the design team and the Environment Agency (EA). The EA are aware of the Project and have confirmed informally their approval of the proposals. They acknowledge that the reduction of the surface water run-off rate from 284l/s/ha to 150l/s/ha represents a significant improvement and welcome the reductions in water usage that have been demonstrated against the baseline demands.

Flood Risk

- 4.6.8 As set out in Section 3.8.7 of this ES, the site is located in EA Flood Zone 1. The provision of surface water attenuation will significantly reduce the risk of surface water flooding for the site. A controlled discharge rate from the underground storage tanks will also reduce the risk of the Project surcharging the surface water drainage network and impacting on third parties.
- 4.6.9 The Flood Risk Assessment Report has been submitted with this application (Appendix 10.1).

4.7 Utilities

- 4.7.1 A Utilities Planning Report (August 2015) has been prepared and submitted with this ES (Appendix 4.4). The utilities will be provided in stages for the Project to suit the phasing of construction. The Project can be served with all utilities, however there will be off site strengthening required to some utilities as described below:

Electricity

- 4.7.2 The required HV electric supply requires strengthening of the strategic UKPN networks at Bruce Grove; this is already in hand as an independent UKPN project due for completion in early 2017. A new 11kV cable route is to be laid from Bruce Grove substation to the site area to provide supply.

Water Supply

- 4.7.3 The potable water supply for the Stadium is to be provided from the existing distribution network in the High Road. Strengthening is required, however this consists of opening an existing valve to allow a greater flow from the existing trunk main to the local distribution network.

Telecommunications

- 4.7.4 The telecoms and broadband services to the Stadium and the other parts of the Project will be provided from the existing infrastructure in the streets around the Stadium. Strengthening may be required depending on which providers are use but this will be arrange and carried out by the provider.
- 4.7.5 Existing utilities serving the existing Stadium will be kept in place until the Stadium goes out of use and removed at that stage.

Gas

- 4.7.6 The gas supply for the Stadium is to be taken from the existing low pressure main in the High Road and National Grid Gas have confirmed there is sufficient capacity with no strengthening.

4.8 Waste

Construction Waste

- 4.8.1 Tottenham Athletic Football Club Limited are committed to a strategic approach to managing materials and construction materials and ensuring the impact on the environment is minimised by reducing amount sent to landfill. Section 5.7 of this report sets out further information on construction waste.

Operational Waste

4.8.2 A Waste Management Policy has been prepared which has informed this ES (see Appendix 2.1). THFC is committed to manage its waste in line with the waste hierarchy, as shown in Appendix 2.1, and other relevant national and local legislation and guidance.

4.8.3 The Club recognises that in order for the buildings to operate in a productive and efficient manner good waste management is required. A meeting with THFC staff and the design team was held on 12th February 2015 to discuss the preliminary waste management aims and aspirations. THFC have produced the Waste Management Policy to ensure that all waste generated is disposed of safely and efficiently to ensure good waste management.

4.9 Comparison of Consented and Proposed

4.9.1 A comparison of the existing planning permission and the emerging proposals is set out below:

Table 4.2: Comparison between Consented and Proposed

	Consented	Emerging Proposals
Residential		
No. of Units	285	585
Number of Blocks	4	4
Open Space (communal for exclusive use of residents)	2,900 sqm	2,695 sqm
Storeys	Up to 12 storeys	From 16 and up to 32 storeys
Parking	200	243
Health Centre and/or Health Club and/or College (Class D1 or D2)		
Floorspace	Up to 15,000 sqm	Not part of current scheme
Storeys	3 - 12	
Community Health Building (North-East Building)		
Floorspace	Not part of previous scheme	2,000 sqm
Storeys		2
Tottenham Experience		
Floorspace Height above site ground level	Not part of previous scheme	4,311 sqm
Storeys		3 storeys
Extreme Sports Centre		
Floorspace	Not part of previous scheme	2,100 sqm
Height		7 storeys
Stadium		
Capacity	56,250	61,000
Height	42m above site ground level	45m above site ground level
Parking	Car Parking Spaces – 319 associated with the Stadium, of which 18% would have been accessible	Car Parking Spaces – 822 associated with the Stadium, of which 18% will be accessible
Events	26 THFC Football	30 THFC football

	events at capacity. 4 concerts at near capacity.	events 6 Annual concerts at near capacity 10 non-THFC football events
Hotel*		
No. of Bedrooms	150	180 (+49 Serviced Apartments)
Parking	40	76 (of which 10.5% will be accessible)
Storeys	12	23

*Hotel –Note- The permission for the hotel has lapsed and therefore is only provided for information purposes only.

4.10 Alternative Locations and Options

Alternative Locations

- 4.10.1 The EIA Regulations do not require the full assessment of all potential alternatives, only a reasonable account of those actually considered by the developers prior to submission of the planning application.
- 4.10.2 Alternative development options within EIA are often considered primarily in terms of location, however, the Club has a long history within Tottenham and is seen by many as an integral part of Tottenham. In addition, the Council has expressed a desire to have the Club remain in Tottenham and has acknowledged the regeneration potential offered by the Project. A permanent move away from Tottenham would have an immediate and profound financial affect on the area and would seriously undermine the Council's regeneration initiatives for the area. The Club are not looking at alternative locations and wish to redevelop their existing site. Therefore it is not necessary to consider alternative locations to deliver the project.

Alternatives Options

- 4.10.3 There are limited realistic options that have been considered by the developers prior to submission of the planning application: the Consented Scheme could be considered to be an alternative option as it has the benefit of planning permission. The design process was an iterative process whereby different design and massing were explored before. This is detailed within the Design and Access Statement which is submitted with the application documentation. For completeness some keys points of this process have been set out below in Option 2,

I) Option 1: Consented Scheme

- 4.10.4 The consented scheme would see the stadium built out at a capacity of 56,250 together with associated development including housing (285 residential units) (permission references HGY/2010/1000 and HGY/2010/2351). This scheme, designed by KSS (see Figure 4.1), and the subsequent amendments to the scheme were fully assessed under EIA and Environmental Statements where submitted with the submission and as such it is not considered appropriate to duplicate the assessments here.

Figure 4.1: Option 1 Illustration



II) Option 2: The Project

- 4.10.5 As set out in Section 4.1 (The Need for the Development), the consented scheme design has its origins back in 2007, with the stadium design finalised in 2010, at which point a planning application was submitted and subsequently approved in 2011. However It was not until earlier this year (2015) that the Club had secured all the relevant statutory approvals (in particular the resolution of a legal challenge to a compulsory purchase order) to allow it to commence with construction of the development.
- 4.10.6 During this significant delay the regeneration context for the Project has changed considerably and so too has the Club's own requirements for the stadium and associated development, as well as the technical requirements and specifications demanded for world class stadia. Details of the change of the regeneration context are set out in the Planning Statement.
- 4.10.7 Responding to this changing context, the Club appointed a new design team of market leading design specialists, including Populous (stadia and sports related development); Allies & Morrison (residential); and Donald Insall Associates (heritage architects and advisors).
- 4.10.8 As part of their design review of the consented scheme Populous sought to investigate ways to improve the crowd safety along the High Road. Movement Strategies were brought on board as crowd safety specialists who considered the consented scheme unsafe in terms of crowd movement along the High Road. In order to address this the design team, with input from heritage specialists Donald Insall Associates, explored the option to demolish the three locally listed building but to retain and incorporate Warmington House into the scheme (the Tottenham Experience)
- 4.10.9 Allies and Morrison leading the design of the southern residential buildings, explored ways to increase the scale of the residential buildings. Details of the design evolution are set out clearly in the Design and Access Statement and it is not considered appropriate to assess them further as part of consideration of

alternatives.

- 4.10.10 The result of the design process is the scheme that is submitted for planning and is assessed as part of this Environmental Statement. An illustration of this scheme is shown in Figure 4.2 below.

Figure 4.2: Option 2 Illustration



- 4.10.11 Details of the design evolution are set out clearly in the Design and Access Statement and it is not considered appropriate to assess them further as part of consideration of alternatives.

4.11 Assessment Scenarios

- 4.11.1 The following scenarios have been assessed within this ES:

- Baseline - This is the Application Site conditions as existing;
- Future Baseline With the Project; and
- Future Baseline with the Project plus Committed Developments.

5. Construction, Phasing and Implementation

5.1 Overview

- 5.1.1 Construction methods are influenced by a combination of factors. These include the existing ground conditions and the preferred methods of the building contractor that will be appointed. While a detailed construction programme for the delivery of the Project has not yet been established, it is possible to describe a generic construction methodology based on anticipated construction methods and timings derived from similar development projects in similar locations.
- 5.1.2 This enables the identification of potentially significant effects at the construction stage and enables suitable mitigation measures to be identified. Clearly these assumptions need to be realistic and appropriate to the Project and many will ultimately be defined in a Construction Environmental Management Plan (CEMP).
- 5.1.3 The construction of the enabling elements of the Project can be undertaken in large part independently of the construction of the Stadium and podium. However, all elements require certain works to be carried out in advance of the construction. These are the remediation of contamination in accordance with the remediation strategy proposed for the site subject to any amendments agreed with the Environment Agency and the Council, demolition of structures around the Stadium. Together these works are referred to as the site preparatory works.

5.2 Site Preparation Works

Remediation Strategy and Methodology

- 5.2.1 A remediation strategy will be agreed for the site in accordance with DEFRA/Environment Agency (2004), Model Procedures for the Management of Land Contamination (CLR11). The strategy will be implemented through a site specific Construction Environment Management Plan (CEMP) which will need to be completed by the contractor prior to construction. This will be reviewed regularly to best suit the practices being undertaken on site.

Earthworks

- 5.2.2 As part of the earthworks the site area is to be excavated to construction platform level and from this level the basement excavation will be undertaken. These works will involve cutting materials and the cut materials will have the following fates: i) re-use as part of an offsite noise bund, ii) disposal to suitably licensed landfill and iii) washing and re-use on site in permanent works concrete and as part of the piling mat.
- 5.2.3 The re-use on site of natural gravels following washing as part of the permanent works concrete will significantly reduce the volume of material that needs to be exported from the site and imported as part of the construction process. It is estimated that approximately 31,000m³ of material will be reused on site.

5.3 Construction Programme

Phasing

- 5.3.1 Table 5.1 indicates that there are three key phases to deliver the Project; Phase 1, 2 and 3. **Phase 1** will

be the construction of the northern section of the Stadium around the existing White Hart Lane, during which the existing Stadium will be demolished. The North-east building will also be construction during this phase. Preparatory works are underway for this phase pursuant to existing permission.

- 5.3.2 **Phase 2** will be the construction of the southern section of the Stadium and the associated podium. This phase will also include the installation of the new retractable pitch. On completion of this phase in 2018, the Stadium will be fully operational.
- 5.3.3 The Tottenham Experience will also be constructed and operational at the same time as the Stadium.
- 5.3.4 **Phase 3** will be the final phase of development which will commence after the completion of Phase 2, with construction work commencing during the operation of the Stadium. The four residential towers and associated landscaping will be constructed during this phase, along with the extreme sports centre and hotel.
- 5.3.5 The Project is intended to be construction between 2015 and 2022. The total construction phase is expected to take approximately 75 month to December 2021.

Programme

- 5.3.6 Under the current programme, construction and associated activates are to be ongoing until 2021.
- 5.3.7 The Project is to be undertaken in three phases taking into account the construction of the Stadium, the North-East buildings and the various elements of the Southern Development.
- 5.3.8 Table 5.1 below sets out the indicative construction phases for the Project. The below programme is based on 12 hour working days, 7 days a week (see Paragraph 5.4.33 for construction working hours).

Table 5.1: Construction and Phasing Programme

Description	Start date	Anticipated Completion
Phase 1 – Stadium Phase (A)		
Ground excavation and remediation	September 2014	October 2015
Test Piles, steel sheet piling, dewatering, propping, gravel washing, concrete batching, concrete piles and pile caps.	March 2015	Test Piles – complete Sheet Piles – complete Gravel washing – November 2015 Concrete piles – January 2016 Concrete Batching – January 2016 Pile Caps/propping

		– February 2016
Piling	September 2015	January 2016
Vacant Possession of Archway Sheet Metal Works	October 2015	
Construction of New Stadium (northern section) around an operational White Hart Lane	March 2016	February 2018
Community Health Building (North-East Building)	2016	2017
Demolition of White Hart Lane	May 2017	October 2017
Phase 2 – Stadium Phase (B)		
Ground excavation and remediation	May 2017	September 2017
Test Piles, steel sheet piling, dewatering, propping, gravel washing, concrete batching, concrete piles and pile caps.	June 2017	October 2017
Piling	July 2017	October 2017
Completion of New Stadium (southern section) and podium	May 2017	August 2018
Construction of THFC Experience	May 2017	August 2018
New Stadium fully Operational	August 2018	
Phase 3 – Mixed-use Phase		
Ground excavation and remediation	May 2017	January 2019
Test Piles, steel sheet piling, dewatering, propping, gravel washing, concrete batching, concrete piles and pile caps.	August 2018	April 2019
Piling	September 2018	July 2019
Construction of Hotel	January 2018	January 2020
Construction of Extreme Sports Centre	2019	2020
Construction of Southern Residential and plinth	2019	2021
Operation of Southern Residential	2022	

5.4 Construction of the Project

i) Anticipated Building Construction

Stadium and Podium

5.4.1 It is anticipated that the Stadium (both Phase 1 and 2) will have a 41 month construction period.

5.4.2 The Stadium is generally reinforced concrete from basement level to level 6, with floors being of post-tensioned concrete. The north podium is also concrete along with the east and west sides of the south podium. The central portion of the south podium, entire south stand and floor levels above 6 are also of steel construction. The outer walls of the stairs and lift cores will be reinforced concrete.

5.4.3 The Stadium will be built in two main phases. The north, east and west can be constructed whilst the current Stadium is in use. The current Stadium must then be partially demolished to allow completion of the new Stadium.

5.4.4 The roof is a cablenet supporting steel rafters. The roof can be partially laid out in the first phase but cannot be lifted until the completion of the compression ring in the second phase.

5.4.5 The completion of each phase of the superstructure construction will be followed by internal fit out.

Tottenham Experience

5.4.6 The Tottenham Experience is envisaged as a mix of steel and concrete framed buildings. The Tottenham Experience will sit under the Stadium podium fronted by two, two storey pavilions. One of these pavilions wrap around the Grade 2 listed Warmington house, and will require sensitive construction with the interfaces.

Community Health Building

5.4.7 The Community Health Centre is envisaged as a mix of steel and concrete framed structure to create a building that sits over the top of the Stadium service yard. The two-storey building sits above the service yard and is enclosed with a mixture of solid panels and glazing, with an outer framework of vertical louvre blades that extend to ground to screen the service yard and also extend up and over the rooftop plant.

Hotel

5.4.8 The hotel will be a concrete framed tower fronting onto the corner of High Street and Park Lane.

Residential and Sports Centre

5.4.9 The residential towers and sports centre are being applied for in outline. As such, the detailed construction method is not yet known.

ii) Piling

5.4.10 Piling works shall be undertaken to ensure sufficient load-carrying capacity for the new Stadium. It is expected that CFA piling techniques will be employed within the Stadium, with a view to reducing noise and vibration levels, as compared to other piling techniques.

5.4.11 It is anticipated that the Stadium will require piles ranging from 0.6m to 0.9m and will be at an approximate depth of 25m below installations level.

iii) Construction Aggregate and Concrete Quantities

Aggregate

- 5.4.12 It is expected that 120,000m³ of aggregate will be excavated from the site. It is estimated that 80,000m³ (60%) of this aggregate will be reused for the construction of the Stadium. As there is the option for the Construction Compound at White Hart Lane Depot to be utilised during construction, there are two scenarios for how this aggregate will be handled.
- 5.4.13 In both scenarios, a temporary concrete batching plant will be set up onsite to produce concrete for the foundations and piles of the Stadium. This is only a temporary facility due to space restrictions onsite. This phase of the construction will require 20,000m³ of aggregated which will be used for concrete batching onsite.
- 5.4.14 If the Construction Compound option is **not** taken forward, then:
- 20,000m³ will be used on the Stadium site for batching concrete before batching plant is removed from site;
 - 60,000m³ will be taken to an alternative concrete batching plant site (taken to the batching plant site before the temporary batching plant is removed from site); and
 - 40,000m³ unwanted taken elsewhere.
- 5.4.15 If the Construction Compound option is **taken forward**, then:
- 20,000m³ will be used on the Stadium site for batching concrete before batching plant is moved to the Construction Compound site;
 - 60,000m³ taken to Construction Compound for concrete batching (taken to the Construction Compound before batching plant is removed from site); and
 - 40,000m³ unwanted taken elsewhere.
- 5.4.16 Due to the outline nature of Phase 3, the level of detail is not yet available to accurately estimate the volumes of aggregate for this Phase. However, the number of construction vehicle trips has been estimated in Section 5.4.29 of this report.

Concrete

- 5.4.17 It has been estimated that approximately 65,000m³ of concrete will be required for the construction of the Stadium. A total of 17,000m³ is expected to be batched onsite using the temporary concrete batching facility. This concrete will be used for the foundations and piles for the Stadium.
- 5.4.18 After the onsite concrete batching facility has been removed from the site, it is expected that a further 48,000m³ of concrete will be required. As there are two scenarios (with and without the Construction Compound), the concrete will either arrive from the Construction Compound, or from another batching facility.
- 5.4.19 Due to the outline nature of Phase 3, the level of detail is not yet available to accurately estimate the volumes of concrete required for this Phase. However, the number of construction vehicle trips has been estimated in Section 5.4.29 of this report.

iv) Construction Traffic

Source of Traffic

5.4.20 Construction traffic movements considers the following sources of traffic:

- Workforce movements to and from Construction Compound / Stadium site;
- Deliveries made to Construction Compound / Stadium site;
- Removal/ import of material from Construction Compound / Stadium site; and
- Trips made by associated trades.

Temporary Road Closures

5.4.21 It is not currently anticipated that there would need to be any temporary road closures within the local area surrounding the Project Site as a result of the construction works. However, this will be reviewed with the Stadium contractor in planning the works, to ensure that environmental impact from any required temporary road closures (e.g. for deliveries of abnormal loads) are kept to a minimum.

Construction Traffic Access/Route

5.4.22 Specific access points into the Project Site will change during each construction Phase (Phases 1, 2 and 3), details of which have not yet been finalised.

5.4.23 **Phase 1 and 2:** Without the Construction Compound, all the Stadium construction traffic for Phases 1 and 2 would route to the construction site by way of the A1010 High Road/Fore Street that connects to site to the A406 North Circular Road. This would still be the route for the Stadium construction traffic if the Construction Compound option is taken forward other than the concrete deliveries and the majority of the aggregate exports.

5.4.24 **Phase 3:** It is assumed that the Construction Compound would become non-operational in late 2017. The facility would not be available for the final stage of construction related to Phase 3, and therefore, all the construction traffic for this phase would route to the construction site by way of the A1010 High Road/Fore Street that connects to site to the A406 North Circular Road.

Peak Construction Traffic Volumes

5.4.25 Set out below are the estimated daily peak construction traffic volumes during each phase. There are two scenarios for calculating the peak trip generation with regard to the construction of the Stadium, which considers the Project with and without the Construction Compound.

5.4.26 It is assumed that the Construction Compound would become non-operational for concrete batching in late 2017. The facility would not be available for the construction of Phase 3.

5.4.27 **Phase 1 (Northern Stadium) and Phase 2 (Southern Stadium) – Without the Construction Compound:** The peak trip generation for the Stadium construction will occur in May and June 2017 – at 75 1-way trips a day – i.e. a peak of 37 vehicles arrivals and departures. Further details are set out in the Transport Assessment submitted with this application.

5.4.28 **Phase 1 (Northern Stadium) and Phase 2 (Southern Stadium) – With the Construction Compound:**

The use of the work site would not significantly reduce the peak daily forecast, at 73 trips compared to 75, because that trip generation would still relate to the stadium demolition. However, benefits would be derived from the possibility of increasing bulk loads from 6m³ to 8.5m³ which offers a significant opportunity to reduce the number of trips. Additionally, the number of kilometres travelled by HGV transporting concrete to the site would be reduced by 194,341 km (96.5%). Further details are set out in the Transport Assessment submitted with this application.

5.4.29 **Phase 3 (Mixed Use):** The peak monthly construction traffic would occur in the second half of 2019 and October/November 2020. On each occasion the peak activity would equate to 13 1-way trips a day, 6-7 arrivals and departures. Further details are set out in the Transport Assessment submitted with this application.

i) **Site Set up**

5.4.30 A number of facilities and laydown areas will be required during the construction process of the Project. Onsite facilities will include:

- Office and Welfare facilities;
- Locker room;
- W/C's;
- Canteen and Kitchen;
- Reception;
- Site operative area;
- Material Storage;
- Lay-down areas;
- Concrete pilling;
- Dewatering plant;
- Concrete batching plant; and
- Mobile aggregate washing plant.

5.4.31 The location of these facilities will be carefully considered to ensure that they are located in suitable locations to avoid any possible disruptions to the surrounding areas.

ii) **Hoarding / Fencing**

5.4.32 The Stadium contractor will provide site security measures around the site, through the provision of hoarding/fencing. Details of the types and height of hoarding/fencing have yet to be developed, however it will be confirmed with the Stadium contractor prior commencement, to ensure minimal environmental impact in providing the required control measures to mitigate anticipated security risks.

i) **Hours and Method of Working**

5.4.33 For this assessment, it has been assumed that the working hours will be **12 hours a day, 7 days a week**. These working hours have been used to inform the above construction and phasing programme.

5.4.34 However, this ES will also assess the Project against the Council's standard working hours; The Council's standard construction hours are Monday to Friday 08:00 – 18:00 and Saturday 08:00 – 13:00. For

assessment purposes, if the construction of the Project were to be restricted to the standard construction hours, the construction process would be extended by an additional year. Both scenarios will be assessed within this ES.

- 5.4.35 In order to maintain the Council's standard working hours, the contractor(s) may require a period of up to half an hour before and up to one hour after normal working hours for start up and close down of activities.
- 5.4.36 The above working hours do not include operation of plant or machinery giving rise to noise with the potential to disturb nearby residents or the arrival of any HGV at site before 07:30 hrs.
- 5.4.37 There will be 100% on site crushing of demolished brickwork and concrete. While it is not possible to identify at this time the precise location of these activities on site they would be located and shielded so as to minimise noise levels at surrounding properties. The crushing activities would be subject to quick dust suppression through the use of water sprays. By crushing material on site it is available to be used as bulk fill as required and also to minimise the number of lorry movements required to remove excess material from the site.

5.5 Plant and Equipment

- 5.5.1 Consideration has been given to the types of plant and equipment that are likely to be used during the construction works. An indication of the typical types of plant and equipment associated with each key element of the works are set out below:
- Light tools and power tools;
 - Excavators and hydraulic breakers;
 - Bored piling rigs (CFA piling);
 - Mobile and Tower cranes;
 - Hydraulic jacks (quiet pieces of equipment);
 - Delivery vehicles;
 - Small dump trucks;
 - Dewatering plant;
 - Concrete placing equipment; and
 - Mobile aggregate washing plant.

5.6 Construction Environmental Management Plan

- 5.6.1 Details of measures to protect the environment during the construction of the Project will be set out in a Construction Environmental Management Plan (CEMP). Such measures will address hours of working, noise, vibration, dust, light spill, wheel washing and control of run-off. It is anticipated that the implementation of the CEMP will be a condition on the planning permission and it will be regularly monitored.
- 5.6.2 The CEMP would be held on-site and could be viewed by all interested parties with contact names, details, lines of communication, and mitigation action plans. All site personnel would be made aware of its existence and undertake to adhere to the guidance.
- 5.6.3 The main contractor would be required to nominate a representative to act as a contact point with the

Council, to ensure that any construction issues that may arise are dealt with effectively and promptly. Sub-contractors would also nominate or appoint a suitable team member responsible for liaison with the lead contractor's representative and to ensure that sub-contractor construction activities are managed effectively.

5.6.4 The CEMP will be based on but not limited to the following documents as a minimum:

- The Construction (Design and Management) Regulations, 2007, Statutory Instrument 2007 No. 320
- Provisions in the Landfill Directive and associated legislative guidance
- Pollution Prevention Guideline (PPG) Notes – Environment Agency
- CIRIA (1996). 'A guide for safe working on contaminated sites. Report 132'. CIRIA London or similar
- Health and Safety Executive. 'Protection of Workers and the General Public During the Development of Contaminated Land'. HMSO London.

5.6.5 Throughout the ES measures are set out to mitigate the effects of the Project during construction. These would be collated in, and implemented by, the CEMP where appropriate.

5.7 Construction Site Waste Management Plan

5.7.1 Tottenham Athletic Football Club Limited are committed to a strategic approach to managing materials and construction materials and ensuring the impact on the environment is minimised by reducing amount sent to landfill. Therefore, construction waste will be minimised wherever possible through best practice, and the site will be subject to a statutory Site Waste Management Plan.

5.7.2 All contractors will be required to develop and implement a Site Waste Management Plan. For all construction work, an assessment of the recycled content (by value) will be undertaken using WRAP's Recycled-content toolkit. For all demolition work, at least 70% of materials arising will be reclaimed or recycled rather than sent to landfill. It is expected that for all construction work a recycled content of at least 10% (by value) will be achieved.

5.7.3 Given the size of the site, there will be sufficient space available for handling and storing waste. This will allow different waste streams to be separated (into, for example, untreated wood, treated wood, metals, plastics, inert wastes, plasterboard, hazardous wastes etc), thereby allowing them to be collected by waste management contractors who specialise in those specific waste streams. There is extensive guidance on good site management practice which makes it unlikely that impacts from construction waste will be significant.

6. Air Quality

6.1 Introduction

- 6.1.1 This chapter addresses the potential air quality effects the Project may have on the Project site and surrounding area. The assessment includes a summary of the current conditions found within the area and identifies mitigation measures where appropriate for adverse air quality effects that may arise as part of the Project. The assessment has been carried out by Air Quality Consultants Ltd.
- 6.1.2 The Project Site lies within an Air Quality Management Area (AQMA) declared by Haringey Council for exceedences of the nitrogen dioxide and fine particulate matter (PM₁₀) objectives.
- 6.1.3 The Project will lead to an increase in traffic on the local roads, which may impact on air quality at existing residential properties.
- 6.1.4 An energy strategy has been prepared by Buro Happold and can be found at Appendix 4.2. The strategy acknowledges that the Council is committed to delivering a District Energy Centre (DEN). The Club is committed to working with the Council on the delivery of a DEN and all buildings will be designed to connect to this network when completed. However, as full details of the location and specification of the DEN are unknown at this stage it cannot be assessed in air quality terms. If the District wide solution has not come forward by the time the residential development is delivered, and appears unlikely to come forward in the foreseeable future, consideration will be given to the provision of a single site wide energy centre within this development, subject to detailed feasibility testing and remodelling of the air quality impacts. In the intermediate phase prior to delivery of the district-wide solution, the various components of the Project will have their own independent energy solutions (a range of boiler and energy plant). The emissions from which could impact upon air quality at existing residential properties. This has been the basis for the Air Quality assessment and, as such, the following components have been assessed:
- The stadium houses 5.6MW of boiler plant and 5000kVA of generator plant;
 - Residential Tower C houses 4.4MW of boiler plant and 330kVA of generator plant; and
 - The Hotel house 3.2MW of boiler plant and 0.69MW 330kVA of generator plant.
- 6.1.5 The new residential properties will also be subject to the impacts of road traffic emissions from the adjacent road network, as well as emissions from the boiler plant located to the north of the Project Site within the Sainsbury's and the University Technical College (UTC) site and the boiler and generator plant associated with the Project.
- 6.1.6 The main air pollutants of concern related to traffic emissions are nitrogen dioxide and fine particulate matter (PM₁₀ and PM_{2.5}), whilst those from the boiler plant are nitrogen dioxide and for the proposed diesel generators the main air pollutants of concern are nitrogen dioxide, PM₁₀ and PM_{2.5}.
- 6.1.7 The air quality neutrality of the Project has also been assessed following the methodology provided in the Greater London Authority's (GLA's) Supplementary Planning Guidance (SPG) on Sustainable Design and Construction (GLA, 2014a).
- 6.1.8 The GLA has also released Supplementary Planning Guidance on the Control of Dust and Emissions

from Construction and Demolition (GLA, 2014b). The SPG outlines a risk assessment approach for construction dust assessment and helps determine the mitigation measures that will need to be applied.

- 6.1.9 This report describes existing local air quality conditions (2014), and the predicted air quality in the future assuming that the Project does, or does not proceed. Two future years are presented (2018 and 2021) to reflect the phasing of the Project. The THFC Stadium is due to be operational in 2018, and the first year of occupation of the residential element will be 2021. The assessment of construction dust impacts focuses on the anticipated duration of the works and the assessment of construction traffic focuses on the year of 2016 when most construction vehicles will be accessing the site.
- 6.1.10 The assessment of construction impacts is based on materials being transported to and from the Project Site from the A10 via the M25, without a local construction compound. However, a Construction Compound at White Hart Lane Depot has been proposed by the Club to support the construction phase of the Stadium (Phase 1 and 2) and a planning application is likely to be submitted for this imminently. This compound has been considered within this chapter and in Appendix 6.12.
- 6.1.11 This report has been prepared taking into account all relevant local and national guidance and regulations, and follows a methodology discussed with Haringey Council.

6.2 Assessment Criteria and Methodology

6.2.1 Legislative Context

Air Quality Strategy

- 6.2.2 The Air Quality Strategy published by the Department for Environment, Food, and Rural Affairs (Defra) provides the policy framework (Defra, 2007) for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

Clean Air Act 1993

- 6.2.3 Small combustion plant of less than 20 MW net rated thermal input is controlled under the Clean Air Act 1993. This requires the local authority to approve the chimney height. Plant which are smaller than 366kW have no such requirement.
- 6.2.4 Measures to ensure adequate dispersion of emissions from discharging stacks and vents are included in Technical Guidance Note D1 (Dispersion) (HMSO, 1993b), issued in support of the Environmental Protection Act (HMSO, 1990).

National Planning Policy

- 6.2.5 The National Planning Policy Framework (NPPF) (2012) sets out planning policy for England in one place. It places a general presumption in favour of sustainable development, stressing the importance of local development plans, and states that the planning system should perform an environmental role to minimise pollution. One of the twelve core planning principles notes that planning should “*contribute to...reducing pollution*”. To prevent unacceptable risks from air pollution, planning decisions should ensure that new development is appropriate for its location. The NPPF states that the effects of pollution on health and the sensitivity of the area and the development should be taken into account.
- 6.2.6 More specifically the NPPF makes clear that: “Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan”.
- 6.2.7 The NPPF is now supported by Planning Practice Guidance (PPG) (DCLG, 2014), which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG states that “*Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values*” and “*It is important that the potential impact of new development on air quality is taken into account ... where the national assessment indicates that relevant limits have been exceeded or are near the limit*”. The role of the local authorities is covered by the LAQM regime, with the PPG stating that local authority Air Quality Action Plans “*identify measures that will be introduced in pursuit of the objectives*”.
- 6.2.8 The PPG states that “Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife)”.
- 6.2.9 The PPG sets out the information that may be required in an air quality assessment, making clear that “*Assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality*”. It also provides guidance on options for mitigating air quality impacts, as well as examples of the types of measures to be considered. It makes clear that “*Mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact*”.

The London Plan

- 6.2.10 The London Plan (GLA, 2015) sets out the spatial development strategy for London consolidated with alterations made to the original plan since 2011. It brings together all relevant strategies, including those relating to air quality.
- 6.2.11 Policy 7.14, ‘Improving Air Quality’, addresses the spatial implications of the Mayor’s Air Quality Strategy and how development and land use can help achieve its objectives. It recognises that Boroughs should have policies in place to reduce pollutant concentrations, having regard to the Mayor’s Air Quality Strategy.

- 6.2.12 Policy 7.14B(c), requires that development proposals should be “at least ‘air quality neutral’ and not lead to further deterioration of existing poor air quality (such as designated Air Quality Management Areas (AQMAs))”. Further details of the London Plan in relation to planning decisions are provided in Appendix 6.1.

The Mayor's Air Quality Strategy

- 6.2.13 The revised Mayor's Air Quality Strategy (MAQS) was published in December 2010 (GLA, 2010). The overarching aim of the Strategy is to reduce pollution concentrations in London to achieve compliance with the EU limit values as soon as possible. The Strategy commits to the continuation of measures identified in the 2002 MAQS, and sets out a series of additional measures. These additional measures and the role of the Low Emission Zone are described in Appendix 6.1.
- 6.2.14 The MAQS also addresses the issue of ‘air quality neutral’ and states that “GLA will work with boroughs to assist in the development of methodologies that will allow an accurate assessment of the impacts of the emissions of new developments” (Para 5.3.19).

GLA SPG: Sustainable Design and Construction

- 6.2.15 The GLA's SPG on Sustainable Design and Construction (GLA, 2014a) provides details on delivering some of the priorities in the London Plan. Section 4.3 covers Air Pollution. It defines when developers will be required to submit an air quality assessment, explains how location and transport measures can minimise emissions to air, and provides emission standards for gas-fired boilers, Combined Heat and Power (CHP) and biomass plant. It also sets out, for the first time, guidance on how Policy 7.14B(c) of the London Plan relating to ‘air quality neutral’ (see Paragraph 6.2.12, above) should be implemented.

GLA SPG: The Control of Dust and Emissions During Construction and Demolition

- 6.2.16 The GLA's SPG on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014b) outlines a risk assessment based approach to considering the potential for dust generation from a construction site, and sets out what mitigation measures should be implemented to minimise the risk of construction dust impacts, dependent on the outcomes of the risk assessment. This guidance is largely based on the Institute of Air Quality Management's (IAQM) 2014 guidance on the Assessment of dust from demolition and construction (Institute of Air Quality Management, 2014), and it states that “*the latest version of the IAQM Guidance should be used*”.

Local Transport Plan

- 6.2.17 The Haringey Local Implementation Plan (Haringey Council, 2011) sets out how the Mayor's Transport Strategy will be delivered within Haringey up until 2031. Air quality is referred to as one of the main transport challenges. It is the objective of the Council to: *‘Improve air quality within the borough through initiatives to reduce and mitigate the effects of pollutant emissions from road and diesel operated rail transport*.
- 6.2.18 The Council has set the challenge to improve air quality within the borough by reducing car use, it states that ‘Haringey Council will continue to introduce initiatives that reduce air pollutant emissions from road transport by promoting smarter travel choices, raising awareness and encouraging sustainable travel behaviour. These include promoting walking and cycling for short journeys, and increased use of public

transport. More sustainable car use will be encourage [sic] through car clubs, car sharing, and the use of fuel efficient vehicles, such as electric vehicles, and smarter driving techniques'.

Local Policies

6.2.19 Haringey's Local Plan (Haringey Council, 2013) was formally adopted in March 2013 and sets out the strategic policies within the borough for the period 2013 to 2016. The Local Plan Strategic Policy 7 Transport relates to air quality in its section on "Delivering Action on Climate Change and Quality and Healthy Places" and states that it will work with its partners in the promotion of traffic management schemes such as:

- "Minimising congestion and addressing the environmental impacts of travel;
- Promoting public transport, walking and cycling...
- ..Seeking to locate major trip generating developments in locations with good access to public transport and so better integrate transport and land use planning.
- Adopting maximum car parking standards and car free housing wherever feasible;...
- ...Supporting measures to influence behavioural change such as promoting low carbon vehicles..."

6.2.20 A number of policies included within Haringey's Unitary Development Plan (Haringey Council, 2013) have been saved as part of the new local plan. A number of the saved policies refer to air quality and include:

"Policy UD1 Planning Statements:

Where appropriate, all development proposals (except 'householder development') are to be accompanied by one or more of the following:

- i) air quality statement, for significant impact on air quality...*

Policy UD3 General Principles:

"The Council will require development proposals to demonstrate that:

- a) there is no significant adverse impact on residential amenity or other surrounding uses in terms of loss of daylight or sunlight, privacy, overlooking, aspect and the avoidance of air, water, light and noise, pollution (including from the contamination of groundwater/water courses or from construction noise) and of fume and smell nuisance; ..."*

Policy ENV7 Air, Water and Light Pollution:

The Council will control potential pollution resulting from development in the Borough by:

- b) requiring developments to include measures to avoid, reduce and only then mitigate the emissions of pollutants, where appropriate; ..."*

6.2.21 Much of the detail to support the UDP policies is contained within accompanying Supplementary Planning Documents (SPDs), which are a material consideration for development control purposes. The Council

adopted the Sustainable Design & Construction SPD in March 2013 (Haringey Council, 2013), Section 7 is on pollution and sets out the requirements for an air quality assessment and states that *"Any mitigation measures should be incorporated into the design prior to submission"*.

Air Quality Action Plan

6.2.22 Haringey Council has declared an AQMA for nitrogen dioxide and PM₁₀ that covers the whole Borough. The Council has since developed an Air Quality Action Plan (Haringey Council, 2011). The main objectives of the Action Plan are to:

- *"demonstrate the Council's commitment to improving air quality and lead by example*
- *provide an overview of local key policies with respect to air quality*
- *improve air quality whilst maintaining economic stability and to explore wider economic opportunities*
- *involve all relevant Council departments and external agencies where appropriate, to ensure a balances and integrated approach in Haringey*
- *improve the quality of life and health of the residents and workforce of Haringey"*.

6.2.23 Assessment Criteria

Construction Dust Criteria

6.2.24 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management¹ (IAQM) (2014), on which the assessment methodology outlined in the GLA's SPG (GLA, 2014b) is based, has been used. Full details of this approach are provided in Appendix 6.2.

Health Criteria

6.2.25 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations, 2000, Statutory Instrument 928(2000) and the Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043(2002).

6.2.26 The objectives for nitrogen dioxide and PM₁₀ were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The PM_{2.5} objective is to be achieved by 2020.

6.2.27 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance(Defra, 2009). The annual mean objectives for nitrogen dioxide and PM₁₀ are considered to apply at the façades of residential properties, schools,

¹ The IAQM is the professional body for air quality practitioners in the UK.

hospitals etc.; they do not apply at hotels. The 24-hour objective for PM₁₀ is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

6.2.28 The European Union has also set limit values for nitrogen dioxide, PM₁₀ and PM_{2.5}. The limit values for nitrogen dioxide are the same numerical concentrations as the UK objectives, but achievement of these values is a national obligation rather than a local one (Directive 2008/50/EC of the European Parliament and of the Council, 2008). In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded.

6.2.29 The relevant air quality criteria for this assessment are provided in Table 6.1.

Table 6.1: Air Quality Criteria for Nitrogen Dioxide, PM₁₀ and PM_{2.5}

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 µg/m ³ not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m ³
Fine Particles (PM ₁₀)	24-hour Mean	50 µg/m ³ not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m ³
Fine Particles (PM _{2.5})	Annual Mean	25 µg/m ³

a) The PM_{2.5} objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

b) A proxy value of 32 µg/m³ as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM₁₀ objective being exceeded. Measurements have shown that, above this concentration, exceedences of the 24-hour mean PM₁₀ objective are possible (Defra, 2009).

6.2.30 Descriptors for Air Quality Impacts and Assessment of Significance

Construction Dust Significance

6.2.31 Guidance from the IAQM (Institute of Air Quality Management, 2014) is that, with appropriate mitigation in place, the effects of construction dust will be 'not significant'. The assessment thus focuses on determining the appropriate level of mitigation so as to ensure that impacts will normally be 'not significant'.

Construction Traffic and Operational Significance

6.2.32 There is no official guidance in the UK on how to describe air quality impacts, nor how to assess their significance. The approach developed jointly by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)² (EPUK & IAQM, 2015) has therefore been used. This includes defining descriptors of the impacts at individual receptors, which take account of the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective. The overall significance of the air quality effects is

² The IAQM is the professional body for air quality practitioners in the UK.

determined using professional judgement, taking account of the impact descriptors. Full details of the EPUK/IAQM approach are provided in Appendix 6.3. The approach includes elements of professional judgement, and the experience of the consultants preparing the report is set out in Appendix 6.4.

6.2.33 It is important to differentiate between the terms impact and effect with respect to the assessment of air quality. The term impact is used to describe a change in pollutant concentration at a specific location. The term effect is used to describe an environmental response resulting from an impact, or series of impacts. Within this chapter, the air quality assessment has used published guidance and criteria described in the following sections to determine the likely air quality impacts at a number of sensitive locations. The potential significance of effects has then been determined by professional judgement, based on the frequency, duration and magnitude of predicted impacts and their relationship to appropriate air quality objectives.

6.2.34 **Geographical Scope**

6.2.35 The study area addressed for construction impacts extends to 350 m from the Project Site construction works, and for construction trackout for a distance of 500 m from the construction site exit. Construction traffic and operational traffic impacts extend along the local road network for distances dependent on whether significant changes in traffic are expected. The area extends approximately 1 km in each direction from the Project Site. This area is also considered appropriate for the assessment of potential impacts from the energy plant emissions.

6.2.36 **Assessment Approach**

Consultation

6.2.37 The assessment follows a methodology discussed with Haringey Council via telephone and email correspondence between Alison Bell (Environmental Health Officer at Haringey Council) and Kieran Laxen (Air Quality Consultants) held in July 2015. Specific requests were made to include modelling of the car park emissions and also assessment a worst-case scenario of the entire development operating at 100% capacity.

Existing Conditions

6.2.38 Existing sources of emissions within the study area have been defined using a number of approaches. A site visit was carried out as part of the previous assessment to identify existing sources from a visual inspection of the area. A further site visit has been carried out as part of the current assessment, to confirm local conditions. Industrial and waste management sources that may affect the area have been identified using the European Pollutant Release and Transfer Register (European Environment Agency, 2014) and the Environment Agency's website 'what's in your backyard' (Environment Agency, 2015). Local sources have also been identified through discussion with Haringey Council's, Environmental Health Department as well as through examination of the Council's Air Quality Review and Assessment reports.

6.2.39 Information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority. The monitoring covers an area greater than the study area for this assessment and is used to provide context for the assessment. The background concentrations across the study area have been defined using the national pollution maps published by Defra (2015a). These cover the whole

country on a 1x1 km grid. Current exceedences of the annual mean EU limit value for nitrogen dioxide have been identified using the maps of roadside concentrations published by Defra (2015e). These are the maps, currently based on 2012 data, used by the UK Government, together with the results from national AURN monitoring sites that operate to EU data quality standards, to report exceedences of the limit value to the EU.

Construction Dust Impacts

- 6.2.40 The construction dust assessment considers the potential for impacts within 350 m of the site boundary; or within 50 m of roads used by construction vehicles out to a distance of up to 500 m from the site exit. The assessment methodology follows the GLA's SPG on the Control of Dust and Emissions During Construction and Demolition (GLA, 2014b), which is based on that provided by the IAQM (Institute of Air Quality Management, 2014). This follows a sequence of steps. Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required. Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation. Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant impacts. Appendix 6.2 explains the approach in more detail.
- 6.2.41 It should be noted that the construction phasing set out in Chapter 5 assumes a 12-hour working day, 7 days a week. An alternative construction solution would for standard construction hours and therefore the overall construction period will be extended by 1 year (i.e. 2022). The construction impacts of the shorter working hours will be broadly the same but would occur for less time per day but for a longer period. It is considered that the assessment is appropriate for both construction scenarios.

Construction Traffic Impacts

- 6.2.42 Predictions of nitrogen dioxide, PM₁₀ and PM_{2.5} concentrations have been carried out for a base year (2014), and the future year of 2016, when the number of vehicles used in the construction phase will be greatest. This assessment follows the same methodology as the operational road traffic assessment; pollutant concentrations have been predicted at a number of receptor locations including likely worst-case locations using the ADMS-Roads dispersion model. Further details of the assessment methodology are explained below in paragraphs 6.2.43 to 6.2.52. The scenario assessed within the chapter assumes no construction compound.

Operational Road Traffic Impacts

Sensitive Locations

- 6.2.43 Concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} have been predicted at a number of locations with relevant exposure adjacent to roads near to the Project Site and within the Project Site. Receptors have been identified to represent worst-case exposure within these locations. When selecting these receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, and where there is a combined effect of several road links. In general the receptors have been located on the façades of the properties closest to the sources.
- 6.2.44 A total of 100 existing residential properties have been identified as receptors for the assessment. An

additional 32 receptor locations have been identified within the Project Site, which represent exposure to the combination of the existing sources and the new sources from the Project. The receptors have been modelled at a range of heights because some of the ground-level receptors are not classified as relevant exposure for the objectives, e.g. local shops. Receptors 1-93 have been modelled at the following heights: 1.5 m, 4.5 m, 7.5 m and 10.5 m. Receptor UTC is modelled at 12 m and represents a roof terrace. Receptors TA to TE2 represent nearby residential tower blocks and have been modelled from ground floor (1.5 m) to the top of the building (37.5 m), at 6 m increments. The on-site receptors have been modelled at a range of heights to represent typical exposure. A receptor was modelled in the middle of the pitch to assess the impacts within the stadium. These locations are shown in Figure 6.1 and Figure 6.2 (shown in Appendix 6.5). In addition, concentrations have been modelled at the automatic monitoring site located at High Road, Haringey (HGY1), in order to verify the modelled results (see Appendix 6.6 for verification method).

Assessment Scenarios

- 6.2.45 Predictions of nitrogen dioxide, PM₁₀ and PM_{2.5} concentrations have been carried out for a base year (2014), and two future years, 2018 when the stadium is expected to be operational and 2021 when the whole site is expected to be fully operational. For both 2018 and 2021, predictions have been made assuming both that the Project does proceed (With Scheme), and does not proceed (Without Scheme). A further 2018 and 2021 sensitivity test has been carried out for nitrogen dioxide that involves assuming no reduction in emission factors for road traffic from the baseline year. This is to address the issue identified by Defra (Carslaw, Beevers, Westmoreland, & Williams, 2011) that road traffic emissions have not been declining as expected which is reflected in the absence of any downward trend of the monitoring data at the local monitoring site at Haringey Town Hall (see later section on *Local Air Quality Monitoring* and the section on *Uncertainty*). Nitrogen dioxide concentrations in both 2018 and 2021, with and without the scheme, are thus presented for two scenarios: 'With Emissions Reduction' and 'Without Emissions Reduction'. The without emission reduction scenario is not expected to be a realistic representation of the impacts but will provide an extreme worst-case sensitivity test.
- 6.2.46 The 2021 'With Scheme' scenario includes the proposed new car parks (see Appendix 6.6).

Modelling Methodology

- 6.2.47 Concentrations due to road traffic have been predicted using the ADMS-Roads dispersion model. Details of the model inputs and the model verification are provided in Appendix 6.6, together with the method used to derive current and future year background nitrogen dioxide concentrations. The dominating input variables are the emissions from the road traffic.

Traffic Data

- 6.2.48 Traffic data have been provided for all the scenarios. Baseline traffic data were derived from 24hr counts at 20 locations within the local area in 2015. These traffic counts were taken on a non-event day and therefore do not include the contribution to the annual average daily flows of the event-day traffic. The one day traffic counts were adjusted to represent annual average daily traffic (AADT) flows using DfT adjustment factors for typical urban areas, taking account of the time of year the counts were carried out. An uplift factor was calculated, based on the number of event-day related trips adjusted to an AADT equivalent, and applied to the baseline 2015 traffic flows. The resultant baseline traffic data set

represents AADT flows including the stadium related traffic.

- 6.2.49 Traffic flows on local roads have been shown to be constant over recent years, and if anything reducing. Therefore as a worst-case this 2015 baseline traffic dataset has been taken to represent both 2014 and future year baseline traffic data.
- 6.2.50 The 2018 "with Project" traffic datasets include the traffic generated by the aspects of the Project operational in 2018 and also a contribution to the annual average daily traffic flow of the additional event-day traffic.
- 6.2.51 The 2021 "with Project" traffic datasets include the traffic generated by the entire Project and also a contribution to the annual average daily flow of the event-day traffic.
- 6.2.52 The additional event-day traffic is based on an assumed number of events: 26 THFC matches, 10 Major Sporting Events (at least 2 of which will be NFL games) and 6 concerts.

Impacts of the Proposed Boiler and Generator Plant

Sensitive Locations

- 6.2.53 In terms of the potential impacts from the proposed gas boiler plant and diesel generators, concentrations have been modelled at the same 132 receptors both within and close to the Project Site at a range of heights.

Assessment Scenarios

- 6.2.54 Predictions of nitrogen dioxide and PM concentrations have been carried out assuming that the plant is installed in 2021.

Modelling Methodology

- 6.2.55 The impacts of emissions from the proposed gas boiler plant and diesel generators have been modelled using the ADMS-5 dispersion model. ADMS-5 incorporates a state-of-the-art understanding of the dispersion processes within the atmospheric boundary layer. Entrainment of the plume into the wake of the building has been simulated within the model. The model outputs are dependent on the meteorological data used. In order to confirm a worst-case meteorological dataset is being used, an initial sensitivity test was carried out whereby concentrations were predicted for four meteorological years to determine which year resulted in the highest concentrations. This meteorological dataset associated with the highest concentrations was then used to model the potential impacts of the proposed gas boilers and diesel generators on the existing and future receptors. Other than the meteorological data the dominating input variables within the model are the emissions from the point sources (the boilers and generators).
- 6.2.56 The methodology is presented in further detail in Appendix 6.6, as are the model input parameters.

Boiler and Generator Plant

- 6.2.57 The Project includes a range of boiler and generator plant:

- The stadium houses 5.6MW³ of boiler plant⁴ and 5000kVA⁵ of generator plant.
- Residential Tower C houses 4.4MW³ of boiler plant and 330kVA⁵ of generator plant.
- The Hotel house 3.2MW³ of boiler plant and 0.69MW 330kVA⁵ of generator plant.
- The Extreme Sport Building houses 0.56MW³ of boiler plant.

6.2.58 The boiler plant will operate on natural gas, while the generator plant will operate on diesel oil. The generator plant are assumed to operator for limited periods. The details of the operating hours are presented in Appendix 6.6. Operating the plant for periods significantly greater than has been assumed may result in the modelling being invalid.

6.2.59 The boiler plant and generators are only considered to be operational in the 2021 "with Project". 'Air Quality Neutral'

6.2.60 The guidance relating to air quality neutral follows a tiered approach, such that all developments are expected to comply with minimum standards for gas boilers, combined heat and power (CHP) and biomass plant (GLA, 2014a). Compliance with 'air quality neutral' is then founded on emissions benchmarks that have been derived for both building (energy) use and road transport in different areas of London. Developments that exceed the benchmarks are required to implement on-site or off-site mitigation to offset the excess emissions (GLA, 2014a).

6.2.61 Appendix 6.7 of this report sets out the emissions benchmarks. The approach has been to calculate the emissions from the Project and to compare them with these benchmarks.

Assumptions and Limitations

6.2.62 The air quality modelling has been carried out based on a range of assumptions of operational use of the boiler and generator plant, the traffic flows and other variables. Where possible a realistic worst-case approach has been adopted.

6.2.63 The 2018 scenario only covers an assessment of road traffic impacts; it does not include the stadium related boiler and generator plant would be operational in 2018. The stadium related boiler and generator plant are included in the assessment of the full development in 2021, along with the boiler and generator plant for the hotel and residential units.

Uncertainty in Modelling Predictions

6.2.64 There are many components that contribute to the uncertainty of modelling predictions. The road model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. The point source model used in the assessment is dependent upon emission rates, flow rates temperatures of the exhaust and other parameters from the point sources all of which are variable during use. There are then additional uncertainties, as the model is required to simplify real-world conditions into a series of algorithms. An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix 6.6). This can

³ Rated based on Net Thermal Input (net fuel in based on natural gas).

⁴ This provides power for the Tottenham Experience and the NE building as well as the stadium.

⁵ The kVA is the output.

only be done for the road traffic model. The level of confidence in the verification process is necessarily enhanced when data from an automatic analyser have been used, as has been the case for this assessment (see Appendix 6.6). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of current year (2014) concentrations.

- 6.2.65 For point sources, the emissions are assumed to be constant regardless of the year. However, predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations, and vehicle emissions. A disparity between the road transport emission projections and measured annual mean concentrations of nitrogen oxides and nitrogen dioxide has been identified by Defra (Carslaw, Beevers, Westmoreland, & Williams, 2011). This is evident across the UK, although the effect appears to be greatest in inner London; there is also considerable inter-site variation. Whilst the emission projections suggested that both annual mean nitrogen oxides and nitrogen dioxide concentrations should have fallen by around 15-25% over the 6 to 8 years prior to 2009, at many monitoring sites levels remained relatively stable, or even showed a slight increase. This pattern is mirrored in the monitoring data assembled for this study, as set out in Paragraph 6.3.7.
- 6.2.66 The reason for the disparity between the expected concentrations and those measured relates to the on-road performance of modern diesel vehicles. New vehicles registered in the UK have to meet progressively tighter European type approval emissions categories, referred to as "Euro" standards. While the nitrogen oxides emissions from newer vehicles should be lower than those from equivalent older vehicles, the on-road performance of some modern diesel vehicles is often no better than that of earlier models. This has been compounded by an increasing proportion of nitrogen dioxide in the nitrogen oxides emissions, i.e. primary nitrogen dioxide, which has a significant effect on roadside concentrations (Carslaw, Beevers, Westmoreland, & Williams, 2011).
- 6.2.67 Defra has taken account of the historical discrepancies in its latest emissions factors which it published in 2014. These show only limited reductions prior to 2014, but continue to show some large improvements thereafter. This is principally because, where previous standards had limited on-road success, the best current evidence is that the 'Euro VI' and 'Euro 6' standards that new vehicles had to comply with from 2013/15⁶ will deliver real improvements, as, for the first time, they will be compliant with the World Harmonized Test Cycle, which better represents real-world driving conditions⁷ and includes a separate slow-speed cycle for heavy duty vehicles. There is, nevertheless, limited information on whether the full improvements expected are being, and will be, delivered, so there remains some uncertainty as to whether emissions will reduce at the rates set out in Defra's Emission Factors Toolkit (Defra, 2015b).
- 6.2.68 To account for the uncertainty about future vehicle emissions of nitrogen oxides and nitrogen dioxide, a sensitivity test has been conducted assuming that the future (2018 and 2021) road traffic emissions per vehicle are unchanged from 2014 values (without emissions reduction). The predictions within this sensitivity test will almost certainly be over-pessimistic, as new Euro VI and Euro 6 vehicles will make up roughly 55% of HDVs and 42% of LDVs on the road in 2018, according to Defra's Emission Factors

⁶ Euro VI refers to heavy duty vehicles, while Euro 6 refers to light duty vehicles. The timings for meeting the standards vary with vehicle type and whether the vehicle is a new model or existing model.

⁷ The test cycle for real-world emissions for Euro 6 vehicles will not be implemented until about 2017. However, there is still expected to be a substantial improvement in NOx emissions from Euro 6 vehicles (as compared with Euro 5) from 2015 onwards.

Toolkit. This will have increased to roughly a 75% and 65% penetration of Euro VI and Euro 6 vehicles respectively in 2021. Future concentrations due to road traffic emissions will therefore be below the 'without emissions reduction' values, but may be above Defra's 'with emissions reduction' values, i.e. they will lie between the two sets of values, but are likely to be closer to the official Defra values than those in the sensitivity test.

- 6.2.69 In addition, the dispersion modelling has assumed that certain roads surrounding the Project Site have been considered to behave like a street canyon, meaning that the model assumes that only limited dispersion occurs within these areas. The roads that have been assumed to be street canyons are shown in Figure A6.6.2 in Appendix 6.6. In reality, dispersion does occur within street canyons, particularly those which are wide and shallow, with uneven or broken facades on one or both sides. The consequence of this is that modelled nitrogen dioxide concentrations at receptor façades are likely to be higher than will occur in practice.

6.3 Baseline Conditions

- 6.3.1 The Project Site is located in Tottenham in the northeast of the London Borough of Haringey. The site is bounded by High Road to the west, Worcester Avenue to the east and Park Lane to the south. It currently consists of the existing THFC 'stadium' and associated infrastructure. There are existing residential and commercial buildings to the east, south and west and a Sainsbury's supermarket to the north.

Industrial sources

- 6.3.2 A search of the European Pollutant Release and Transfer Register (European Environment Agency, 2014) and Environment Agency's 'what's in your backyard' (Environment Agency, 2015) websites did not identify any significant industrial or waste management sources that are likely to affect the Project, in terms of air quality.

Site Visit

- 6.3.3 The first site visit was carried out in 2013, with a further site visit carried out on 6th August 2015. Other than road traffic, no significant sources of air pollution were identified during the site visits.

Air Quality Review and Assessment

- 6.3.4 Haringey Council has investigated air quality within its area as part of its responsibilities under the LAQM regime. In July 2001 an AQMA was declared across the whole borough for exceedences of the nitrogen dioxide and PM₁₀ objectives.

Local Air Quality Monitoring

- 6.3.5 Haringey Council operates two automatic monitoring stations within its area. The Haringey High Road roadside automatic monitoring site is located approximately 300 m southwest of the Project Site. The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Lambeth Scientific Services (using the 50% TEA in acetone method). In 2014 diffusion tube monitoring was completed at four sites within approximately 1.5 km of the Project Site (HR07 closed in September 2014). Results for the years 2009 to 2014 are summarised in Table 6.2 and the monitoring locations are shown in Figure 6.3 (shown in Appendix 6.5).

Table 6.2: Summary of Nitrogen Dioxide (NO₂) Monitoring (2009-2014) a,b

Site No.	Site Type	Location	2009	2010	2011	2012	2013	2014
Automatic Monitors – Annual Mean (µg/m³) ^a								
HGY1	Roadside	High Road	42	45	38	42	43	44 ^c
Objective			40					
Automatic Monitors – No. of Hours > 200 µg/m³								
HGY1	Roadside	High Road	0	0	0	0	1	0
Objective			18 (200 – 99.79 th Percentile if low data capture)					
Diffusion Tubes – Annual Mean (µg/m³) ^a								
HR07	Urban Background	Park View Road	34	38	33	32	29	25
HR14	Roadside	High Road	48	47	44	46	39	37
HR23	Roadside	High Street	-	-	42	37	41	30
HR25	Roadside	White Hart Lane	-	-	36	37	34	34
Objective			40					

a. Exceedences of the objectives are shown in bold.

b. 2009 and 2010 data have been taken from the 2010 Air Quality Progress Report (Haringey Council, 2011), 2011 to 2014 data have been taken from the Air Quality Updating and Screening Assessment for 2014 (Haringey Council, 2015).

c. Data capture was 64 % in 2014 and therefore results have been annualised in accordance with Box 3.2 in LAQM.TG(09) (Defra, 2009) (see Appendix 6.8).

- 6.3.6 Concentrations have exceeded or been close to exceeding the annual mean nitrogen dioxide objective at the roadside monitoring locations, these measured concentrations are considered to be representative of baseline conditions across the Project Site. At the urban background diffusion tube monitoring site annual mean concentrations are well below the annual mean objective.
- 6.3.7 Annual mean concentrations at the HR07 urban background site and the HR14 roadside site suggest an overall downward trend over the past six years. However, examining the data for the roadside automatic monitoring site, HGY1, which provides more accurate data, there is no significant trend in monitoring results over the last 10 years (Figure 6.4, shown in Appendix 6.5). This contrasts with the expected decline due to the progressive introduction of new vehicles operating to more stringent standards. The implications of this are discussed in Section 6.4 of this report.
- 6.3.8 The Haringey HGY1 automatic monitoring station, located on High Road measured PM₁₀ concentrations from 2009 to 2013, PM₁₀ monitoring ceased at this site in 2014. There are no other sites in Haringey which measure PM₁₀. Results for the years 2009 to 2013 are summarised in Table 6.3 information. PM_{2.5} concentrations are also measured at this automatic monitor. Data for 2009-2014 are also presented in Table 6.3. Measured concentrations of both PM₁₀ and PM_{2.5} have consistently been well below the relevant objectives and have remained relatively stable.

Table 6.3: Summary of PM₁₀ and PM_{2.5} Monitoring (2009-2014)

Site No.	Site Type	Location	2009	2010	2011 ^a	2012	2013	2014
PM ₁₀ Annual Mean (µg/m ³) ^a								
HGY1	Roadside	High Road	21	23	-	23	25	-
Objective			40					
PM ₁₀ No. Days >50 µg/m ³								
HGY1	Roadside	High Road	5	9	-	11	13	-
Objective			35 (50 – 90 th percentile if low data capture)					
PM _{2.5} Annual Mean								
HGY1	Roadside	High Road	15	18	-	18	18	16 ^b
Objective			25					

a. In 2011 the data were affected by the Tottenham riots.

b. Reference equivalent. Data capture was 82% in 2014, and thus the results have been annualised in accordance with Box 3.2 in LAQM.TG(09) (Defra, 2009) (see Appendix 6.8).

Exceedences of EU Limit Value

6.3.9 There are several AURN monitoring sites within the Greater London Urban Area that have measured exceedences of the annual mean nitrogen dioxide limit value. Furthermore, the national map of roadside annual mean nitrogen dioxide concentrations (Defra, 2015e), used to report exceedences of the limit value to the EU, identifies exceedences of this limit value in 2012 along many roads in London, including the High Road adjacent to the Project Site. The Greater London Urban Area has thus been reported to the EU as exceeding the limit value for annual mean nitrogen dioxide concentrations. The national maps of roadside PM₁₀ and PM_{2.5} concentrations show no exceedences of the limit values anywhere in London. These maps are for 2012 concentrations; detailed maps of predicted future year exceedences are not available (Defra, 2015e).

Background Concentrations

6.3.10 In addition to these locally measured concentrations, estimated background concentrations in the study area have been determined for 2014 and the future years of 2018 and 2021 (Table 6.4). In the case of nitrogen dioxide, two sets of future-year backgrounds are presented to take into account uncertainty in future year vehicle emission factors. The derivation of background concentrations is described in Appendix 6.6. The future year background concentrations are all well below the objectives.

Table 6.4: Estimated Annual Mean Background Pollutant Concentrations in 2014, 2018 and 2021

Year	NO ₂	PM ₁₀	PM _{2.5}
2014 ^a	27.1 – 30.4	21.1 – 22.3	14.6 – 15.2
2018 – Without Reductions in Traffic Emissions ^b	25.5 – 28.8	n/a	n/a
2018 – With Reductions in Traffic Emissions ^c	23.4 – 26.0	20.2 – 21.4	13.8 – 14.4
2021 – Without Reductions in Traffic Emissions ^d	24.7 – 28.0	n/a	n/a
2021 – With Reductions in Traffic Emissions ^e	20.9 – 23.0	19.8 – 21.0	13.4 – 14.0
Objectives	40	40	25

n/a = not applicable. The range of values is for the different 1x1 km grid squares that cover the study area.

a. This assumes that road vehicle emission factors in 2014 remain the same as in 2011 (See Appendix 6.6).

b. This assumes that road vehicle emission factors in 2018 remain the same as in 2011.

c. This assumes that road vehicle emission factors reduce between 2014 and 2018 at the current 'official' rates.

d. This assumes that road vehicle emission factors in 2021 remain the same as in 2011.

e. This assumes that road vehicle emission factors reduce between 2014 and 2021 at the current 'official' rates.

Baseline Dispersion Model Results

- 6.3.11 Baseline concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} have been modelled at each of the existing receptor locations (see Figure 6.1, shown in Appendix 6.5). The results, which cover both the existing (2014) and future year (2018 and 2021) baseline (Without Scheme), are set out in Appendix 6.9. The future baseline for nitrogen dioxide covers the two scenarios: with the official reductions in vehicle emission factors and without these reductions. The modelled road components of nitrogen oxides concentrations have been adjusted by a factor of 1.89, which was derived during the model verification process (see Appendix 6.6 for details of the model verification). The modelled road components of PM₁₀ and PM_{2.5} concentrations have also been adjusted by a factor of 1.89. The existing boilers within the Sainsbury's and UTC buildings have been modelled and included in the baseline concentrations. The traffic associated with the Sainsbury's and UTC buildings is included within the baseline traffic counts, and hence within the baseline concentrations.
- 6.3.12 The results are consistent with the conclusions of Haringey Council in the outcome of its air quality review and assessment work. The results are set out in Appendix 6.9.

2014 Baseline

- 6.3.13 The predicted annual mean concentrations of nitrogen dioxide exceed the objective at 33 of the 100 receptors at ground-floor level in 2014. These are predominately along High Road and tie in with the declaration of an AQMA by the Council. Some of these receptors are not representative of relevant exposure at ground level (shops etc.), however, at first floor level where there are relevant receptors, 26 of the 33 still exceed the objective. The annual mean nitrogen dioxide concentrations are above 60 µg/m³ at two of the receptor locations and therefore it is possible that the 1-hour mean nitrogen dioxide objective may be exceeded in some locations.
- 6.3.14 The predicted annual mean concentrations of PM₁₀ and PM_{2.5} are below the objectives in 2014 at all receptors. The annual mean PM₁₀ concentrations are below 32 µg/m³ and therefore it is unlikely that the 24-hour mean PM₁₀ will be exceeded.
- 6.3.15 The 2014 concentrations are shown in Figure A6.9.1 to A6.9.6 in Appendix 6.9.

2018 Baseline With 'Official' Emission Reduction

- 6.3.16 The predicted annual mean concentrations of nitrogen dioxide are above the objective at 12 receptor locations (at ground level) out of 100. All of the predictions for PM₁₀ and PM_{2.5} are well below the objectives. The annual mean nitrogen dioxide concentrations are below 60 µg/m³ at all of the receptor locations and therefore it is unlikely that the 1-hour mean nitrogen dioxide objective may be exceeded. The annual mean PM₁₀ concentrations are below 32 µg/m³ and therefore it is unlikely that the 24-hour mean PM₁₀ will be exceeded.

2018 Baseline Without Emission Reduction

- 6.3.17 The predicted annual mean concentrations of nitrogen dioxide are above the objective at 30 of the 100

receptor locations (at ground level), with two receptor locations exceeding $60 \mu\text{g}/\text{m}^3$ and therefore it is possible that the 1-hour mean nitrogen dioxide objective may be exceeded.

2021 Baseline With 'Official' Emission Reduction

- 6.3.18 The predicted annual mean concentrations of nitrogen dioxide are above at two of the 100 receptor locations. The annual mean nitrogen dioxide concentrations are below $60 \mu\text{g}/\text{m}^3$ at all of the receptor locations and therefore it is unlikely that the 1-hour mean nitrogen dioxide objective may be exceeded.
- 6.3.19 All of the predictions for PM_{10} and $\text{PM}_{2.5}$ are well below the objectives. The annual mean PM_{10} concentrations are below $32 \mu\text{g}/\text{m}^3$ and therefore it is unlikely that the 24-hour mean PM_{10} will be exceeded.

2021 Baseline Without Emission Reduction

- 6.3.20 The predicted annual mean concentrations of nitrogen dioxide are above the objective at 30 of the 100 receptor locations (at ground level), with two receptor locations exceeding $60 \mu\text{g}/\text{m}^3$ and therefore it is possible that the 1-hour mean nitrogen dioxide objective may be exceeded.

6.4 Inherent Design Mitigation

- 6.4.1 The EPUK/IAQM guidance advises that good design and best practice measures should be considered whether or not more specific mitigation is required. The Council's saved policy ENV7 also requires development to include measures to avoid and reduce emissions where appropriate and only after this provide mitigation.
- 6.4.2 The Project incorporates the following good design and best practice measures:
- Scheme design such that the most sensitive uses (residential) are the furthest from the main source of pollution (High Road). The residential towers are clustered on the eastern side of the site, on the junction of Worcester Avenue and Park Lane, both with little through traffic;
 - In addition, the majority of residential units are located more than 11 meters above street level, with the exception of the 5 triplex maisonettes. However, these maisonettes are set back by more than 8 meters from the kerb line and have a line of trees between them and the carriageway.
 - Provision of a car club parking space;
 - Provision of 1 electric vehicle "rapid charge" point per 10 car parking spaces;
 - Provision of a detailed travel plan setting out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety; and
 - Provision of pedestrian and cycle access to the new development, including cycle parking.

6.5 Potential Environmental Impacts and Effects

Potential Construction Phase Environmental Impacts and Effects

- 6.5.1 The construction of the Project will be completed over three Phases. The initial phase of the Stadium (Stadium Phase A) was begun in 2014 and is due for completion in October 2017 and includes excavation and earthworks, the construction of the northern section of the stadium and the demolition of White Hart Lane. The second phase of the Stadium (Stadium Phase B) is due to commence in May 2017 and end in August 2018 and includes the excavation and earthworks, the construction of the southern section of the stadium and podium and the construction of the Tottenham Experience. The third phase (Mixed-use Phase) is due to commence in May 2017 and complete by 2021 and includes the excavation and earthworks and construction of the hotel, Extreme Sports centre and southern residential area and plinth.
- 6.5.2 The construction phasing described above assumes a 12-hour working day, 7 days a week. There is an alternative construction programme proposed during which working hours will be reduced and therefore the overall construction period will be extended by 1 year. The construction impacts of the shorter working hours will be broadly the same but would occur for less time per day but for a longer period. It is considered that the assessment set out below is appropriate for both construction scenarios.

Construction Dust Impacts

- 6.5.3 The construction works will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. In each case the worst-case scenario has been considered.

Potential Dust Emission Magnitude

Demolition

- 6.5.4 There will be a requirement to demolish buildings with an approximate volume of 750,000 m³ in total across each of the three phases. The demolition phase is expected to take place over a 6 month period. The method of demolition has not yet been decided, however, a mobile crusher is likely to be used at the site. Based on the example definitions set out in Table A6.2.1 in Appendix 6.2, the dust emission class for demolition is considered to be *large*.

Earthworks

- 6.5.5 The characteristics of the soil at the Project Site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2015), as set out in Table 6.5.

Table 6.5: Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Deep
Soil Parent Material Grain Size	Argillaceous ^a
European Soil Bureau Description	Loam Loess
Soil Group	Medium to Light (Silty) to Heavy
Soil Texture	Clay to Clayey Loam ^b

a. grain size < 0.06 mm.

b. a loam is composed mostly of sand and silt.

6.5.6 Overall, it is considered that, when dry, this soil has the potential to be slightly dusty.

6.5.7 The site where earthworks will take place covers some 70,000 m² (total for all three phases), involving removal of the foundations of the demolished buildings, excavation, haulage, tipping, stockpiling and landscaping. The excavation works will be carried out in three phases ranging from 5 to 20 months. During the earthworks dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials. Based on the example definitions set out in Table A6.2.1 in Appendix 6.2, the dust emission class for earthworks is considered to be *large*.

Construction

6.5.8 Construction will involve a total building volume of over 100,000 m³ (for all three phases). Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials, and from the cutting of concrete. The construction will take place over a 75-month period. Based on the example definitions set out in Table A6.2.1 in Appendix 6.2, the dust emission class for construction is considered to be *large*.

Trackout

6.5.9 The number of vehicles accessing the site, which may track out dust and dirt is currently unknown, but given the size of the site it is likely that there will be a maximum of over 50 outward heavy vehicle movements per day. Based on the example definitions set out in Table A6.2.1 in Appendix 6.2, the dust emission class for trackout is considered to be *large*.

6.5.10 Table 6.6 summarises the dust emission magnitude for the Project.

Table 6.6: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	Large
Earthworks	Large
Construction	Large
Trackout	Large

Sensitivity of the Area

6.5.11 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM₁₀ concentrations. The three phases of the construction of THFC and the mixed-use Project will overlap and therefore a worst-case scenario has been assumed in terms of defining sensitive receptors within the area.

Sensitivity of the Area to Effects from Dust Soiling

6.5.12 The IAQM guidance, upon which the GLA's guidance is based, explains that residential properties are 'high' sensitivity receptors to dust soiling (Table A6.2.2 in Appendix 6.2). There are over 100 residential properties within 20 m of the site boundary, (see Figure 6.4, shown in Appendix 6.5). Using the matrix set out in Table A6.2.3 in Appendix 6.2, the area surrounding the on-site works is of 'high' sensitivity to dust soiling. Table 6.6 shows that dust emission magnitude for trackout is 'large' and Table A6.2.3 in Appendix

6.2 thus explains that there is a risk of material being tracked 500 m from the site exit. Since it is not known which roads construction vehicles will use, it has been assumed that all possible routes could be affected. There are over 100 residential properties within 50 m of the roads along which material could be tracked (see Figure 6.5, shown in Appendix 6.5), and Table A6.2.3 in Appendix 6.2 thus indicates that the area is of 'high' sensitivity to dust soiling due to trackout. Taking these points into account, it is judged that the areas surrounding the on-site works and along surrounding roads along which material may be tracked from the site are of 'high' sensitivity to dust soiling (Table 6.7).

Sensitivity of the Area to any Human Health Effects

- 6.5.13 Residential properties are also classified as being of 'high' sensitivity to human health effects, as are health centres and schools. The matrix in Table A6.2.4 in Appendix 6.2 requires information on the baseline annual mean PM₁₀ concentration in the area. It is considered that the modelled baseline PM₁₀ concentration at Receptor 37 of 24.3 µg/m³ (Table 6.9.1 in Appendix 6.9) will best represent conditions near to the site, due to the proximity to the Project Site. Using the matrix in Table A6.2.4 in Appendix 6.2, the areas surrounding the on-site works and surrounding roads along which material may be tracked from the site are of 'high' sensitivity to human health effects (Table 6.7).

Sensitivity of the Area to any Ecological Effects

- 6.5.14 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. There are no designated ecological sites within 50 m of the site boundary or those roads along which material may be tracked, thus ecological impacts will not be considered further.

Table 6.7: Summary of the Area Sensitivity

Effects Associated With:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	High Sensitivity	High Sensitivity
Human Health	High Sensitivity	High Sensitivity
Ecological	None	None

Risk and Significance

- 6.5.15 The dust emission magnitudes in Table 6.6 have been combined with the sensitivities of the area in Table 6.7 using the matrix in Table A6.2.7 in Appendix 6.2, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 6.8. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 6.7.

Table 6.8: Summary of Risk of Impacts Without Mitigation

Source	Dust Soiling	Human Health	Ecology
Demolition	High Risk	High Risk	None
Earthworks	High Risk	High Risk	None
Construction	High Risk	High Risk	None
Trackout	High Risk	High Risk	None

Construction Compound

- 6.5.16 The use of the construction compound may reduce the onsite construction phase dust impacts, due to the storage of materials at the construction compound rather than onsite. The earthworks and trackout impacts will remain the same. Overall, the assessment of construction impacts presented here will be

appropriate even with the use of the construction compound.

Potential Construction Traffic Impacts

- 6.5.17 Assuming there is no local construction compound during the construction phase, an average of 41 HGV movements per day is expected from construction vehicles accessing the site. These vehicles will travel along High Road (North of the Site) and may impact on air quality at existing properties along this road. The impacts of this construction traffic have been assessed for the year of 2016, when the number of HGVs accessing the site will be greatest. When considering the impacts described below, it should be borne in mind that these impacts are temporary and will only occur during the construction phase.
- 6.5.18 Predicted annual mean concentrations of nitrogen dioxide, PM₁₀, PM_{2.5} are set out in Appendix 6.9 for both the 'Without Scheme' and 'With Scheme' scenarios. The concentrations presented include the existing Sainsbury's and UTC boiler plant and road traffic emissions within the baseline.
- 6.5.19 Excavations at the site and the delivery of construction materials have been occurring since 2014. The modelled baseline includes the HGV construction traffic for these works. The 'With Scheme' scenario includes both the existing baseline construction vehicles as well as the construction vehicles expected in 2016. This scenario therefore double counts a small number of construction vehicles. The impacts are thus slightly over-predicted and the assessment is therefore considered robust.

Nitrogen Dioxide With 'Official' Emissions Reduction in 2016

- 6.5.20 The annual mean nitrogen dioxide concentrations are above the objective at the same 32 receptor locations that were showing exceedences without the Project, therefore the scheme is not causing the exceedences.
- 6.5.21 The percentage changes in concentrations, relative to the air quality objective (when rounded), are predicted to range from 0 % to 1 %. Using the matrix in Table A6.3.1 (Appendix 6.3), these impacts are described as ranging from *negligible* to *moderate adverse* due to the absolute "with Project" concentrations. The impacts are summarised in Figures A6.9.7 and A6.9.8 (Appendix 6.9).
- 6.5.22 The annual mean nitrogen dioxide concentrations are below 60 µg/m³ at all of the receptor locations and therefore it is unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded.
- 6.5.23 This scenario assumes the emission reductions will occur at official rates, which has not occurred to date and this is therefore considered to be an optimistic scenario.

Nitrogen Dioxide Without Emissions Reduction in 2016

- 6.5.24 Assuming no reduction in vehicle emissions, the annual mean nitrogen dioxide concentrations are above the objective at the same 32 receptor locations that were predicted to show exceedences without the Project, as well as at Receptor 14. The scheme is not causing the exceedences at these 32 receptor locations, but is causing a marginal exceedence at Receptor 14.
- 6.5.25 The percentage changes in concentrations, relative to the air quality objective (when rounded), are predicted to range from 0 % to 1 %. Using the matrix in Table A6.3.1 (Appendix 6.3), these impacts are described as ranging from *negligible* to *moderate adverse*. The impacts are summarised in Figures

A6.9.9 and A6.9.10 (Appendix 6.9). The percentage change at Receptor 14 is rounded to 0 % and thus the impact at this Receptor is described as *negligible*.

- 6.5.26 The annual mean nitrogen dioxide concentrations are below $60 \mu\text{g}/\text{m}^3$ at most of the receptor locations and therefore it is unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded at these locations. The annual mean nitrogen dioxide concentrations are, however, slightly above $60 \mu\text{g}/\text{m}^3$ at Receptors 57 and 58, and it is possible that the 1-hour mean nitrogen dioxide objective could be exceeded at these locations. The annual mean concentrations at these two receptors are predicted to be above $60 \mu\text{g}/\text{m}^3$ without the Project. The scheme is thus not causing the exceedences.
- 6.5.27 Although this scenario is based on worst-case assumptions, given that the expected air quality improvements have not occurred to date, this scenario is considered to be the more realistic for 2016.

PM₁₀ and PM_{2.5}

- 6.5.28 The annual mean PM₁₀ and PM_{2.5} concentrations are below the annual mean objectives at all receptors, with or without the scheme. Furthermore, as the annual mean PM₁₀ concentrations are below $32 \mu\text{g}/\text{m}^3$, it is unlikely that the 24-hour mean PM₁₀ objective will be exceeded at any of the receptors.
- 6.5.29 The percentage changes in both PM₁₀ and PM_{2.5} concentrations, relative to the air quality objective (when rounded), are predicted to be zero at all of the receptors. Using the matrix in Table A6.3.1 (Appendix 6.3), these impacts are described as *negligible*. The impacts are summarised in Figures A6.9.11 to A6.9.14 (Appendix 6.9).

Overall Construction Traffic Impacts in 2016

- 6.5.30 There may be some *moderate adverse* impacts at properties along High Road but these will be temporary and not applicable when the site is fully operational.

Construction Compound

- 6.5.31 Concrete delivery is the source of the greatest anticipated number of vehicle movements to and from the Project Site during the construction works. There are no local concrete batching plant within the borough and it would be beneficial to minimise the distance concrete delivery vehicles would have to travel, thus the use of a local construction compound for concrete batching rather than sourcing concrete from batching plant outside the borough would be beneficial. A construction compound is being proposed for a site 180m along White Hart Lane from High Road. Batching concrete at this local compound would greatly reduce the distance the concrete delivery vehicles would have to travel and thereby reduce their adverse air quality impacts on the wider area.
- 6.5.32 There are likely to be some localised adverse impacts of this compound on the receptors along White Hart Lane; this is mainly due to the rerouting of the construction traffic. These impacts have been considered as part of this assessment for the compound, a copy of which is provided in Appendix 6.12. The air quality assessment for the construction compound focuses on localised impacts and shows that there will be *moderate adverse* impacts along White Hart Lane and High Road between White Hart Lane and the Site entrance due to the use of the construction compound in 2016, however, these will be short-term. It must be noted that the assessment for the construction compound evaluates the impacts in relation to the scheme as assessed without the compound, i.e. comparing the scenario where all

construction traffic goes directly to site versus the use of the local construction compound. The use of the construction compound reduces construction traffic along High Road north of White Hart Lane, but does not remove the moderate adverse impacts of the construction traffic (paragraph 6.5.30) when compared to the baseline (no Project). The compound will, nevertheless, be beneficial along High Road north of White Hart Lane, with a very small reduction in concentrations due to the use of the construction compound.

- 6.5.33 The conclusions of the localised construction compound air quality impact assessment are that there will be some short-term localised adverse impacts in addition to those predicted due to the scheme without the construction compound (paragraph 6.5.30).

Significance of Construction Related Air Quality Impacts

Construction Dust

- 6.5.34 The IAQM does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effects will normally be *not significant* (Institute of Air Quality Management, 2014).

Construction Traffic

- 6.5.35 The construction related air quality effects without mitigation and without the construction compound are judged to be potentially *significant*. This professional judgement is made in accordance with the methodology set out in Appendix 6.3. More specifically, the judgement takes account of the assessment that:
- Concentrations are predicted to remain above the nitrogen dioxide objective at some locations, particularly along High Road; and
 - The construction traffic impacts on nitrogen dioxide concentrations are likely to be moderate adverse at locations along High Road.

Construction Compound

- 6.5.36 The conclusions of the localised construction compound air quality impact assessment (see Appendix 6.12) are that there will be some short-term localised adverse impacts, which will be in addition to those predicted due to the scheme without the construction compound (paragraph 6.5.30) and therefore the effects of the construction compound are potentially *significant*. However, taking into account that the use of the construction compound will dramatically reduce the distance construction traffic must travel to deliver concrete to the development and therefore the benefit to the wider area, this construction compound is judged to be overall beneficial in terms of the wider impacts across the borough. Overall the effects of the construction compound are considered to be potentially *significant* but possibly beneficial in the wider area when compared with the scheme without the construction compound. However, both options (with and without the construction compound) would have a *significant* effect, although this will only be temporary.

Potential Operational Phase Environmental Impacts and Effects

Road Traffic Impacts 2018

- 6.5.37 Predicted annual mean concentrations of nitrogen dioxide, PM₁₀, PM_{2.5} are set out in Appendix 6.9 for both the 'Without Scheme' and 'With Scheme' scenarios. The concentrations presented include the existing Sainsbury's and UTC boiler plant and road traffic emissions within the baseline. The impacts in 2018 are likely to be marginally greater than shown, as boiler and generator plant that may be operational in 2018 have not been included because the exact operational loads are unknown. The 2021 scenario, which follows, does, however, provide a full assessment of road traffic, boiler and generator plant emissions with the entire Project in operation.

Nitrogen Dioxide With 'Official' Emissions Reduction

- 6.5.38 The annual mean nitrogen dioxide concentrations are above the objective at the same 12 receptor locations that were showing exceedences without the Project, therefore the scheme is not causing the exceedences.
- 6.5.39 The percentage changes in concentrations, relative to the air quality objective (when rounded), are predicted to range from 0 % to 1 %. Using the matrix in Table A6.3.1 (Appendix 6.3), these impacts are all described as *negligible*, this is largely due to the low baseline concentrations in 2018 associated with the assumed reduction in vehicle emissions. The impacts are summarised in Figures A6.9.15 and A6.9.16 (Appendix 6.9).
- 6.5.40 The annual mean nitrogen dioxide concentrations are below 60 µg/m³ at all of the receptor locations and therefore it is unlikely that the 1-hour mean nitrogen dioxide objective may be exceeded.
- 6.5.41 This scenario assumes the emission reductions will occur at official rates which has not occurred to date and therefore is an optimistic scenario. However, with the introduction of new vehicle *emission limits* these reductions should start to happen.

Nitrogen Dioxide Without Emissions Reduction

- 6.5.42 Assuming no reduction in vehicle emissions, the annual mean nitrogen dioxide concentrations are above the objective at the same 30 receptor locations that were predicted to show exceedences without the Project, again the scheme is not causing the exceedences.
- 6.5.43 The percentage changes in concentrations, relative to the air quality objective (when rounded), are predicted to range from 0 % to 1 %. Without a reduction in vehicle emissions the baseline concentrations are significantly higher and therefore using the matrix in Table A6.3.1 (Appendix 6.3), these impacts are described as ranging from *negligible to moderate adverse*. The impacts are summarised in Figures A6.9.17 and A6.9.18 (Appendix 6.9).
- 6.5.44 The annual mean nitrogen dioxide concentrations are below 60 µg/m³ at all of the receptor locations and therefore it is unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded.
- 6.5.45 This scenario is based on worst-case assumptions and is unlikely to be realised. It is likely that the actual

concentrations will lie between the two scenarios and probably be nearer to the without emission reduction scenario in 2018 given the absence of any local downward trend over the 10 year period to 2014.

PM₁₀ and PM_{2.5}

- 6.5.46 The annual mean PM₁₀ and PM_{2.5} concentrations are below the annual mean objectives at all receptors, with or without the scheme. Furthermore, as the annual mean PM₁₀ concentrations are below 32 µg/m³, it is unlikely that the 24-hour mean PM₁₀ objective will be exceeded at any of the receptors.
- 6.5.47 The percentage changes in both PM₁₀ and PM_{2.5} concentrations, relative to the air quality objective (when rounded), are predicted to be zero at all of the receptors. Using the matrix in Table A6.3.1 (Appendix 6.3), these impacts are described as *negligible*. The impacts are summarised in Figures A6.9.19 to A6.9.22 (Appendix 6.9).

Overall Operational Impacts in 2018

- 6.5.48 There are likely to be some *slight to moderate adverse* impacts at properties along High Road in 2018, however, the number will depend on how effective the new cleaner Euro 6 and Euro VI vehicles are.

Combined Road Traffic, Boiler and Generator Plant Impacts 2021

- 6.5.49 Predicted annual mean concentrations of nitrogen dioxide, PM₁₀, PM_{2.5}, as well as percentiles for 1-hour mean nitrogen dioxide and 24-hour mean PM₁₀ are presented in Appendix 6.9 for both the 'Without Scheme' and 'With Scheme' scenarios. The concentrations presented include the existing boiler plant within Sainsbury's and UTC and the impacts of local traffic sources (road and car park), and the assumed worst-case emissions associated with boiler and generator plant provision for the site.

Nitrogen Dioxide With 'Official' Emissions Reduction

- 6.5.50 The annual mean nitrogen dioxide concentrations are below the objective at all relevant receptors. There are two predicted exceedances of the objective at the ground-floor level at receptors 57 and 58, although these are shops, and therefore not relevant receptors for the annual mean objective. At first-floor level these two receptors are just below the objective.
- 6.5.51 The percentage changes in concentrations, relative to the air quality objective (when rounded), are predicted to range between 0 % and 2 %. Using the matrix in Table A6.3.1 (Appendix 6.3), the impacts at ground level are described as *negligible* at all receptor locations apart from three, where there is predicted to be one *slight adverse* impact (Receptor 56) and two *moderate adverse* impacts (Receptors 57 and 58). The moderate adverse impacts occur at ground level, which does not count as a relevant receptor for the objectives, at first floor the impacts is slight adverse. Overall, there are three slight adverse impacts at relevant receptors. The impacts are summarised in Figures A6.9.23 and A6.9.24 (Appendix 6.9). The *slight adverse* impacts are predominately due to the combined effect of the Project related traffic and the diesel generator emissions. The boiler emissions make only a small contribution.
- 6.5.52 Predicted percentile concentrations are all below the objective of 200 µg/m³, with the highest predicted 99.8th percentile of 1-hour mean concentrations being 176.6 µg/m³. Therefore the short-term nitrogen dioxide objective will not be exceeded.

- 6.5.53 This scenario assumes the emission reductions will occur at official rates which has not occurred to date and therefore is an optimistic scenario. However, with the introduction of new vehicle emission limits these reductions should start to happen.

Nitrogen Dioxide Without Emissions Reduction

- 6.5.54 Assuming no reduction in vehicle emissions, the annual mean nitrogen dioxide concentrations are above the objective at 30 of the 100 existing receptors locations.
- 6.5.55 The percentage changes in concentrations, relative to the air quality objective (when rounded), are predicted to range from 0 % to 3 %. Using the matrix in Table A6.3.1 (Appendix 6.3), these impacts are described as *negligible to substantial adverse*. The impacts are summarised in Figures A6.9.25 and A6.9.26 (Appendix 6.9). The *adverse* impacts are predominately due to either the Project related traffic or the diesel generator emissions or the combined effect of both. The boiler emissions have a lesser impact than either the road impacts or the generator impacts.
- 6.5.56 Predicted percentile concentrations are all below the objective of $200 \mu\text{g}/\text{m}^3$, with the highest predicted 99.8th percentile of 1-hour mean concentrations of $185.0 \mu\text{g}/\text{m}^3$. Therefore the short-term nitrogen dioxide objective will not be exceeded.
- 6.5.57 This scenario is based on worst-case assumptions and is unlikely to be realised. It is likely that the actual concentrations will lie between the two scenarios and should be nearer to the without emission reduction scenario in 2021 given the expected performance of the new vehicle emission standards.

PM₁₀ and PM_{2.5}

- 6.5.58 The annual mean PM₁₀ and PM_{2.5} concentrations are below the annual mean objectives at all receptors, with or without the scheme. Furthermore, the relevant percentile of 24-hour mean concentrations is below the objective of $50 \mu\text{g}/\text{m}^3$ (based on the headroom methodology explained in Appendix 6.6). Therefore the short-term PM₁₀ objective will not be exceeded.
- 6.5.59 The percentage changes in both PM₁₀ and PM_{2.5} concentrations, relative to the air quality objective (when rounded), are predicted to range from 0 % to 2 % for PM₁₀ and 0% to 3% for PM_{2.5}. Using the matrix in Table A6.3.1 (Appendix 6.3), the impacts of PM₁₀ are described as *negligible* at most receptors although *slight adverse* at five receptor locations (Receptors 64, 65, 67, 76 and 79) and *moderate adverse* at one receptor location (Tower A). The impacts of PM_{2.5} are described as *negligible* at most receptors although *slight adverse* at seven receptor locations (Receptors 60, 61, 64, 65, 66, 74 and 91) and *moderate adverse* at three receptor locations (Receptor 67, 76 and 79). These adverse impacts are predominately due to the diesel generators and the adverse impacts occur to the north east of the stadium generator flues (downwind, in relation to the prevailing wind direction). The impacts are likely to be over-estimate because the specific PM₁₀ and PM_{2.5} emission rates of the generators are unknown and a single PM emission rate set at the limit was modelled. Furthermore, the proportion of this PM emission that is PM₁₀ and PM_{2.5} will be slightly less than was modelled. The impacts are summarised in Figures A6.9.27 to A6.9.30 (Appendix 6.9).

Overall Operational Impacts in 2021

- 6.5.60 There are likely to be a small number of *adverse* impacts at properties along High Road at relevant receptor locations due mainly to road traffic, however, in the wider study area the impacts are mainly

negligible. There are also likely to be *adverse* impacts due to the operation of the stadium generator plant, in particular to the northeast of the stadium.

Impacts on the Project

6.5.61 Predicted air quality conditions for residents of the Project are set out in Appendix 6.9 (Figure 6.2 for receptor locations, shown in Appendix 6.5). Table 6.9 shows the maximum concentration in each part of the Project. All of the values are below the objectives. Furthermore not all of the objectives apply to all the locations shown in the table. For example the Walkway does not represent annual mean exposure or 24-hour mean exposure, however, concentrations have been presented for information. Air quality for future residents within the Project Site and users of the development will thus be acceptable. These predictions are based on the assumed usage of the on-site boiler and generator plant. The generator plant are a far more significant contributor to the concentrations even though their usage is limited (292 hours annual for the stadium generator and 52 hours annually for the back-up generators, these durations include maintenance). This conclusion is therefore based on the generators being operational for no more time than has been modelled.

Table 6.9: Maximum Concentrations within the Project Site in 2021

Location	Annual Mean		PM ₁₀	PM _{2.5}	Short term		PM ₁₀
	NO ₂ With Reduction ^a	Without Reduction ^b			NO ₂ With Reduction ^a	Without Reduction ^b	
Stadium	23.1	28.4	25.6	19.0	76.9	87.4	7.9
Walkway	34.3	47.8	26.1	19.4	104.3	131.1	8.6
NE Building	22.9	27.9	25.5	19.0	74.3	84.3	9.0
Residential	25.0	31.5	25.7	19.2	140.0	148.2	27.0
Extreme	26.0	33.4	22.3	15.4	91.3	100.0	5.0
Hotel	26.0	32.7	35.8	29.2	176.6	185.0	43.1
Objective	40	40	40	25	200	200	50

a. This assumes that road vehicle emission factors in 2021 remain the same as in 2011.

b. This assumes that road vehicle emission factors reduce between 2014 and 2021 at the current 'official' rates.

Significance of Operational Air Quality Impacts

6.5.62 The operational air quality effects without mitigation are judged to be potentially *significant*. This professional judgement is made in accordance with the methodology set out in Appendix 6.3, and also takes into account of the results for both assessment years (2018 and 2021). It also takes account of the uncertainty over future projections of traffic-related nitrogen dioxide concentrations, which may not decline as rapidly as expected using the 'official' emission factors for motor vehicles. The latter has been addressed by giving consideration to both sets of modelled results for nitrogen dioxide; those with and without reductions in traffic emissions. It is expected that concentrations will fall in the range between the two sets of results, although by 2021 the impacts should be closer to the 'without reduction' results than the 'with reduction' results.

6.5.63 More specifically, the judgement that the air quality effects will be *significant* without mitigation takes account of the assessment that:

- concentrations are predicted to remain above the nitrogen dioxide objective at some locations;
- the operational impacts on nitrogen dioxide concentrations are likely to be at least slight adverse at

some locations, mainly along High Road;

- the PM concentrations are all below the objectives, however, the impacts are slight to moderate adverse at a number of receptors particularly to the northeast of the stadium, which is due to the PM emissions from the generators; and
- the short-term nitrogen dioxide and PM₁₀ objectives will not be exceeded providing the operations of the generators does not exceed the modelled number of operating hours.

'Air Quality Neutral'

Building Emissions

- 6.5.64 Based on the installation of boilers that conform to the London SPG, which requires the installation of ultra-low NO_x boilers (<40 mg/kWh of NO_x) and generators conforming to stage IIIA emission limits the total NO_x and PM emission from all of the proposed boilers and generators will be 26,183 kg/annum. Appendix 6.7 shows the Building Emissions Benchmarks (BEBs) for each land use category. Table 6.10 shows the calculation of the BEBs for this Project.

Table 6.10: Calculation of Building Emissions Benchmark for the Project

Description		Value		Reference
Stadium				
A	Gross Internal Floor Area (m ²)	119,945		Project Team
		NO _x	PM ₁₀	
B	BEBs (g/m ² /annum)	284	16.3	Table A6.7.1
Tottenham Experience				
C	Gross Internal Floor Area (m ²)	4,311		Project Team
		NO _x	PM ₁₀	
D	BEBs (g/m ² /annum)	22.6	1.29	Table A6.7.1
Hotel				
E	Gross Internal Floor Area (m ²)	18,820		Project Team
		NO _x	PM ₁₀	
F	BEBs (g/m ² /annum)	70.9	4.07	Table A6.7.1
Extreme Sports Centre				
G	Gross Internal Floor Area (m ²)	2,099		Project Team
		NO _x	PM ₁₀	
H	BEBs (g/m ² /annum)	284	16.3	Table A6.7.1
Residential Towers				
I	Gross Internal Floor Area (m ²)	64,231		Project Team
		NO _x	PM ₁₀	
J	BEBs (g/m ² /annum)	26.2	2.28	Table A6.7.1
Community Health Centre				
K	Gross Internal Floor Area (m ²)	2,000		Project Team
		NO _x	PM ₁₀	
L	BEBs (g/m ² /annum)	43	2.47	Table A6.7.1
		NO _x	PM ₁₀	
M	Total BEBs Emissions (kg/annum)	37,861	2,223	(A x B + C x D + E x F + G x H + I x J + K x L)/1000

- 6.5.65 The Total Building NO_x Emission of 26,183 kg/annum is less than Total BEB NO_x Emission of 37,861 kg/annum. The Total Building PM₁₀ Emission of 1,299 kg/annum is less than Total BEB PM₁₀ Emission of 2,223 kg/annum. The Project is thus better than air quality neutral in terms of building emissions.

Road Transport Emissions

- 6.5.66 The Transport Emissions Benchmarks (TEBs) are based on the number of car trips generated by different land-use classes, together with the associated trip lengths and vehicle emission rates. However, the GLA has only published TEBs for a limited number of land-use categories due to the non-availability of robust data for their calculation. Where TEBs have not been derived for specific land-use classes, it is possible to compare Project-related trip rates with benchmarked trip rates.
- 6.5.67 Appendix 6.7 provides default values for the average trip length for residential properties and B1 offices in Inner London, as well as the average NO_x and PM₁₀ emissions per vehicle-kilometre. This information has been used to calculate the transport emissions generated by these elements of the Project (Table 6.11). These have then been compared with the TEBs for the Project set out in Table 6.12. For the elements of the Project for which it has not been possible to calculate TEBs, the trip rates provided by the project team and shown in Table 6.13 in have been compared with the benchmarked trip rates provided in Appendix 6.7 (Table 6.14).
- 6.5.68 The Transport Emissions for the residential towers and the Tottenham Experience (95 kg/annum for NO_x and 17 kg/annum for PM₁₀) are less than the Transport Emissions Benchmarks for these elements of the Project (944 kg/annum for NO_x and 169 kg/annum for PM₁₀) for both NO_x and PM₁₀. Furthermore, the annual trip rates for the remaining elements of the Project (see Table 6.13) are less than the corresponding benchmark trip rates (see Table 6.14). The Project is thus better than air quality neutral in terms of transport emissions.

Table 6.11: Calculation of Transport Emissions for the Project

Description		Value		Reference
Residential Towers				
A	Total Vehicle Trips per Year ^a	143,810		Project Team
B	Average Distance per Trip (km)	3.7		Table A6.7.3
		NO _x	PM ₁₀	
C	Emissions per Vehicle-km (g)	0.37	0.0665	Table A6.6.4
D	Transport Emissions (kg/annum)	197	35	A x B x C / 1,000
Tottenham Experience				
E	Total Vehicle Trips per Year ^a	43,320		Project Team
F	Average Distance per Trip (km)	5.9		Table A6.7.3
		NO _x	PM ₁₀	
G	Emissions per Vehicle-km (g)	0.37	0.0665	Table A6.7.4
H	Transport Emissions (kg/annum)	95	17	E x F x G / 1,000

a. Each trip is 1-way (i.e. a return journey would be two trips).

Table 6.12: Calculation of Transport Emissions Benchmarks for the Project

Description		Value		Reference
Residential Towers				
A	Number of Dwellings	580		Project Team
		NO _x	PM ₁₀	
B	Benchmark Emissions (g/dwelling/annum)	558	100	Table A6.7.2
C	Residential TEBS	324	58	A x B / 1,000
Tottenham Experience				
D	Gross Internal Floor Area (m ²)	4,311		Project Team
		NO _x	PM ₁₀	
E	Benchmark Emissions (g/m ² /annum)	219	39.3	Table A6.7.2
F	TEBs	944	169	D x E / 1,000

Table 6.13: Trip Rates for the Project

Description	Value	Reference
Stadium		
Total Vehicle Trips per Year ^a	60,766	Project Team
Hotel		
Total Vehicle Trips per Year ^a	87,053	Project Team
Extreme Sports Centre		
Total Vehicle Trips per Year ^a	20,000	Project Team
Community Health Centre		
Total Vehicle Trips per Year ^a	79,511	Project Team

a Each trip is 1-way (i.e. a return journey would be two trips).

Table 6.14: Benchmarks Trip Rates for the Project

Description	Value	Reference
Stadium		
Benchmark Trip Rate (trips/annum)	2,698,763	Project Team
Hotel		
Benchmark Trip Rate (trips/annum)	94,099	Project Team
Extreme Sports Centre		
Benchmark Trip Rate (trips/annum)	47,228	Project Team
Community Health Centre		
Benchmark Trip Rate (trips/annum)	130,200	Project Team

6.6 Additional Mitigation, Compensation and Enhancement Measures

Construction Impacts

Construction Dust Impacts

- 6.6.1 Measures to mitigate dust emissions will be required during the construction phase of the Project in order to reduce impacts upon nearby sensitive receptors.
- 6.6.2 The site has been identified as a *High Risk* site for dust soiling during demolition, earthworks, construction and trackout and as a *High Risk* site for human health during demolition and *Medium Risk* site for human health during earthworks, construction and trackout, as set out in Table 6.8. The GLA's SPG on *The Control of Dust and Emissions During Construction and Demolition* (GLA, 2014b) describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on what monitoring that should be undertaken during the construction phase. This reflects best practice experience and has been used, together with the professional experience of the consultant and the findings of the dust impact assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix 6.10.
- 6.6.3 The mitigation measures should be written into a dust management plan (DMP). The DMP may be integrated into a Code of Construction Practice or the Construction Environmental Management Plan, and may require monitoring. The GLA's guidance suggests that, for a Medium to High Risk site, automatic monitoring of particulate matter (as PM₁₀) will be required. It also states that, on certain sites, it may be appropriate to determine the existing (baseline) pollution levels before work begins. However, the guidance is clear that the Local Authority should advise as to the appropriate air quality monitoring procedure and timescale on a case-by-case basis.
- 6.6.4 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

Construction Traffic Impacts

- 6.6.5 The scheme may cause some moderate adverse impacts due to additional traffic along High Road. Emissions from road traffic are being addressed principally through the introduction of more stringent emission standards, via European legislation.
- 6.6.6 The conclusions of the localised construction compound air quality impact assessment are that there will be some short-term localised adverse impacts in addition to those predicted due to the scheme without the construction compound (paragraph 6.5.30). The assessment goes further and states that although additional mitigation is not required, mitigation measures to further minimise the localised impacts could be implemented including using, as a minimum, Euro VI vehicles for the transport of concrete to and from the Project Site from the construction compound. And the possibility of electric or hybrid vehicles for transport between the construction compound and the Project Site could be considered if they are feasible and commercially available.

Operational Road Traffic Impacts

- 6.6.7 The assessment has demonstrated that the scheme will not cause any exceedences of the air quality objectives in areas where they are not currently exceeded.
- 6.6.8 The scheme may cause some adverse impacts due to additional traffic. Emissions from road traffic are being addressed principally through the introduction of more stringent emission standards, via European legislation. The Council's Air Quality Action Plan will also help reduce emissions, as will the Mayor's Air Quality Strategy.
- 6.6.9 In addition, Policy 6.13 of the London Plan (GLA, 2015) outlines that "developments must...ensure that 1 in 5 spaces (both active and passive) provide an electrical charging point to encourage the uptake of electric vehicles". Table 6.2 of the London Plan further emphasises that, for retail developments, 10% of all car parking spaces must be for electric vehicles, with an additional 10% passive provision for electric vehicles; for employment (B1) developments, 20% of all car parking spaces must be for electric vehicles, with an additional 10% passive provision for electric vehicles; and for residential developments, 20% of all car parking spaces must be for electric vehicles, with an additional 20% passive provision for electric vehicles. The Project will include this allowance for electric vehicle charging points, which will assist in minimising the impacts of the development, as identified in Section 0, as the uptake of electric vehicles increases.

Energy Plant Impacts

- 6.6.10 In order to conform with the Clean Air Act, the local authority's approval regarding the height of the flues will be required for the plant to be installed in this scheme.
- 6.6.11 The boiler and generator plant flues will conform with the specifications to minimise air quality impacts set out in the GLA's Sustainable Design and Construction SPG (GLA, 2014a), which includes the requirement that all stacks should discharge vertically upwards and be unimpeded by any fixture on top of the stack (e.g., rain cowls or 'Chinaman's Hat').
- 6.6.12 Although the SPG does not specifically state it, it is also generally considered best practice for plant to have a flue terminating at least 1 m above the roof level, which will be the case for this scheme. In

addition, in order to ensure good dispersion all boiler flues will be designed to emit emissions with a velocity of at least 7.5 m/s, which is the minimum velocity that has been modelled.

- 6.6.13 Further requirements from the SPG are set out in Appendix 6.11, which also details the specifications of the plant used to assess the boiler and generator impacts. If the installed plant do not conform to these specifications, additional assessment and/or mitigation may be required. Appendix 6.11 also sets out measures included in Technical Guidance Note D1 (Dispersion) (HMSO, 1993b) to ensure adequate dispersion of emissions from discharging stacks and vents.
- 6.6.14 The two back-up generators in the hotel and residential block have been assumed to be stage IIIA generators in relation to emissions. The EU does not regulate stationary prime or emergency standby installations, although some individual member countries do for example the TA Luft regulations in Germany. The UK does not have any regulations that apply. The generators used specifically as stationary emergency power provision in the hotel and residential tower block are therefore not required to conform to the Stage IIIA emission limits. Similarly the stationary stadium generators are not required to conform to emission limits. Although they have been modelled with emissions rates based on the Stage IIIA emission limits and using plant that does not meet these basic emission rates would lead to significantly worst impacts.
- 6.6.15 If the stationary non-road generator conformed to the non-road mobile machinery Stage IV emission limits (in force from 2014) or proposed Stage V emission limits, which would apply from 2019 the impacts would be significantly reduced. For generators with a net power greater than 560 kW (the stadium generators), Stage V emission limits for NO_x are 0.67 g/kWh (19% of the rate modelled, which is based on Stage IIIA emissions) and 0.035 g/kWh for PM emission (17.5% of the rate modelled, which is based on Stage IIIA emissions). These Stage V emission limits are in line with the US EPA Tier 4 limits which are currently in force in the USA. For generators with a net power less than 560 kW (the hotel and residential generators) Stage V emission limits for NO_x are 0.40 g/kWh (11% of the rate modelled, which is based on Stage IIIA emissions) and 0.015 g/kWh for PM emission (7.5% of the rate modelled, which is based on Stage IIIA emissions). This is again in line with the US EPA Tier 4 limits.
- 6.6.16 Stage V is currently only proposed to be required for mobile plant installed in or after 2019. Using Stage V (US EPA Tier 4) generators is not a requirement but will help to substantially reduce emissions and hence minimise and reduce any possible adverse impacts.

Air Quality Neutral

- 6.6.17 The air quality neutral policy is intended to minimise the cumulative impacts of many schemes throughout London. The Project is better than air quality neutral and therefore no additional measures to offset cumulative impacts of the of the scheme are required.

6.7 Assessment Summary and Residual Impacts and Effects

Construction Dust Impacts

- 6.7.1 The IAQM guidance is clear that, with appropriate mitigation in place, the residual effect will normally be 'not significant'. The mitigation measures set out in Appendix 6.10 are based on the IAQM guidance. With these measures in place and effectively implemented the residual effects are judged to be *not significant*.

- 6.7.2 The IAQM guidance does, however, recognise that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. During these events, short-term dust annoyance may occur, however, the scale of this would not normally be considered sufficient to change the conclusion that overall the effects will be *not significant*.

Construction Traffic Impacts

- 6.7.3 Without the construction compound the residual impacts will be the same as those identified in Section 6.5 (paragraphs 6.5.17 to 6.5.30) and the temporary impacts of the construction traffic would remain as *moderate adverse* and the effects are considered potentially *significant*, although temporary.
- 6.7.4 If the construction compound is utilised then the residual impacts for receptors along High Road north of White Hart Lane, where adverse impacts have been predicted, will be reduced marginally, but are likely to remain *moderate adverse* compared with the baseline. Additional *moderate adverse* impacts may be introduced along White Hart Lane. Taking account that the use of the construction compound will dramatically reduce the distance construction traffic must travel to deliver concrete to the development and therefore the benefit to the wider area by using the construction compound, this construction compound is judged to be overall beneficial in terms of the wider impacts across the borough. Although the local impacts would remain *moderate adverse* and the effects are considered potentially *significant*, although temporary.

Boiler and Generator Plant Impacts

- 6.7.5 If the installed generator plant conform to Stage IIIA emission limits the residual impacts will be the same as those previously identified in this Chapter, and will be at least slight adverse. However, if cleaner generators are installed, for example conforming to stage V (US EPA Tier 4), then the impacts will be significantly less.

Road Traffic Impacts

- 6.7.6 The residual impacts will be the same as those identified in Section 6.6. The impacts of the Project will remain as slight adverse. Impacts in 2021 include the boiler and generator plant and by using cleaner generators the impacts would be minimised, however, there will still be adverse impacts along High Road due to road traffic.

Cumulative Impacts and Effects

- 6.7.7 The construction phase is expected to be completed by 2021 and there are no other significant developments in the local area that may cause cumulative effects during the construction phase.
- 6.7.8 From 2021 onwards, when the Project will be operational, there are no significant developments consented in the local area. The High Road West (HRW) development, which currently isn't consented, will be fully operational from 2024 onwards. The additional traffic generated by HRW development may cause cumulative effects on air quality in the local area. In the future there may also be some minor developments in the area that may lead to cumulative effects. The traffic data used in the assessment assume no growth in the baseline traffic. The baseline traffic has been decreasing in recent years and is expected to continue to decrease in the future. Taking these points into account, the baseline traffic used in the assessment is likely to account for increases in traffic due to the High Road West development and