

Hyde Park, Hayes, Site HPH5

AIR QUALITY ASSESSMENT

- 16 August 2012



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Executive Summary

SKM Enviros was commissioned by Hyde Park Hayes Ltd. to assess the impact of air emissions from road traffic and other sources at the site of the proposed office development at Hyde Park Hayes.

The objective of the assessment was to identify whether levels of air quality at the proposed development site were suitable for introducing new potentially sensitive receptors and whether the development itself would cause a significant impact on local air quality during the operational and construction phases.

A detailed dispersion modelling study was carried out to determine the air pollutant concentrations at the Hyde Park Hayes site – HPH5. The assessment of air quality at the proposed development considered the short-term air quality objectives, as employees at the office space would not normally be subject to prolonged pollutant exposure that would warrant comparison with the annual mean objectives. The results of the detailed assessment indicated that concentrations of nitrogen dioxide and PM₁₀ are likely to comply with the short term air quality objectives across the entire development site.

The significance of the forecast increase in pollutant concentrations due to development-related traffic at existing sensitive receptor locations is described as “slight adverse”. The actual increase in pollutant concentrations is small, and does not result in any new breaches of the annual mean air quality objective for nitrogen dioxide. However, existing ambient pollution levels in the vicinity of the site are already above the annual mean air quality objective. The potential effects of dust generated during the construction phase of the HPH5 development have been assessed qualitatively. The qualitative assessment shows that, although dust is expected to occur from site activities, this is likely to have a short-term moderate impact on the surrounding environment. This impact can be further reduced by the use of appropriate mitigation measures.

Therefore, it is concluded that the development is suitable for office use from an air quality perspective.

1. Introduction

SKM Enviros was commissioned by Hyde Park Hayes Ltd. to assess the impact of air emissions from road traffic and other sources at the site of the proposed 13,880 square metres of office space at Hyde Park Hayes (HPH5 site).

The proposed development site has been cleared and is ready for development. The site is located in a predominantly commercial area with office and residential use. The wider HPH campus surrounds the HPH5 site to the north, east and west. The site is bounded to the north by a minor access road with the HPH2 site beyond, to the east by a multi-storey carpark, to the south by a light industrial/warehouse units with residential properties beyond, and to the west by Millington Road with the HPH4 site beyond.

There are two aspects to consider in this air quality assessment;

- The site suitability for office development from an air quality perspective; and
- The impact of the development on nearby residents adjacent to the local road network.

This assessment investigates the existing air quality situation, relevant guidance and legislation and the future air quality situation at the site compared to relevant air quality objectives. The assessment also considers the impact of the development on local sensitive receptors in terms of construction dust.

Chapter 2 outlines the existing air quality situation in the London Borough of Hillingdon, Chapter 3 details the methodology and results of the detailed assessment. Chapter 4 is the construction dust assessment, including a series of mitigation measures and Chapter 5 is the conclusion.

2. Existing Air Quality Situation

2.1. Local Air Quality Management

Local authorities are responsible for air quality within their area as part of the Local Air Quality Management (LAQM) process. This process requires local authorities to assess air quality within their boroughs and designate Air Quality Management Areas (AQMA) if the health based Air Quality Objective levels are likely to be exceeded. Once an AQMA has been declared, the local authority must prepare an Action Plan to put measures in place to improve air quality in that area.

The LAQM process has been set in regulations made under the Environment Act 1995 and is described in the LAQM Policy Guidance Note PG (09)¹ and Technical Guidance Note TG (09)².

A LAQM assessment carried out by the London Borough of Hillingdon³ indicated that concentrations of nitrogen dioxide (NO₂) were unlikely to meet the annual mean national Air Quality Objectives by their respective deadlines in areas close to busy roads and the Chiltern-Marylebone railway line within the south of the borough. Therefore, the Council declared the area around the A40 and all areas south of the A40 as an AQMA on the basis of elevated levels of nitrogen dioxide due to road traffic emissions. The most recent LAQM assessment states that concentrations of fine particulate matter (PM₁₀) are forecast to comply with the objective level within the borough.

This assessment has assessed levels of nitrogen dioxide and PM₁₀ for the proposed development. The work carried out by the Council confirms that levels of other pollutants are not significant in this area.

2.2. Industrial Sources

The closest installation designated as a Part A industrial process, as specified by the Environmental Permitting (England and Wales) Regulations 2010⁴ (EPR) as amended, that emits to air is a fuel combustion facility operated by Nestle UK Ltd, located approximately 1 kilometre to the east of the proposed development site. This process is permitted to emit a range of substances to air, which include particulate matter and oxides of nitrogen. Another similar process, operated by Heathrow Airport Ltd, is located approximately 1.6 kilometres upwind of the proposed development site.

1 Part IV of the Environment Act 1995 Local Air Quality Management Policy Guidance LAQM.PG (09), Department of the Environment, Food and Rural Affairs, January 2009.

2 Part IV of the Environment Act 1995 Local Air Quality Management Policy Guidance LAQM.TG (09), Department of the Environment, Food and Rural Affairs, February 2009.

3 The London Borough of Hillingdon Air Quality Action Plan. Progress Report 2011.

4 Environmental Protection, England and Wales. The Environmental Permitting (England and Wales) Regulations 2010, Statutory Instrument 2010 No.675



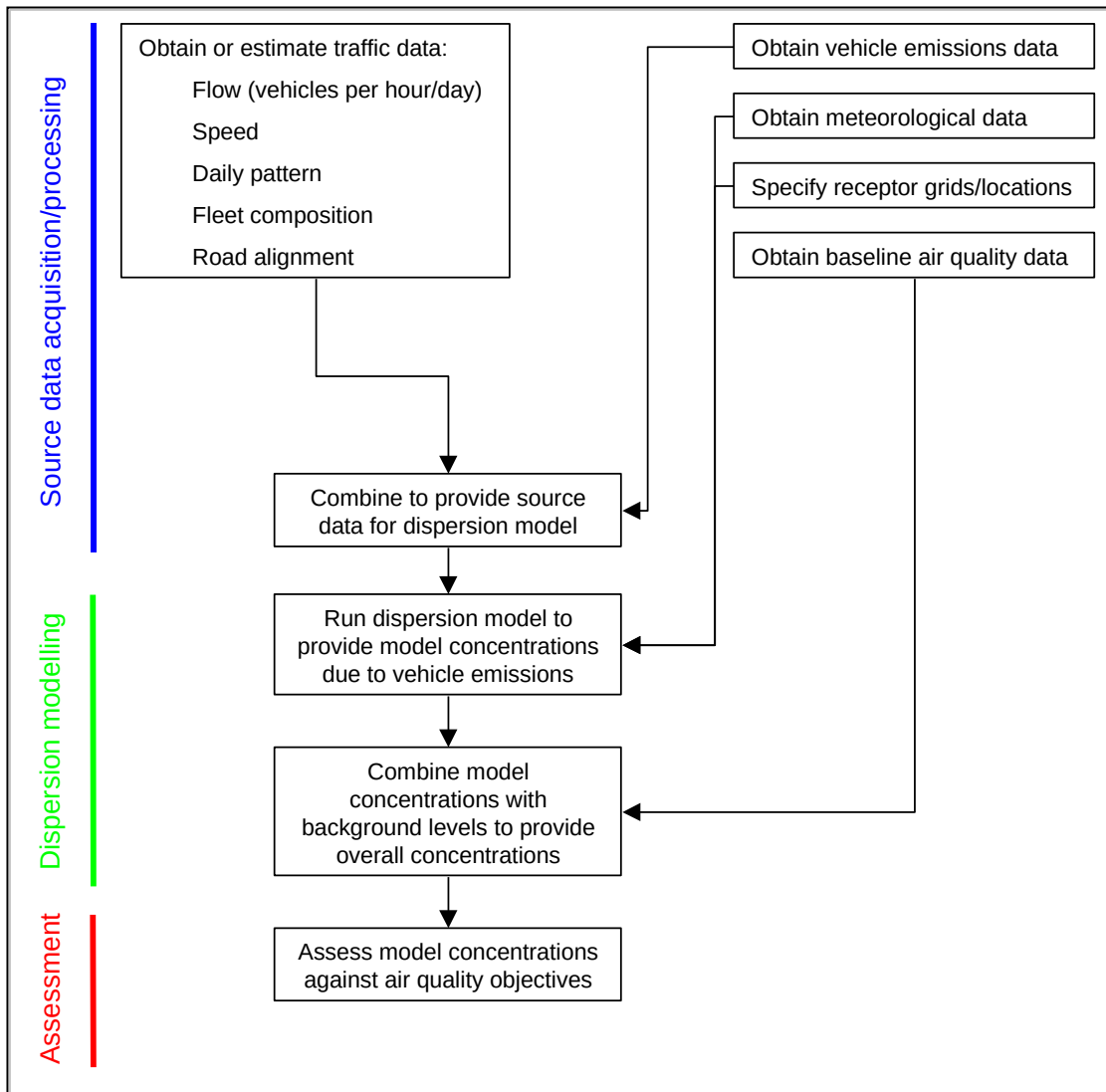
The distance between these processes and the proposed development site should allow sufficient dispersion of pollutant emissions so that no significant effects on air quality would be experienced at the development. The environmental impacts of any emissions from these processes are monitored and regulated by the Environment Agency (EA).

3. Road Traffic Emissions: Modelling Assessment

3.1. Methodology (ADMS-Roads)

A detailed modelling assessment was carried out using the atmospheric dispersion modelling system, ADMS-Roads version 3.1. The methodology for this study is shown in outline below. The dispersion model used for the study is described in **Appendix A**. The study inputs and results are set out below.

■ Detailed air quality study structure



3.1.1. Assessment Scenarios

The air pollutants requiring a detailed study, as indicated by the results of the London Borough of Hillingdon's Review and Assessment Process are nitrogen dioxide and PM₁₀.

The following scenarios have been assessed:

- Without Development (Baseline Assessment): model road traffic emissions at the development site and at existing sensitive receptors, for the year 2014 with other committed developments in the vicinity (including site HPH4 – shown in Figure 1), for comparison to the air quality objectives. This provides a context to compare the impact of the completed scheme.
- With Development (Impact Assessment): model road traffic emissions at the development site and at existing sensitive receptors for the year 2014 with other committed developments in the vicinity (including site HPH4), plus traffic related to the HPH5 development, and compare results to the air quality objectives. This represents the greatest impact from road traffic as the transport consultant has confirmed the peak flows occur once the development is complete. This allows for an assessment of the impact of the development compared to the “Without Development” scenario described above.

3.1.2. Air quality objectives

Concentrations of traffic-derived nitrogen dioxide and PM₁₀ have been predicted for 2014, the year by which the development is expected to be complete. To assess the likely significance, the predicted concentrations were compared with the Air Quality Objectives in the UK Air Quality Strategy⁵ and the most recent Air Quality Regulations⁶ as set out in **Table 1**.

It was agreed with the EHO at LBH that the impact of air pollution at the proposed development need only be assessed against the short-term air quality objectives, given the relatively short exposure period of future office employees⁷. However, the annual mean objectives have still been considered, along with the short term objective for both nitrogen dioxide and PM₁₀. Guidance set out in LAQM.TG(09) states that the 1-hour mean objective for nitrogen dioxide is likely to be achieved if predicted annual mean concentrations are less than 60 µg/m³. Therefore concentrations of nitrogen dioxide were compared against the annual mean level of 60 µg/m³. The use of this value as an indicator of the short term objective is an established procedure and is less uncertain than modelling the short term concentrations precisely.

⁵ **The Air Quality Strategy for England, Scotland, Wales and Northern Ireland** Department for Environment, Food and Rural Affairs, 2007.

⁶ **The Air Quality Standards Regulations 2010**, Crown Copyright, 2010 No 1001

⁷ Email correspondence between N Chandran (London Borough of Hillingdon) and T Dean (SKM Enviros)

■ **Table 1 Short term air quality objectives**

Pollutant	Air quality objective	
Nitrogen Dioxide	40 $\mu\text{g}/\text{m}^3$	Annual mean
	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times per year†	Hourly mean
Particulate matter PM ₁₀	40 $\mu\text{g}/\text{m}^3$	Annual mean
	50 $\mu\text{g}/\text{m}^3$ (gravimetric) not to be exceeded more than 35 times a year	24 hour mean

† Guidance set out in LAQM.TG(09) states that the 1-hour mean objective for nitrogen dioxide is likely to be achieved if predicted annual mean concentrations are less than 60 $\mu\text{g}/\text{m}^3$. Therefore concentrations of nitrogen dioxide were compared against the annual mean level of 60 $\mu\text{g}/\text{m}^3$

$\mu\text{g}/\text{m}^3$ = micrograms per cubic metre

3.1.3. Assessment locations

Levels of air pollutants have been estimated at three locations across the Hyde Park Hayes development site; two at the HPH 5 site and one at the HPH4 site. These locations have been chosen to represent the points on the site which are closest to the roads being assessed, and therefore closest to the sources of air pollutants, and to ensure that each facade of the development site is considered. These assessment locations provide an indication of pollutant levels where they will be most significant (i.e. relative to potentially sensitive locations). A further eleven sensitive receptor locations were selected for existing properties close to the local road network to identify potential impacts of development-related traffic emissions on local air quality. **Table 2** and **Figure 1** present the sensitive receptor locations.

■ **Table 2 Sensitive receptor locations**

Receptor	Easting	Northing	Height above ground (m)	Description
1	509039	179627	0	Existing residential property on Dawley Road to the north west of the development site
2	509021	179399	0	Existing residential property on Dawley Road to the north west of the development site
3	508976	179352	0	Existing residential property on Bourne Avenue to the north west of the development site
4	508987	179309	0	Existing residential property on junction of Bourne Avenue and Dawley Road to the west of the development site
5	509003	179264	0	Existing residential property on Dawley Road to the west of the development site

Receptor	Easting	Northing	Height above ground (m)	Description
6	509067	179299	0	Proposed office use at the north western corner of the HPH4 development site close to Dawley Road
7	509225	179411	0	Existing residential property on Keith Road to the north of the development site
8	509295	179363	0	Existing residential property on North Hyde Road to the north of the development site
9	509113	179208	0	Proposed office use at the south western corner of HPH5 development site close to Dawley Road
10	509196	179238	0	Proposed office use at the north eastern corner of HPH5 development
11	509493	179253	0	Existing residential property on the junction of North Hyde Road and Station Road to the north east of the development site
12	509498	179187	4	Existing residential property on the junction of North Hyde Road and Station Road to the north east of the development site
13	509481	179160	0	Existing residential property on Station Road to the east of the development site
14	509422	178993	0	Existing residential property on Station Road to the south east of the development site

Guidance provided in the Design Manual for Roads and Bridges (DMRB) indicates that sections of roads within 200m of a proposed development need to be considered for the purposes of an air quality assessment. The sections of road which have been considered are North Hyde Road, Station Road, Dawley Road and the roundabout at the junction of North Hyde Road and Dawley Road; all of which are located in close proximity to the site.

Traffic flows on other roads within 200 metres of the proposed development are likely to be less than 10,000 vehicles per day. Government guidance³ indicates that roads with less than 10,000 vehicles per day are unlikely to have a significant impact on air quality and do not require specific assessment. Emissions from traffic using these roads and roads further than 200 metres from the proposed development were taken into account by the use of appropriate background air quality data.

3.1.4. Traffic data

Traffic data for the “Without Development” and “With Development” scenarios were obtained from the Transport Consultant for the development.

Guidance provided by Environmental Protection UK (EPUK)⁸ states that roads require assessment if the development proposals result in a change in annual average daily traffic flow (AADT) of greater than $\pm 5\%$ within an AQMA on roads with more than 10,000 AADT. On this basis the transport consultant has calculated those roads which meet this criterion and the air quality assessment has been undertaken at sensitive receptors close to those roads.

The traffic data supplied by the Transport Consultant for the scheme were for the year 2014, which is the year that the development is proposed to be operational. This data has been accepted *de facto* by SKM Enviros.

The average speed was determined based on the speed limit and road layout e.g. proximity to crossings or junctions. Several of the roads were broken down to smaller road links in order to assess the lower average speed at junctions. Traffic data used for this assessment are presented in **Table 3**.

■ **Table 3 Traffic input data**

Road Link	Without Development		With Development		Average Vehicle Speed (kph)	
	AADT	% HDV	AADT	% HDV	Slow	Fast
Dawley Rd (north of roundabout)	23,841	2.4%	24,125	2.4%	20	40
Dawley Rd (south of roundabout)	15,613	1.8%	16,692	1.8%	20	40
North Hyde Rd (west of Station Rd)	13,856	2.2%	13,856	2.2%	20	40
North Hyde Rd (east of Station Rd)	21,237	1.8%	22,216	1.8%	20	40
Station Rd (north of North Hyde Rd)	13,813	1.7%	13,858	1.7%	20	40
Station Rd (south of North Hyde Rd)	13,764	1.0%	13,929	1.0%	20	40
Roundabout	23,841	2.4%	24,125	2.4%	20	

⁸ Development Control: Planning for Air Quality (2010 Update) Updated guidance from Environmental Protection UK on dealing with air quality concerns within the development control process. EPUK April 2010

The Department for Transport's Transport Statistics Bulletin was used to provide a 24 hour flow pattern, which takes into account the flows during day time and night time. This was input into the model.

Vehicle emission factors for the assessed pollutants were calculated using the Emissions Factors Toolkit for Vehicle Emissions (Version 5.1) produced by Defra. These emission factors were input into the model to represent vehicle emissions on the assessed road links.

3.1.5. Background data

The selection of appropriate background data was discussed and agreed with the Environmental Health Officer (EHO) at the London Borough of Hillingdon. The nearest suitable background air quality monitoring station for use in this assessment was confirmed as the Harlington Urban Background Station located approximately 1.7km to the south west of the development site. This station has recorded concentrations of nitrogen dioxide, oxides of nitrogen and PM₁₀ since January 2004. This information was sourced from the London Air Quality Network (<http://www.londonair.org.uk>). Nitrogen dioxide data was not available for all of 2011 and PM₁₀ monitoring was ceased in 2009; therefore, nitrogen dioxide data from 2010 and PM₁₀ data from 2008 has been used for this assessment.

Standard practice is to factor these data forward to the year of development completion in accordance with Government guidance⁹. However, recent monitoring for Local Authorities has shown that concentrations of air pollutants are not reducing in line with forecast levels⁹. Therefore, for the purpose of this assessment the monitored value in 2010 has been used without further adjustment.

Table 4 provides the concentrations values used in the assessment.

■ **Table 4 Background pollutant data**

Pollutant	Annual Mean Concentration (µg/m ³)	Details
Oxides of Nitrogen	61.6	Hillingdon, Harlington Background Monitoring Station from 2010
Nitrogen dioxide	34.3	
PM ₁₀	21.1	Hillingdon, Harlington Background Monitoring Station from 2008

⁹ Defra and the Devolved Administrations, Local Air Quality Management, Review and Assessment Helpdesk, "Measured nitrogen oxides (NO_x) and/or nitrogen dioxide (NO₂) concentrations in my local authority area do not appear to be declining in line with national forecasts. Should I take this into account in my Review and Assessment work?" FAQ response dated September 2010 and accessed via <http://laqm.defra.gov.uk/faqs/faqs.html>

3.1.6. Road Geometry

The alignment of the road links was taken from digital Ordnance Survey mapping of the area around the proposed development.

3.1.7. Meteorological Data

One of the key inputs to the modelling study is the use of appropriate meteorological data, representative of conditions experienced at the site. Government guidance³ indicates that meteorological data less than five years old should be used in ADMS modelling assessments. Data from the London Heathrow Airport meteorological station was used for this assessment. This is the closest weather station to the site which records all the parameters required by the atmospheric dispersion model. Data for 2006 to 2010, inclusive were used. The results presented are the maximum concentrations predicted using any of the five years of meteorological data.

3.1.8. Surface Roughness

The turbulent atmosphere caused by wind movements across structures and other surface features such as crop, forestry and bodies of water is described in terms of the surface roughness. Surface roughness ranges from 0.001 m for areas over the sea, to 1 m for built-up city centre areas.

Given the location of the plant, on the edge of Greater London, in an area dominated by residential use and light industrial use, a surface roughness of 0.8 m has been selected. This is representative of an urban area and considered suitable for use in this study. A value of 0.2m was used to represent the surface roughness at the London Heathrow weather station.

3.2. Dispersion Model Verification

A model verification exercise was undertaken to minimise any disparity between the modelling and monitoring results and to provide confidence in the predicted concentrations in the vicinity of each road assessed.

Any disparities are likely to be a combination of uncertainties in traffic flows, speeds, emissions estimates, background concentrations, meteorological data, model input parameters such as surface roughness and the overall limitations of the dispersion model. Details of the model verification are presented in **Appendix B**.

3.3. Calculating Nitrogen Dioxide Concentrations

The total nitrogen dioxide concentrations were determined using the “NO_x to NO₂ conversion spreadsheet” tool available at the UK Air Quality Archive¹⁰, in line with Government guidance³.

3.4. Impact Assessment criteria

The analysis of magnitude and significance of effects of emissions was undertaken based on guidance published by Environmental Protection UK (EPUK)¹¹. This was used to evaluate the significance of impacts of development-related traffic at existing sensitive receptor locations.

The definitions of impact magnitude used in the assessment of nitrogen dioxide concentrations are set out in **Table 5**. These relate to changes in the annual mean concentration in relation to the annual mean air quality objective of 40 µg/m³. For example, an imperceptible change is a change which is less than 1% of the air quality objective value. A small change is identified when the change is between 1% and 5% of the air quality objective, and so on.

■ **Table 5 Impact Magnitude for Changes in Annual Mean Nitrogen Dioxide Concentrations with respect to the Air Quality Objective**

Magnitude of Change	Increase/Decrease in Annual Mean
Large	>4 µg/m ³
Medium	2 – 4 µg/m ³
Small	0.4 – 2 µg/m ³
Imperceptible	<0.4 µg/m ³

Table 6 outlines the impact descriptor matrix for the changes in nitrogen dioxide concentrations when taking the total concentrations into account, in accordance with the EPUK guidance. An imperceptible change (i.e. a change of less than 1% of the value of the annual mean air quality objective) is described as ‘negligible’, regardless of the absolute (total) concentration.

10 Department for Environment, Food and Rural Affairs, UK Air Quality Archive, accessed at www.airquality.co.uk November 2010.

11 Environmental Protection UK, Development Control: Planning for Air Quality (2010 Update), April 2010

- **Table 6 Air Quality Impact Descriptors for Changes to Annual Mean Nitrogen Dioxide Concentrations at a Receptor**

Absolute Concentration in Relation to Objective	Changes in Concentration		
	Small	Medium	Large
Increase with Development			
Above objective with scheme ($>40 \mu\text{g}/\text{m}^3$)	Slight adverse	Moderate adverse	Substantial adverse
Just below objective with scheme ($36\text{-}40 \mu\text{g}/\text{m}^3$)	Slight adverse	Moderate adverse	Moderate adverse
Below objective with scheme ($30\text{-}36 \mu\text{g}/\text{m}^3$)	Negligible	Slight adverse	Slight adverse
Well below objective with scheme ($<30 \mu\text{g}/\text{m}^3$)	Negligible	Negligible	Slight adverse

3.5. Conservative Assumptions

The following conservative assumptions were reflected in the assessment:

- The assessment has not taken into account the screening affect of buildings, as the ADMS modelling software does not specifically allow for assessment of buildings;
- The assessment has used the maximum concentrations from five years of meteorological data. Under normal conditions, pollutant concentrations experienced at the assessed locations are likely to be less;
- The assessment has not used the standard method for forecasting background data to future years as set out TG(09). These factors show a trend for reducing levels of nitrogen dioxide due to improvements in fuel efficiency and technology. The assessment used actual monitored levels for 2010 with no further adjustment.

3.6. Detailed Modelling Results

The results of the dispersion modelling for the “Without Development” and “With Development” scenarios are presented in **Table 7** and **Table 8**, respectively. Exceedances of the relevant air quality objectives are shown in bold.

■ Table 7 Modelled pollutant concentrations, 2014 – “Without Development” scenario

Receptor	Annual Mean Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$)	Annual Mean PM_{10} ($\mu\text{g}/\text{m}^3$)	No. Days $\text{PM}_{10} > 50\mu\text{g}/\text{m}^3$
1	53.4	22.3	7
2	46.7	21.9	6
3	42.5	21.5	6
4	48.0	21.9	6
5	46.2	21.8	6
6	46.8	21.9	6
7	41.7	21.5	5
8	44.6	21.7	6
9	40.3	21.4	5
10	39.2	21.3	5
11	46.7	21.9	6
12	45.4	21.8	6
13	45.5	21.9	6
14	45.2	21.8	6

Note Exceedances are in **BOLD**

■ Table 8 Modelled pollutant concentrations, 2014 – “With Development” scenario

Receptor	Annual Mean Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$) (% increase)	Annual Mean PM_{10} ($\mu\text{g}/\text{m}^3$) (% increase)	No. Days $\text{PM}_{10} > 50\mu\text{g}/\text{m}^3$
1	53.5 (0.32%)	22.3 (0.00%)	7
2	47.5 (1.61%)	21.9 (0.01%)	6
3	42.6 (0.21%)	21.5 (0.02%)	6
4	48.2 (0.38%)	21.9 (0.03%)	6
5	46.6 (0.80%)	21.9 (0.18%)	6
6	47.0 (0.43%)	21.9 (0.06%)	6
7	41.7 (0.10%)	21.5 (0.01%)	5
8	44.6 (0.07%)	21.7 (0.01%)	6
9	40.4 (0.37%)	21.4 (0.09%)	5
10	39.2 (0.18%)	21.3 (0.03%)	5
11	46.9	21.9	6

Receptor	Annual Mean Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$) (% increase)	Annual Mean PM_{10} ($\mu\text{g}/\text{m}^3$) (% increase)	No. Days $\text{PM}_{10} > 50\mu\text{g}/\text{m}^3$
	(0.32%)	(0.01%)	
12	45.6 (0.49%)	21.8 (0.00%)	6
13	45.6 (0.31%)	21.9 (0.01%)	6
14	45.2 (0.07%)	21.8 (0.01%)	6

Note Exceedances are in **BOLD**

The results presented in Table 7 indicate that the annual mean air quality objective for nitrogen dioxide is forecast to be exceeded at all assessment locations, without the presence of development-related traffic, with the exception of Receptor 10, which is very close to the objective value. However, it is proposed that the development will be for office use. As such, it is not anticipated that individuals working at the development will spend sufficient time at the office in order for the annual mean air quality objective to apply and, therefore, the modelling results for the proposed development will be assessed against the short-term objective. This was agreed with the EHO at LBH.

Guidance set out in LAQM.TG(09) states that the 1-hour mean objective for nitrogen dioxide is likely to be achieved if predicted annual mean concentrations are less than $60 \mu\text{g}/\text{m}^3$. The annual mean concentration of nitrogen dioxide is predicted to be below the threshold value of $60 \mu\text{g}/\text{m}^3$ at all assessed locations, thus complying with the short-term air quality objective for nitrogen dioxide.

Annual mean and short-term concentrations of PM_{10} are forecast to be well below the respective air quality objective values.

The results shown in Table 8 indicate that the development related traffic does not significantly increase pollutant concentrations at any of the assessed locations, and does not cause an exceedance of the air quality objectives at locations not previously exceeding the objective values.

As per the “Without Development” scenario, annual mean concentrations of nitrogen dioxide are above the objective value at all assessment locations, with the exception of Receptor 10. However, the exceedance of the air quality objective at existing sensitive receptors is as a result of existing high ambient concentrations of nitrogen dioxide.

The maximum increase in annual mean nitrogen dioxide at any of the assessed sensitive receptor locations, as a result of development-related traffic, is 1.61% (or an increase of 1.9% of the annual mean air quality objective). According to the significance criteria presented in Section 3.4, the impact magnitude of this increase is described as “small”. As background levels of nitrogen



dioxide were already greater than the objective value, this increase is described as “Slight Adverse”.

Modelled concentrations of PM₁₀ are forecast to comply with the relevant air quality objectives for the “With Development” scenario at all assessment locations.

4. Construction Impacts

Major construction sites can give rise to increasing long term and short term PM₁₀ concentrations and also cause annoyance due to the soiling of surfaces by dust unless the appropriate mitigation measures are implemented. The impacts of dust therefore need to be addressed.

The assessment of dust during construction has been carried out on a qualitative basis with reference to the site's location in relation to sensitive locations; the planned process; site characteristics; material handling procedures and prevailing winds.

4.1. Potential Sources

The key potential construction air quality emission sources are:

- Excavation/demolition activities;
- Earthworks;
- Construction vehicle movement: vehicles moving in and around the site emitting exhaust fumes and re-suspending loose material on the road;
- Material transfer: spillage from transferring material around the site, wind picking up dust from material stock piles, particulate lifted from open container vehicles by the wind generated from the vehicle movement; and
- Passing vehicles: Material tracked out on the wheels of site traffic and re-suspended by passing traffic.

The temporary nature of construction differentiates it from other fugitive dust sources as to the estimation and control of emissions. The construction process consists of a series of different operations, each with its own duration and potential for dust generation. Emissions from any single construction site can be expected to have a definable beginning and end and to vary substantially over different phases of the construction process and over different tasks within each phase.

4.2. Environmental Risk

The Institute of Air Quality Management (IAQM)¹² provides guidance on the risk posed by construction sites in terms of dust emissions.

The guidance considers four types of construction activities:

- Demolition

¹² **The Institute of Air Quality Management (IAQM).** Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance January 2012



- Earthworks;
- Construction; and
- Trackout (transport of material from a construction site onto the local road network, where it may be deposited and then be re-suspended by other vehicles passing over it on the local road network).

The methodology in the guidance provides an assessment on three separate dust effects, these are:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to a significant increase in exposure to PM_{10} ,

The methodology for the assessment of the construction impacts is based on a four step approach. These steps are summarised below:

- Step 1: Screen the requirement for a more detailed assessment, i.e. whether to proceed to Steps 2-4.
- Step 2: Assess the risk of dust effects based on nature and scale of the works and proximity to sensitive receptors.
- Step 3: Is to determine the site-specific mitigation for each of the four potential activities used in Step 2.
- Step 4: Is to assess the significance of the dust effects, generally undertaken after applying the site-specific mitigation.

4.2.1. Step 1: Screen the need for a detailed assessment

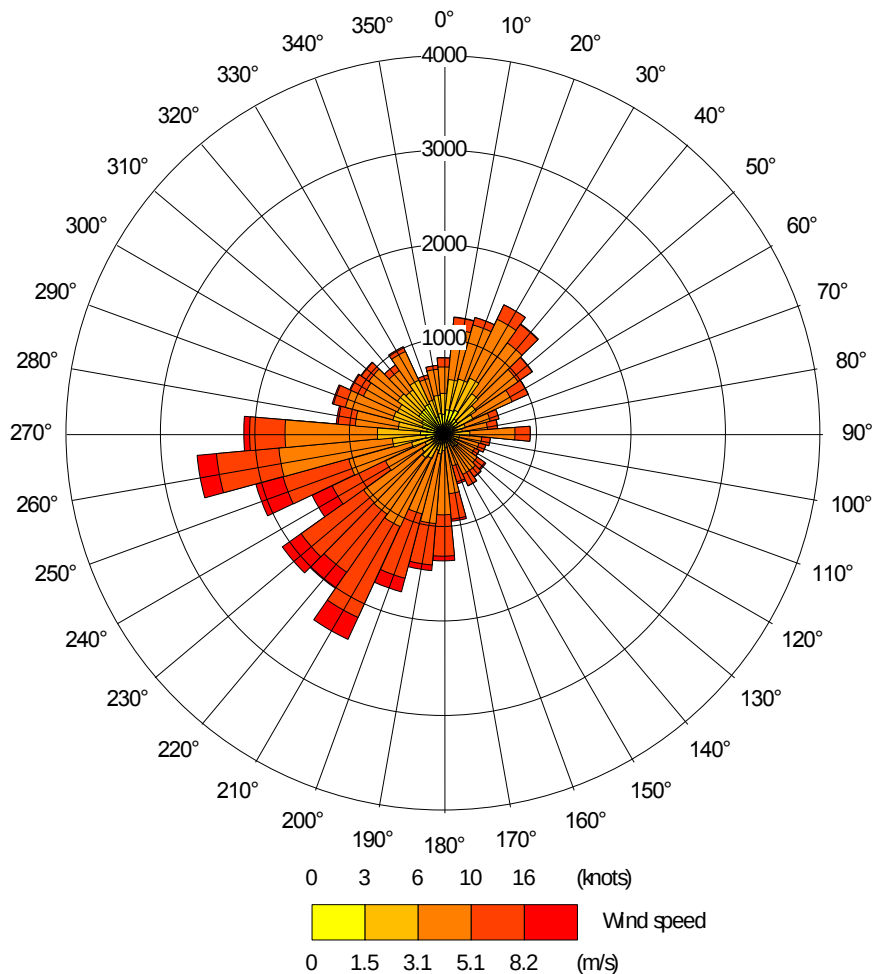
Based on the IAQM guidance, the impact on ecological receptors can be screened out as there are no habitat sites within 350 m from the site. The risk of health effects due to significant increases in exposure to PM_{10} can also be screened out as the PM_{10} concentrations are less than 90% of the relevant air quality objectives. However, as there are receptors within 350 m of the site boundary and 100 m of the access route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s) the annoyance due to dust soiling requires further assessment, Step 2-Step 4.

4.2.2. Step 2: Assess the risk of dust effects arising

Description of the site and surroundings

The closest existing potentially sensitive locations to the proposed works are located to the west and southwest on Waltham Avenue and Dawley Road. If the construction phase of the development were to produce excessive dust emissions there is likely to be some impact on these sensitive locations, which can be reduced through the use of appropriate mitigation measures. Figure 2 shows a wind rose covering the period 2006 – 2010, for the London Heathrow airport meteorological station, located approximately 6 km south of the site. This shows that the predominant wind direction is from the southwest, meaning that the prevailing wind direction is likely to blow fugitive dust emissions away from properties on Waltham Avenue and Dawley Road towards neighbouring commercial properties during construction.

■ Figure 2 Wind rose for the London Heathrow Airport meteorological station, 2006-2010



A summary of the estimated number of receptors based on the descriptors in the guidance are shown in **Table 5**.

■ **Table 9 Summary of receptors**

Distance from the site	Number of receptors from site	Number of receptors from access roads ¹
Less than 20 m	0	Fewer than 10
20 m to 40/50 m	Fewer than 10	Fewer than 10
40/50 m to 100 m	10 - 100	10 - 100
100 m to 350 m	10 - 100	10 - 100

Note 1 – this considers access roads within a distance of 200m from the site entrance

Demolition

The proposed development site is located on an area of hardstanding and does not contain any existing structures. As such, it is not anticipated that any demolition activities will be required at the development site. However, materials on site during this phase still have the potential for dust emissions. Therefore, based on the guidance, the dust emission class is “Small”.

A matrix of Risk Categories for demolition activities is shown in **Table 6**.

■ **Table 10 Risk category from demolition activities**

Distance to nearest receptor (m) ¹	Dust emission class		
	Large	Medium	Small
Less than 20	High risk site	High risk site	Medium risk site
20 to 100	High risk site	Medium risk site	Low risk site
100 - 200	Medium risk site	Low risk site	Low risk site
200 - 350	Medium risk site	Low risk site	Negligible

Note 1 – Approximate distance from the site boundary. Distance to activities on site is likely to be greater

Using the dust emission class and the distance to the closest receptor is less between 20m and 100m from the site, the risk category for demolition activities is a “Low Risk”.

Earthworks

The total HPH5 site area is approximately 5,572m², which places the site in the “Medium” dust emission class.

A matrix of Risk Categories for earthwork activities is shown in **Table 7**.

■ Table 11 Risk category from earthwork activities

Distance to nearest receptor (m) ¹	Dust emission class		
	Large	Medium	Small
Less than 20	High risk site	High risk site	Medium risk site
20 to 50	High risk site	Medium risk site	Low risk site
50 – 100	Medium risk site	Medium risk site	Low risk site
100 - 200	Medium risk site	Low risk site	Negligible
200 - 350	Low risk site	Low risk site	Negligible

Note 1 – Approximate distance from the site boundary. Distance to activities on site is likely to be greater

Using the dust emission class and the distance to the closest receptor being between 20m and 50m from the site, the risk category for earthwork activities is a “Medium Risk”.

Construction

The proposed site will involve the construction of office space and associated parking. It is anticipated that the total volume of buildings to be constructed is 73,152m³. Based on the guidance the dust emission class of the proposed HPH5 development is “Medium”.

A matrix of Risk Categories for construction activities is shown in **Table 8**.

■ **Table 12 Risk category from construction activities**

Distance to nearest receptor (m) ¹	Dust emission class		
	Large	Medium	Small
Less than 20	High risk site	High risk site	Medium risk site
20 to 50	High risk site	Medium risk site	Low risk site
50 – 100	Medium risk site	Medium risk site	Low risk site
100 - 200	Medium risk site	Low risk site	Negligible
200 - 350	Low risk site	Low risk site	Negligible

Note 1 – Approximate distance from the site boundary. Distance to activities on site is likely to be greater

Using the dust emission class and the distance to the closest receptor is between 20m and 50m from the site, the risk category for construction activities is a “Medium Risk”.

Trackout

Trackout is used to describe the possible transport and deposition of soil and dust by construction vehicle movements onto local roads. The construction traffic for this development is likely to access the site via Dawley Road and North Hyde Road. Only receptors within 100 m of the route(s) used by vehicles on the public highway and up to 200 m from the site entrance(s) are considered to be at risk.

The number of vehicles required for the construction activities are unknown; however, it is likely to be less than 100 HDV movements per day. Therefore based on the guidance the assessment is based on a dust emission class of “Medium”.

A matrix of Risk Categories for Trackout is shown in **Table 9**.

■ **Table 13 Risk category from Trackout**

Distance to nearest receptor (m) ¹	Dust emission class		
	Large	Medium	Small
Less than 20	High risk site	Medium risk site	Medium risk site
20 to 50	Medium risk site	Medium risk site	Low risk site
50 – 100	Low risk site	Low risk site	Negligible

Note 1 – Approximate distance from the roads used by construction traffic up to a distance of 200m from the site entrance

Using the dust emission class and the distance to the closest receptor to the access roads being less than 20 m, then the risk category for Trackout is a “Medium Risk”.

Summary of the risk of dust effects

A summary of the risk of dust effects described in this assessment are summarised in **Table 10**.

■ Table 14 Summary Risk Effects Table with No Mitigation

Source	Dust Risk
Demolition	Medium risk site
Earthworks	Medium risk site
Construction	Medium risk site
Trackout	Medium risk site

4.2.3. Step 3 – Identify the need for site specific mitigation

During the construction phase of the development it will be important to control dust levels for both high and medium risk sources. In order to avoid significant impacts from dust during the construction phase, measures such as the following should be adopted. These measures have been specified in the London Code of Construction Practice¹³ as measures suitable to mitigate dust emissions for sites such as the proposed development.

Measures such as these would normally be sufficient to reduce construction dust nuisance to a minor impact:

Demolition Works

- Use water as dust suppressant;
- Cutting equipment to use water as suppressant or suitable local extract ventilation.

Earthworks

- Minimising dust generating activities;
- Use water as dust suppressant where applicable; and
- If applicable, ensure concrete crusher or concrete batcher has permit to operate.

¹³ **The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance.**
Greater London Authority and London Councils. November 2006

Construction

- Erect solid barriers to site boundary;
- No bonfires;
- Plan site layout – machinery and dust causing activities should be located away from sensitive receptors;
- All site personnel to be fully trained; and
- Trained and responsible manager on site during working times to maintain logbook and carry out site inspections.

Construction Traffic

- All vehicles to switch off engines – no idling vehicles;
- Effective vehicle cleaning and specific wheel-washing on leaving site and damping down of haul routes;
- All loads entering and leaving site to be covered;
- No site runoff of water or mud;
- On-road vehicles to comply to set emission standards/Low Emission Zone requirements;
- All non road mobile machinery (NRMM) to use ultra low sulphur tax-exempt diesel (ULSD) where available;
- Minimise movement of construction traffic around site; and
- Hard surfacing and effective cleaning of haul routes and appropriate speed limit around site.

4.2.4. Step 4 – Define effects and their significance

A summary of the risk of dust effects described in this assessment following the implementation of the appropriate mitigation are summarised in **Table 11**.

■ Table 15 Summary Risk Effects Table with Mitigation

Source	Dust Risk
Demolition	Low Risk
Earthworks	Low Risk
Construction	Low Risk
Trackout	Low Risk



4.3. Conclusions

A qualitative assessment of dust levels associated with the construction of the proposed development shows that although dust is likely to occur from site activities, this can be reduced through appropriate mitigation measures. The predominant wind direction is south-westerly and any dust generated could potentially be blown to the north-east from the site towards neighbouring commercial properties and residential properties on North Hyde Road and beyond under these prevailing conditions. Some degree of dust impact is possible at nearby residential properties in other directions if the dust is not properly mitigated.

In our experience, the use of measures such as those specified above is normally sufficient to control any dust generated during the construction programme to an acceptable level. The measures to control dust emissions would normally be agreed formally with the local authority as part of a construction management plan or equivalent environmental management plan.

5. Conclusions

A detailed assessment was carried out to determine the potential air quality impacts at the proposed development at Hyde Park Hayes, London Borough of Hillingdon.

The results of the detailed modelling assessment indicated that levels of nitrogen dioxide and PM₁₀ were forecast to comply with the short-term air quality objectives at all assessment locations. It was agreed with the EHO at LBH that the short-term objectives were more applicable at the proposed development itself as its use as offices would not cause prolonged exposure to employees in order for the annual mean objectives to apply.

The significance of the forecast increase in pollutant concentrations due to development-related traffic at existing sensitive receptor locations is described as “slight adverse”. The actual increase in pollutant concentrations is small, and does not result in any new breaches of the annual mean air quality objective for nitrogen dioxide. However, existing ambient pollution levels in the vicinity of the site are already above the annual mean air quality objective.

The potential effects of dust generated during the construction phase of the HPH5 development have been assessed qualitatively. The qualitative assessment shows that, although dust is expected to occur from site activities, this is likely to have a short-term moderate impact on the surrounding environment. This impact can be further reduced by the use of appropriate mitigation measures.

Therefore, it is concluded that the development is suitable for office use from an air quality perspective.

Appendix A Description of Dispersion Model

The dispersion model used in the study was ADMS-Roads, Version 3.1. ADMS-Roads contains the same treatment of road traffic emissions as ADMS-Urban, which is widely accepted as an appropriate tool to use in the Review and Assessment process. Concentrations predicted using ADMS-Urban have formed the basis of many declarations of Air Quality Management Areas (AQMAs) by local authorities.

The model takes as starting point information on emissions from a source. This includes details of the release rate of the substance of interest; the temperature and velocity of the release, and height; and the location and, for modelling industrial sources, dimensions of any nearby buildings. For road traffic, the key information includes vehicle flows and speeds. Information characterising a set of meteorological conditions is also required. This includes the wind speed, wind direction, and information relating to the atmospheric stability. Given this information, the model provides an estimated concentration of the substance of interest at a specified point. This process is repeated over a large number of meteorological conditions and at a large number of points to build up an estimate of long-term mean and short-term peak concentrations over an area of interest.

ADMS-Roads represent a substantial development from the previous generation of dispersion models. The most significant development is an improved representation of the structure of the atmospheric boundary layer. ADMS-Roads uses measurable physical parameters obtained from meteorological readings to specify the boundary layer, in contrast to the poorly defined qualitative parameters used in previous atmospheric dispersion models. This allows for a more realistic representation of the changing characteristics of dispersion with height, resulting in more accurate and soundly based predictions of the concentrations of pollutants.

In any modelling study, there will be uncertainty over the accuracy and reliability of the model results. In the case of atmospheric dispersion modelling, models are generally more reliable for long period means than short period means. Models are usually more reliable over intermediate distances (100 m to 1000 m) than very close to the source or more distant from the source. This reflects the range of data that have been used to compile the models. Provided accurate information on emissions and appropriate meteorological data are available, our experience suggests that it would generally be possible to predict annual mean concentrations due to emissions from a single source at a given point to within an accuracy of 20 - 30%. Where emissions data are less reliable, or averaging periods are shorter, the results are likely to be less accurate.

Appendix B Verification Study

B.1 Verification Input Data

B.1.1 Diffusion Tube Data

The verification exercise was undertaken at two diffusion tube locations operated by LBH in the vicinity of the proposed development site; HD55 and HD93. Both diffusion tubes were at roadside locations. There were no other suitable diffusion tube locations within the vicinity of the development site. Other locations were considered too far from the development site to be representative and accurate traffic data was not available for the roads surrounding these sites. The most recent year when diffusion tube data were available was 2010. Details of the diffusion tube are included in Table B1

■ **Table B1 –Diffusion Tube Data (2008)**

Site	Location		Year	Monitored NO ₂ (µg/m ³)	Source
	E	N			
HD55	509917	179015	2010	40.2	LBH Air Quality Action Plan, Progress Report 2011
HD93	509251	178619	2010	41.6	

The verification exercise involves calculating the level of oxides of nitrogen (NO_x) required to adjust the modelled concentration to be consistent with actual monitored levels. An adjustment factor is derived which is applied to the output of the modelling exercise at the site. The technique used in the study is consistent with the technique outlined in TG(09)³.

B.1.2 Traffic Data

Baseline traffic count data for the year 2012 provided by the Transport Consultant was used in the model verification exercise. Although the traffic data was not of the same year as the pollutant monitoring data, it was deemed the most robust traffic count data available for the location, close to the year of monitoring data. Details are presented in Table B2.

■ **Table B2 Verification assessment traffic input data (2012)**

Road Link	Baseline Traffic		Average Vehicle Speed (kph)	
	AADT	% HDV	Slow	Fast
Dawley Rd (north of roundabout)	22,648	2.4%	20	40
Dawley Rd (south of roundabout)	14,182	1.8%	20	40

Road Link	Baseline Traffic		Average Vehicle Speed (kph)	
	AADT	% HDV	Slow	Fast
North Hyde Rd (west of Station Rd)	12,116	2.2%	20	40
North Hyde Rd (east of Station Rd)	19,082	1.8%	20	40
Station Rd (north of North Hyde Rd)	11,520	1.7%	20	40
Station Rd (south of North Hyde Rd)	12,851	1.0%	20	40
Roundabout	22,648	2.4%	20	

B.1.3 Meteorological Data

Data for 2010 from London Heathrow Airport meteorological station were used.

B.2 Verification Results

The adjustment factor is provided in **Table B3**.

■ **Table B3 – NO_x adjustment Factors for Sites across London**

Site	Background NO ₂ (µg/m ³)	Background NO _x (µg/m ³)	Monitored Total NO _x	Monitored Road Contribution (NO _x) (µg/m ³)	Modelled Road Contribution NO _x (µg/m ³)	Ratio of Monitored Road NO _x / Modelled Road NO _x
HD55	34.3	61.6	75.4	13.8	5.3	2.58
HD93	34.3	61.6	78.9	17.3	9.0	1.91
NO_x Adjustment Factor						2.25

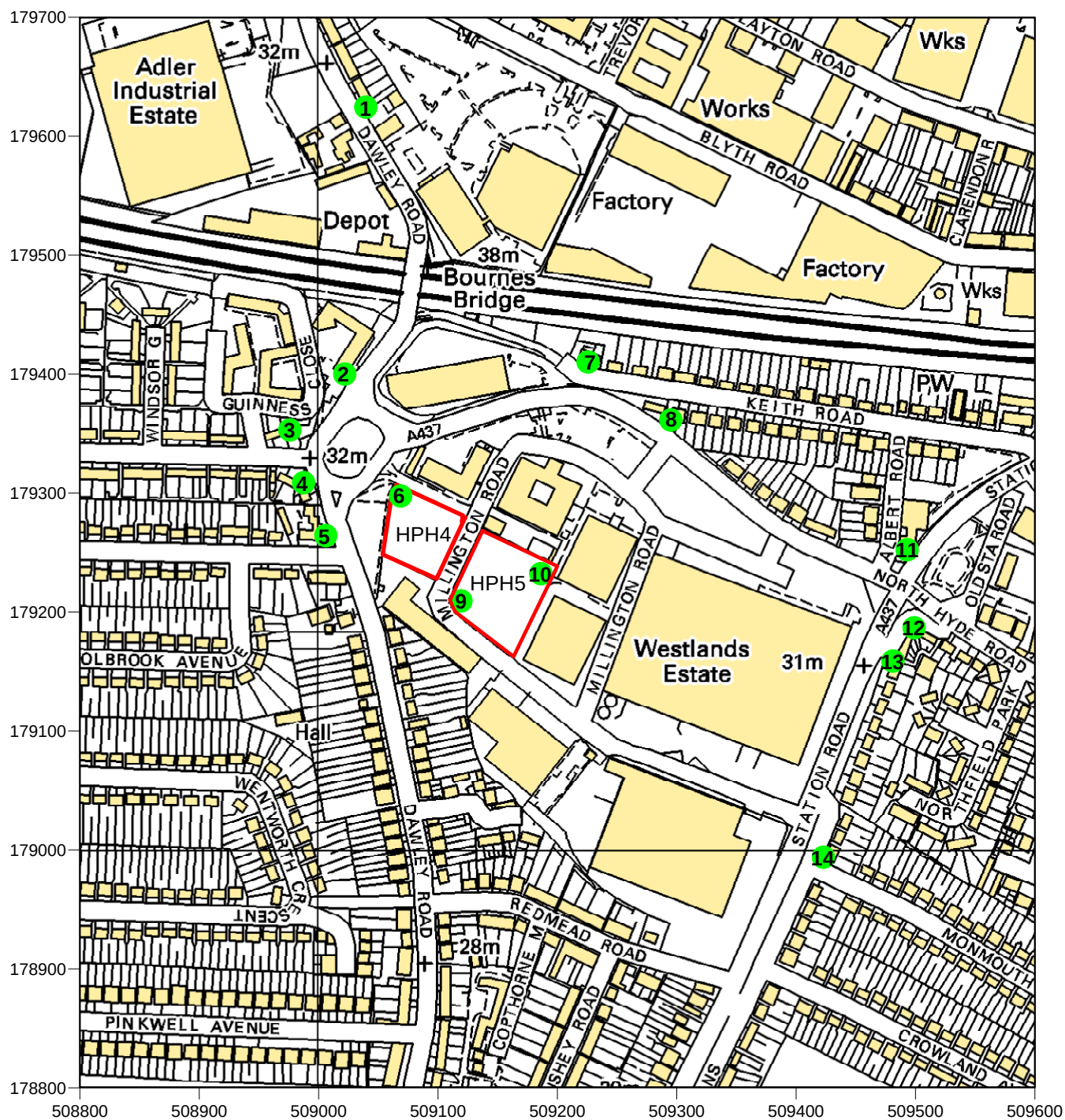
The verification assessment has shown that the model was underestimating the concentration of nitrogen dioxide. Therefore, modelled levels of oxides of nitrogen resulting from road traffic emissions were multiplied by an adjustment factor of **2.25**. The adjustment factor was applied to all modelled levels of oxides of nitrogen presented in this assessment before converting to nitrogen dioxide using the NO_x to NO₂ calculator as provided in TG(09).



Figures



- **Figure 1- Site Location and Sensitive Receptors Locations**



KEY:

-  Site Boundary HPH 4 (Approximate)
-  Site Boundary HPH 5 (Approximate)
-  Sensitive Receptor Location



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Hyde Park, Hayes - HPH4

SCALE: 1:5,000

CAN: JE30558

Figure 1

Site Location and
Sensitive Receptor Locations

CONTENT: FHL

DRAWN: FHL

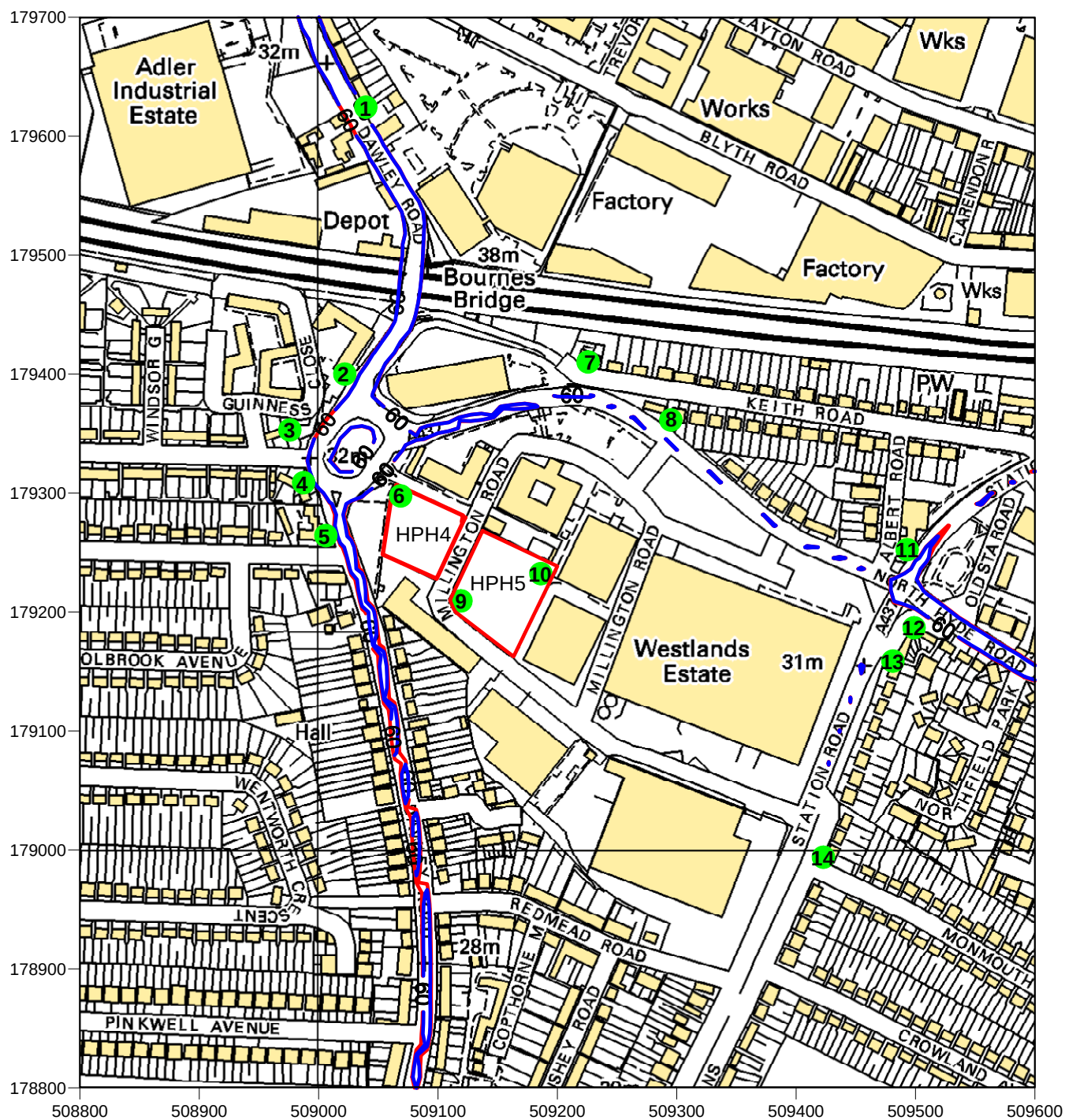
CHECKED: ALMc

DATE: May 2012

SINCLAIR KNIGHT MERRI
SKM ENVIROS



- **Figure 3- Short-term air quality objective exceedances: “Without Development” and “With Development” scenarios**



KEY:

— 60 — Annual mean nitrogen dioxide "Without Development" $\mu\text{g}/\text{m}^3$

— 60 — Annual mean nitrogen dioxide "With Development" $\mu\text{g}/\text{m}^3$



Site Boundary HPH 4 (Approximate)



Site Boundary HPH 5 (Approximate)



Sensitive Receptor Location



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Hyde Park, Hayes - HPH5

Figure 3

Short-term air quality objective exceedances:
"Without Development" and
"With Development" scenarios

SCALE: 1:5,000

PROJECT: JE30558

CONTENT: TD

DRAWN: TD

CHECKED: ALMc

DATE: July 2012