SES STANSTED ENVIRONMENTAL SERVICES

SIT413-KILB-003; Kilburn High Street

SOUND INSULATION TESTING SCHEDULE

Project Manager: Edwin Egbuonu 01279 873379
Testing Bookings: Niamh Murphy 01279 873224

Building Regulations Compliance: **ABW/ABF:** **45dB or above** $D_{nT,w} + C_{tr}$ **dB**

IMP **62dB or below** LnT,w **dB**

Block B

Set No	Test No	Transmit Plot	Room	Receive Plot	Room	Test Type	Test Date	Consultant	Result (dB)	Pass/ Fail
1	1	409	KLD	408	KLD	ABW	04/03/2020	JG	57	Pass
	2	407	KLD	408	BED 3	ABW	04/03/2020	JG	53	Pass
	3	306	BED 1	206	BED 1	ABF	04/03/2020	JG	64	Pass
	4	306	BED 1	206	BED 1	IMP	04/03/2020	JG	40	Pass
	5	306	KLD	206	KLD	ABF	04/03/2020	JG	62	Pass
	6	306	KLD	206	KLD	IMP	04/03/2020	JG	36	Pass
2	7	307	KLD	306	BED 1	ABW	04/03/2020	JG	53	Pass
	8	309	BED 1	307	BED 1	ABW	04/03/2020	JG	53	Pass
	9	409	KLD	309	KLD	ABF	04/03/2020	JG	70	Pass
	10	409	KLD	309	KLD	IMP	04/03/2020	JG	37	Pass
	11	409	BED 1	309	BED 1	ABF	04/03/2020	JG	66	Pass
	12	409	BED 1	309	BED 1	IMP	04/03/2020	JG	36	Pass

SOUND INSULATION TESTING SCHEDULE

Project Manager: Edwin Egbuonu 01279 873379
Testing Bookings: Niamh Murphy 01279 873224

Building Regulations Compliance: ABW/ABF: **45dB or above** $D_{nT,w} + C_{tr}$ **dB**
IMP **62dB or below** LnT,w **dB**

Block A

Set No	Test No	Transmit Plot	Room	Receive Plot	Room	Test Type	Test Date	Consultant	Result (dB)	Pass/ Fail
1	1	503	KLD	502	BED 1	ABW	05/03/2020	TG	52	Pass
	2	501	BED 1	503	BED 2	ABW	05/03/2020	TG	52	Pass
	3					ABF				
	4					IMP				
	5					ABF				
	6					IMP				
2	7	402	BED 1	403	BED 1	ABW	05/03/2020	TG	55	Pass
	8	401	BED 1	402	BED 2	ABW	05/03/2020	TG	55	Pass
	9					ABF				
	10					IMP				
	11					ABF				
	12					IMP				
3	13	301	BED 1	303	BED 1	ABW	05/03/2020	TG	56	Pass
	14	303	KLD	305	BED 2	ABW	05/03/2020	TG	58	Pass
	15					ABF				
	16					IMP				
	17					ABF				
	18					IMP				

254 Kilburn High Road, London NW6

Air Quality Addendum

254 Kilburn High Road, London NW6

Air Quality Addendum

Revision	Date	Notes	Author	Checked	Approved
1	28/11/14		SD	ND	Dr N Davey

Entran Limited
12 Greenway Farm
Bath Road
Wick
Bristol
BS30 5RL

T: 0117 937 4077
www.entranltd.co.uk

-

CONTENTS **PAGE**

1 INTRODUCTION

1.1 Entran Limited was commissioned to undertake an air quality assessment for a proposed mixed-use development at 254 Kilburn High Road. This report forms an addendum to the original assessment for the proposed development and assesses the potential impact of the proposed combined heat and power (CHP) plant at the site on local air quality.

1.2 The proposed plant comprises a single CHP unit, which will discharge to air via a single stack at roof level. The unit will be natural-gas fired, resulting in emissions of nitrogen oxides (NOx) and carbon monoxide (CO). Of these pollutants, NOx (as NO_2) is of principle concern since the proposed development is within the London Borough of Camden (LBC) Air Quality Management (AQMA).

1.3 The proposed development has no allocated parking and is therefore air quality neutral with respect to traffic-related emissions. On this basis it was agreed with Amy Farthing, Air Quality Officer at LBC, that provided the proposed CHP plant is compliant with the Mayor of London's Emissions Standards and the predicted NO_2 impacts are air quality neutral, the impact of the development as a whole on local air quality would be considered negligible.

.

2 LEGISLATION AND POLICY

The London Plan and Mayor of London's SPG

2.1 Policy 7.14 of The London Plan[1] sets out the Mayor of London's commitment to improving air quality and public health. It states that development proposals should "*minimise increased exposure to poor air quality*" by:

- promoting sustainable transport;
- promoting sustainable design and construction; and
- being "at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas"

2.2 The Mayor of London's Sustainable Design and Construction Supplementary Planning Guidance (SPG)[2] was published in April 2014 and sets out the requirements for undertaking impact assessments in accordance with the policies set out in the London Plan and the Mayor of London's Air Quality Strategy[3].

2.3 An additional planning support document was issued in April 2014[4], which provides guidance on the implantation of the 'air quality neutral' policy for 'major developments' (over 10 residential dwellings or 1000m^2 floor space).

Mayor of London's Emission Standards for CHP Plants

2.4 Emissions standards for CHP plants are provided within Appendix 7 of the SPG. The standards apply to CHP units of greater than 50 kWth inputs and are dependent on the existing baseline air quality with respect to the national air quality objectives.

2.5 The proposed CHP plant would comprise a lean-burn reciprocating spark-ignition with a thermal output per unit of approximately 30 kWth, therefore there is no statutory requirement for compliance with the emission standards. The emission standard for larger gas-fired spark ignition engines in areas where there is an exceedence of the air quality objective (Band B) is

---

[1] The London Plan Spatial Development Strategy for Greater London, July 2011.

[2] Sustainable Design and Construction Supplementary Planning Guidance, Mayor of London, London Plan 2011 Implementation Framework, April 2014

[3] Clearing the Air, The Mayor's Air Quality Strategy, December 2010.

[4] Air Quality Neutral Planning Support Update, GLA 80371, April 2014

95 mg/Nm^3. The manufacturer's specification for the proposed CHP (Loadtracker XRGI), states that a maximum NOx emission concentration of 90 mg/Nm^3 will be achieved, which is within the emission standard.

Air Quality Neutral Emission Benchmarks

Appendix 5 of the SPG defines Building Emission Benchmarks (BEBs) for various land-use classes. The BEBs are in units of g/m^2/annum and represent the total annual NO_x emission per unit area of a proposed development. Where the building related emission for a proposed development is below the relevant BEB, the development may be considered 'air quality neutral' and is unlikely to result in a significant impact on local air quality.

3 ASSESSMENT OF IMPACTS

3.1 The proposed CHP unit is a Loadtracker XRGI gas-fired lean-burn reciprocating spark ignition engine, vented to air via a single vertical 150 mm flue protruding from the roof of the building at approximately 64 m AOD. The flue will be fitted with a cone to reduce the diameter to 35 mm and increase the exit velocity of the exhaust gases to 12.7 m/s. The heat release of the unit is 0.0010 MW, therefore in accordance with the SPG, a minimum exit velocity of 10 m/s is required.

3.2 The flue will be located in the centre (front to rear) of the roof and therefore would not adversely impact on air quality at the ventilation inlets or opening windows.

3.3 A summary of the stack emissions parameters is presented in Table 3.1.

Table 3.1: Stack Emission Parameters

Parameter	Unit	Value
Exhaust height	m	64
Flue Diameter (at exit)	mm	35
Emission Temperature	ºC	110
Actual Flow Rate	Am^3/s	0.012
Normalised Flow Rate	Nm^3/s (at 5% O_2, 101.3mb and 273K)	0.010
Stack Discharge Velocity	m/s	12.7
NOx Emission Concentration	mg/Nm^3	90
Maximum NOx Mass Emission Rate	g/s	0.00093
Maximum NOx Mass Emission Rate	kg/annum	29

3.4 A summary of the BEB calculation for the proposed development is presented in Table 3.2. The ground floor of the development will comprise flexible B1/B8 use. For the purposes of the assessment the use has been classified as B8 (which has a lower emission benchmark), as a worst-case.

Table 3.2: Building Emission Benchmark Calculation

Land Use	GFA (m^2)	Building Emissions Benchmark (g NOx/m^2/annum)	Benchmarked Emissions (kg NOx/annum)
B8 Storage and Distribution	1,000	23.6	24
C3 Residential	4,656	26.2	122
Total			**146**

3.5 The Maximum NOx emission rate for the proposed CHP is 29 kg NOx/annum which is well within the benchmarked emissions for the development of 146 kg NOx/annum. On this basis the CHP is considered air quality neutral and is unlikely to significantly affect local air quality.

4 SUMMARY AND CONCLUSIONS

4.1 An assessment of the likely air quality impact of the proposed CHP plant at 254 Kilburn High Road has been undertaken in accordance with the Mayor of London's Sustainable Design and Construction SPG.

4.2 The proposed plant will comprise a single gas-fired unit, which is of sufficiently small thermal input that compliance with the specified emission standards is not required. Nevertheless, the manufacturer's NOx emission limit for the proposed unit is below the recommended standard for areas where the air quality objective is exceeded. However, it is recommended that post installation emissions testing is carried out within 6 months to 1 year of commissioning to confirm compliance with the manufacturers limits.

4.3 The total annual NOx emission from the proposed development has been used to calculate the building related emission in accordance with the Mayor's air quality neutral policy. The development has been assessed as air quality neutral, indicating that emissions reduction or off-setting measures are not required.

4.4 It is considered that the impact of the CHP plant will be insignificant and should not pose a constraint to the development of the site as proposed.

254 Kilburn High Road, London NW6

Air Quality Assessment

254 Kilburn High Road, London NW6

Air Quality Assessment

Revision	Date	Notes	Author	Checked	Approved
1.1	06/03/14	E997	SD	ND	ND

Entran Limited
12 Greenway Farm
Bath Road
Wick
Bristol
BS30 5RL

T: 0117 9374077
www.entranltd.co.uk

-

CONTENTS **PAGE**

1 INTRODUCTION

1.1 Entran Limited was commissioned to undertake an air quality assessment for a proposed mixed-use development at 254 Kilburn High Road, NW6. The Site location is identified in Figure 1.

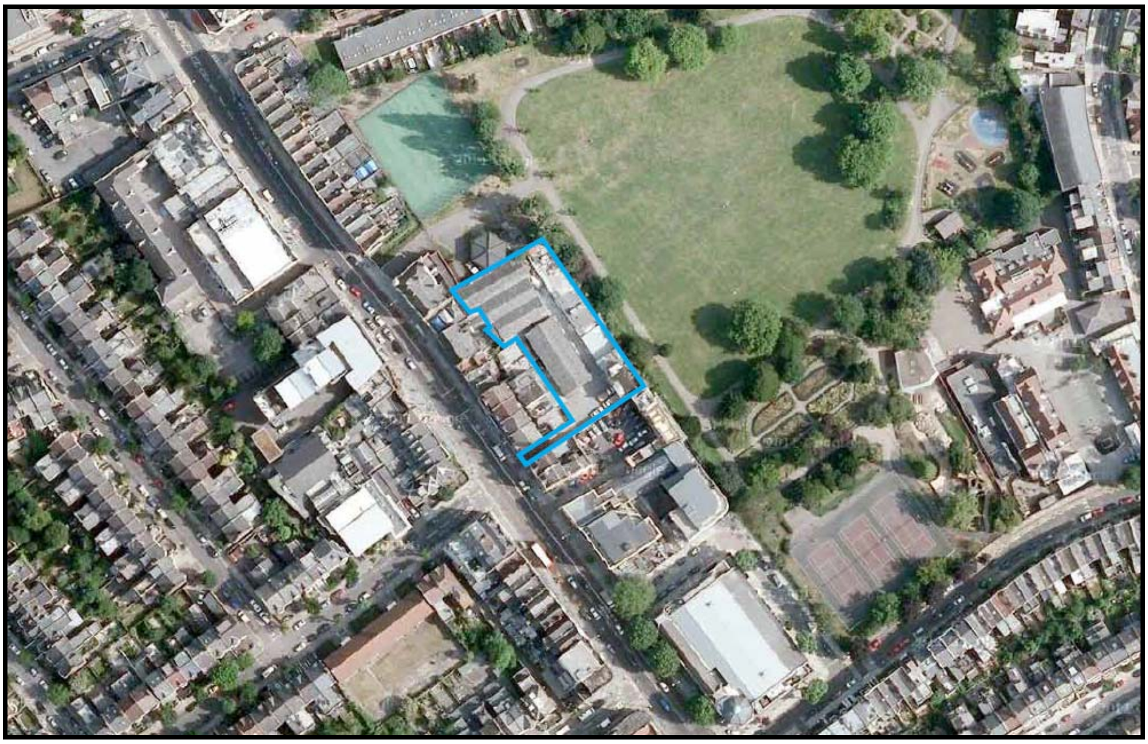
1.2 It is proposed to redevelop the existing site to provide commercial units at ground level, with residential units over floors 1 to 5.

1.3 The London Borough of Camden (LBC) has declared a Borough-wide Air Quality Management Area (AQMA), due to exceedances of the annual mean nitrogen dioxide (NO_2) and 24-hour mean particulate matter (PM_{10}) objectives. Consequently the Site falls within the designated AQMA.

1.4 This report presents the findings of a detailed air quality assessment of the potential impacts of the proposed development on local air quality during construction and the suitability of the site for residential development with regards to exposure of future occupants to elevated pollution concentrations. For both the construction and operational phases of the development the type, source and significance of potential impacts are identified and the measures that should be employed to minimise any identified impacts and exposure to elevated pollution are described.

1.5 A glossary of common air quality terminology is provided in **Appendix A.**

Figure 1: Site Location



2 LEGISLATION AND POLICY

The European Directive on Ambient Air and Cleaner Air for Europe

2.1 European Directive 2008/50/EC of the European Parliament and of the Council of 21st May 2008[1] , sets legally-binding Europe-wide limit values for the protection of public health and sensitive habitats. The Directive streamlines the European Union's air quality legislation by replacing four of the five existing Air Quality Directives within a single, integrated instrument. The pollutants included are sulphur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter of less than 10 micrometres (µm) in aerodynamic diameter (PM_{10}), particulate matter of less than 2.5 µm in aerodynamic diameter lead ($PM_{2.5}$), lead (Pb), carbon monoxide (CO), benzene (C_6H_6), ozone (O_3), polycyclic aromatic hydrocarbons (PAHs), cadmium (Cd), arsenic (As), nickel (Ni) and mercury (Hg).

Air Quality Strategy for England, Scotland, Wales & Northern Ireland

2.2 The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007[2], pursuant to the requirements of Part IV of the Environment Act 1995. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.

2.3 The AQS sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems. These are benzene (C_6H_6), 1,3-butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), particulate matter (PM_{10}, $PM_{2.5}$), sulphur dioxide (SO_2), ozone (O_3) and polycyclic aromatic hydrocarbons (PAHs).

2.4 The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). These are general concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

---

[1] Directive 2008/50/EC of the European Parliament and of the Council of 21st May 2008, on ambient air quality and cleaner air for Europe

[2] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – July 2007.

2.5 The air quality objectives (AQO) are medium-term policy based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedences of the standard over a given period.

2.6 For some pollutants there is both a long-term (annual mean) standard and a short-term standard. In the case of NO_2, the short-term standard is for a 1-hour averaging period, whereas for PM_{10} it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g. temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

2.7 Of the pollutants included in the AQS, NO_2, PM_{10} and $PM_{2.5}$ will be particularly relevant to this project as these are the primary pollutants associated with road traffic. The air quality standards and objectives for these pollutants are presented in Table 1.

Table 1: Air Quality Standards and Objectives

Pollutant	Standard (µg/m^3)	Averaging Period	No. of Permitted Exceedences
NO_2	200 (a)	1-Hour	18 per annum (99.8th percentile)
	40 (a)	Annual	-
PM_{10}	200 (a)	24-Hour	35 per annum (90.4th percentile)
	50 (a)	Annual	-
$PM_{2.5}$	25 (a)	Annual	-

(a) Air Quality Standards Regulations (2010)
(b) EU Directive Limit Value

Local Air Quality Management (LAQM)

2.8 Part IV of the Environment Act 1995 also requires local authorities to periodically Review and Assess the quality of air within their administrative area. The Reviews have to consider the present and future air quality and whether any air quality objectives prescribed in Regulations are being achieved or are likely to be achieved in the future.

2.9 Where any of the prescribed air quality objectives are not likely to be achieved the authority concerned must designate that part an Air Quality Management Area (AQMA).

2.10 For each AQMA, the local authority has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the air quality objectives. Local authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.

2.11 The Department of Environment, Food and Rural Affairs (DEFRA) has published technical guidance for use by local authorities in their Review and Assessment work[3]. This guidance, referred to in this chapter as LAQM.TG(09), has been used where appropriate in the assessment.

National Planning Policy Framework

2.12 Published on 27th March 2012, the National Planning Policy Framework (NPPF)[4] sets out the Government's planning policies for England and how these are expected to be applied. It replaces Planning Policy Statement 23: Planning and Pollution Control[5], which provided planning guidance for local authorities with regards to air quality.

2.13 At the heart of the NPPF is a presumption in favour of sustainable development. It requires Local Plans to be consistent with the principles and policies set out in the Framework with the objective of contributing to the achievement of sustainable development.

2.14 Current planning law requires that application for planning permissions must be determined in accordance with the relevant development plan (i.e. Local Plan or Neighbourhood Plan). The NPPF should be taken into account in the preparation of development plans and therefore the policies set out within the Framework are a material consideration in planning decisions.

2.15 The NPPF identifies 12 core planning principles that should underpin both plan-making and decision-taking, including a requirement for planning to '*contribute to conserving and enhancing the natural environment and reducing pollution'.*

2.16 Under Policy 11: Conserving and Enhancing the Natural Environment the Framework requires the planning system to *'prevent both new and existing developments from contributing to or being put at unacceptable risk or being adversely affected by unacceptable levels of air pollution'.*

---

3 Department for Environment, Food and Rural Affairs (DEFRA), (2009): Part IV The Environment Act 1995 Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(09).

4 Communities and Local Government: *National Planning Policy Framework* (March 2012)

5 Office of the Deputy Prime Minister: Planning Policy Statement 23: Planning and Pollution Control (Oct 2004).

2.17 In dealing specifically with air quality the Framework states 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'.*

Local Planning Policy

2.18 A number of policies relating to improving air quality are contained within the London Borough of Camden's Core Strategy[6]. In particular policy CS16 (Improving Camden's health and wellbeing) recognises the impact of poor air quality on public health.

2.19 Camden's Clean Air Action Plan[7] outlines the Councils commitment to improving air quality in the Borough. The key objectives of the plan are to reduce PM_{10} and NO_2 concentrations by:

- encouraging the use of clean fuels and technologies;
- promoting energy efficient to reduce fossil fuel usage;
- raising awareness of air quality issues and promoting lifestyle changes which reduce air pollution and improve the health of local residents; and
- working in partnership with other organisations to foster improvements in air quality.

2.20 The Action Plan is supported by The Camden Plan[8] and Camden's Environmental Sustainability Plan[9] drawing on European and National legislation in conjunction with national, regional and local policy to manage and improve air quality across the Borough.

2.21 The Borough has been designated a 'Clear Zone' focussing on reducing traffic congestion and promoting sustainable transport initiatives. Development Policy DP32 (Air Quality and Camden's Clear Zone)[10] states that planning permission will only be granted for developments that are likely to significantly increase travel demands where 'appropriate measures to minimise impacts are incorporated'.

[6] Camden Core Strategy 2010 – 2025, Adopted 2010.

[7] London Borough of Camden, Camden's Clean Air Action Plan 2013-2015.

[8] The Camden Plan 2012 - 2017

[9] Green Action for Change 2012 – 2020.

[10] Camden Development Policies 2010 – 2025

Control of Dust and Particulates Associated with Construction

2.22 Section 79 of the *Environmental Protection Act (1990*) states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Statutory nuisance is defined as:

- *'Any dust or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance', and*
- *'any accumulation or deposit which is prejudicial to health or a nuisance'.*

2.23 Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

2.24 In the context of the proposed development, the main potential for nuisance of this nature will arise during the construction phase – potential sources being the clearance, earthworks, construction and landscaping processes.

2.25 There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist – 'nuisance' is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred. However, research has been undertaken by a number of parties to determine community responses to such impacts and correlate these to dust deposition rates.

The Mayor of London's Draft Supplementary Planning Guidance on the Control of Dust and Emissions during Construction and Demolition

2.26 The Mayor of London's Draft Supplementary Planning Guidance was published for public consultation in September 2013. It replaces the Best Practice Guidance, published by the London Council's and Mayor of London in 2006[11].

2.27 The guidance describes the methodology for undertaking assessments of construction phase dust impacts, in accordance with the policies set out in the London Plan[12] and Mayor of London's Air Quality Strategy[13]. Impacts are based on the proximity of sensitive receptors, scale of dust raising activities and local background particulate concentrations.

---

[11] The control of dust and emissions from construction and demolition Best Practice Guidance, Greater London Authority and London Council's, November 2006.

[12] The London Plan Spatial Development Strategy for Greater London, July 2011.

[13] Clearing the Air, The Mayor's Air Quality Strategy, December 2010.

3 METHODOLOGY

Scope of Assessment

3.1 The scope of the assessment has been determined in the following way:

- Review of air quality data for the area surrounding the site and background pollutant maps; and
- Review of the traffic flow data, which has been used as an input to the air quality modelling assessment.

3.2 With the exception of three disabled spaces, no parking provision is provided, therefore the development is considered to be ‘car free’. Operational impacts are considered to be negligible and the impact of traffic generated by the development has not been considered within this assessment. However, an assessment of air quality at the site has been undertaken to ascertain the suitability of the Site for residential purposes to ensure future residents are not exposed to elevated pollution levels.

3.3 During construction of the proposed development there is the potential for dust soiling and health impacts to occur as a result of dust and PM_{10} emissions. These have also been considered as part of this assessment.

3.4 Details of the assessment methodology and the specific issues considered are provided below.

Construction Dust

Introduction

3.5 To assess the potential impacts associated with dust and PM_{10} releases during the construction phase and to determine any necessary mitigation measures, an assessment based on the latest guidance from the Institute of Air Quality Management[14] has been undertaken.

3.6 This approach divides construction activities into the following dust emission sources:

- demolition;
- earthworks;
- construction; and

[14] Guidance on the assessment of dust from demolition and construction, IAQM, February 2014.

- trackout.

3.7 The risk of dust effects (low, medium or high) is determined by the scale (magnitude) and nature of the works and the proximity of sensitive human and ecological receptors.

3.8 The IAQM guidance recommends that an assessment be undertaken where there are sensitive human receptors:

- within 350 m of the Site boundary; or
- within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance(s).

3.9 An assessment should also be carried out where there are dust-sensitive ecological receptors:

- within 50 m of the Site boundary;
- or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance(s).

3.10 The significance of the dust effects is based on professional judgement, taking into account the sensitivity of receptors and existing air quality.

Dust Emission Magnitude

3.11 The magnitude of the dust impacts for each source is classified as Small, Medium or Large depending on the scale of the proposed works. Table 2 summarises the IAQM criteria that may be used to determine the magnitude of the dust emission. These criteria are used in combination with site specific information and professional judgement.

Table 2: Dust Emission Magnitude Criteria

Source	Large	Medium	Small
Demolition	• Total building volume >50,000m³ • Potentially dusty material (e.g. concrete) • Onsite crushing and screening • Demolition activities >20m above ground level.	• Total building volume 20,000 - 50,000m³ • Potentially dusty material • Demolition activities 10 - 20m above ground level.	• Total building volume <20,000m³ • Construction material with low potential for dust release • Demolition activities <10m above ground level • Demolition during wetter months
Earthworks	• Total site area >10,000m² • Potentially dusty soil type (e.g. clay) • >10 heavy earth moving vehicles active at any one time • Formation of bunds >8m in height • Total material moved >100,000 tonnes	• Total site area 2,500 - 10,000m² • Moderately dusty soil type (e.g. silt) • 5 - 10 heavy earth moving vehicles active at any one time • Formation of bunds 4 - 8m in height • Total material moved 20,000 - 100,000 tonnes	• Total site area <2,500m² • Soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • Formation of bunds <4m in height • Total material moved <20,000 tonnes • Earthworks during wetter months
Construction	• Total building volume >100,000m³ • On site concrete batching • Sandblasting	• Total building volume 25,000 - 100,000m³ • Potentially dusty construction material (e.g. concrete) • On site concrete batching	• Total building volume <25,000m³ • Material with low potential for dust release (e.g. metal cladding or timber)
Trackout	• >50 HDV movements in any one day (a) • Potentially dusty surface material (e.g. high clay content) • Unpaved road length >100m	• 10 - 50 HDV movements in any one day (a) • Moderately dusty surface material (e.g. silt) • Unpaved road length 50 - 100m	• <10 HDV movements in any one day (a) • Surface material with low potential for dust release • Unpaved road length <50m
(a) HDV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes.			

Receptor Sensitivity

3.12 Factors defining the sensitivity of a receptor are presented in Table 3.

Table 3: Factors Defining the Sensitivity of a Receptor

Sensitivity	Human (health)	Human (dust soiling)	Ecological
High	• Locations where members of the public are exposed over a time period relevant to the air quality objectives for PM_{10} (a) • Examples include residential dwellings, hospitals, schools and residential care homes.	• Regular exposure • High level of amenity expected. • Appearance, aesthetics or value of the property would be affected by dust soiling. • Examples include residential dwellings, museums, medium and long-term car parks and car showrooms.	• Nationally or Internationally designated site with dust sensitive features (b) • locations with vascular species (c)
Medium	• Locations where workers are exposed over a time period relevant to the air quality objectives for PM_{10} (a) • Examples include office and shop workers (d)	• Short-term exposure • Moderate level of amenity expected • Possible diminished appearance or aesthetics of property due to dust soiling • Examples include parks and places of work	• Nationally designated site with dust sensitive features (b) • Nationally designated site with a particularly important plant species where dust sensitivity is unknown
Low	• Transient human exposure • Examples include public footpaths, playing fields, parks and shopping streets	• Transient exposure • Enjoyment of amenity not expected. • Appearance and aesthetics of property unaffected • Examples include playing fields, farmland (e), footpaths, short-term car parks and roads	• Locally designated site with dust sensitive features (b)

(a) In the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day.

(b) Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete).

(c) Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.

(d) Does not include workers exposure to PM_{10} as protection is covered by Health and Safety at Work legislation.

(e) Except commercially sensitive horticulture.

3.13 The sensitivity of a receptor will also depend on a number of additional factors including any history of dust generating activities in the area, likely cumulative dust impacts from nearby construction sites, any pre-existing screening such as trees or buildings and the likely duration of the impacts. In addition, the influence of the prevailing wind direction and local topography may be of relevance when determining the sensitivity of a receptor.

Area Sensitivity

3.14 The sensitivity of the *area* to dust soiling and health impacts is dependent on the number of receptors within each sensitivity class and their distance from the source. In addition, human health impacts are dependent on the existing PM_{10} concentrations in the area. Tables 4 and 5 summarise the criteria for determining the overall sensitivity of the area to dust soiling and health impacts respectively.

Table 4: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the source (a)			
		<20m	<50m	<100m	<350m
High	**>100**	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	**>1**	Medium	Low	Low	Low
Low	**>1**	Low	Low	Low	Low
(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.					

Table 5: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} (µg/m^3)	Number of Receptors	Distance from the source (a)				
			<20m	<50m	<100m	<200m	<350m
High	> 32	> 100	High	High	High	Medium	Low
		10 - 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32	> 100	High	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 - 28	> 100	High	Medium	Low	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	< 24	> 100	Medium	Low	Low	Low	Low
		10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	-	> 10	High	Medium	Low	Low	Low
	-	1 - 10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.

Table 6: Sensitivity of Area to Ecological Impacts

Sensitivity of Area	Distance from the Source	
	<20m	<50m
High	High Risk	Medium Risk
Medium	Medium Risk	Low Risk
Low	Low Risk	Low Risk

3.15 For each dust emission source (demolition, construction, earthworks and trackout), the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts.

Risk of Dust Impacts

3.16 The risk of dust impacts prior to mitigation for each emission source is presented in Tables 7 and 8.

Table 7: Risk of Dust Impacts – Demolition, Earthworks and Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 8: Risk of Dust Impacts - Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Mitigation and Significance

3.17 The IAQM guidance provides a range of mitigation measures which are dependent on the level of dust risk attributed to the site. Site specific mitigation measures are also included where appropriate.

3.18 The significance of the impacts following appropriate mitigation is determined by professional judgement.

Construction Traffic

3.19 Construction traffic will contribute to existing traffic levels on the surrounding road network. The greatest potential for impacts on air quality from traffic associated with this phase of the proposed development will be in the areas immediately adjacent to the principal means of access for construction traffic.

3.20 Information is not currently available regarding the numbers of vehicles associated with construction; however the flows are not predicted to be significant in terms of total emissions or construction duration.

Operational Phase Methodology

3.21 Dispersion modelling has been carried out using the ADMS-Roads model (Version 3.2) to quantify the effect of existing traffic on residents of the proposed development.

3.22 ADMS-Roads, a version of the Atmospheric Dispersion Modelling System (ADMS), is a PC based model for simulating the dispersion in the atmosphere of pollutants released from industrial and road traffic sources in urban areas. The model simulates the dispersion of emissions using point, line, area and volume source models. It is designed to allow consideration of dispersion problems ranging from simple (e.g. a single isolated point source or a single road) to complex problems (e.g. multiple industrial and road traffic emissions over a large area).

3.23 The model uses detailed information regarding traffic flows on the local road network and local meteorological conditions to predict pollution concentrations at specific locations selected by the user. Meteorological data from the London Heathrow Meteorological Station, (the closest suitable meteorological site to the development) for 2012 has been used for the assessment.

3.24 The model has been used to predict concentrations of oxides of nitrogen (NOx) and particulate matter (as PM_{10} and $PM_{2.5}$) at selected receptors using emission factors from version 5.1.3 of the Emission Factor Toolkit (EFT V5.1.3), which is built into ADMS 3.2. The predicted concentrations of NO_x have been converted to NO_2 using the LAQM calculator on the DEFRA air quality website[15].

3.25 Existing traffic flows for Kilburn High Road have been obtained from a Department for Transport (DfT) automatic traffic count (ATC) site (56125), approximately 250m southeast of the proposed development. The annual average daily traffic (AADT) flow in 2012 was 21,132 of which 13.3% were heavy goods vehicles (HGVs).

3.26 A summary of the baseline traffic data used in the assessment is presented in Table 5. It has been assumed that the future year flows will be the same as the existing baseline (i.e. zero growth). The speed limit on Kilburn High Road is 30 mph (50 kph); however for the purposes of the assessment an average speed of 25 kph has been assumed to account for traffic congestion and turning vehicles. There are four-storey buildings on either side of Kilburn High Road at this location,

---

[15] http://uk-air.defra.gov.uk

therefore a street canyon height and width of 12m and 20m respectively, was incorporated into the model.

3.27 LAQM.TG(09), recommends that modelled concentrations should be within 25% of monitored concentrations, ideally within 10%. Where there is a large discrepancy between modelled and measured concentrations, it is considered necessary to adjust the model results to more accurately reflect local air quality. Modelled NO_2 concentrations have been verified using recent diffusion tube monitoring data for a site at Kilburn Bridge, approximately 800m southeast of the Site on Kilburn High Road. A nearby DfT ATC site (75136) indicates that the traffic flows at this location are very similar to those close to the proposed development, therefore the Kilburn Bridge diffusion tube data is considered suitable for verification purposes. Full details of the model verification process are presented in **Appendix B**.

3.28 A quantitative assessment of the impacts on local air quality from road traffic emissions associated with the operation of the development have been completed against the current statutory standards and objectives set out in Table 1.

Sensitive Receptors

3.29 To assess the suitability of the site for residential development with regards to air quality, pollutant concentrations have been predicted for several receptors over the development site at heights above ground level which represent each floor of the proposed building. Each storey of the building is 3m high, with the exception of the first floor, which is 3.6m above ground floor level. An additional 1.5 m elevation is assumed within each floor for the potential exposure and breathing zone.

3.30 The receptors assumed for the assessment are presented in Table 9 and Figure 2.

Figure 2: Sensitive Receptors

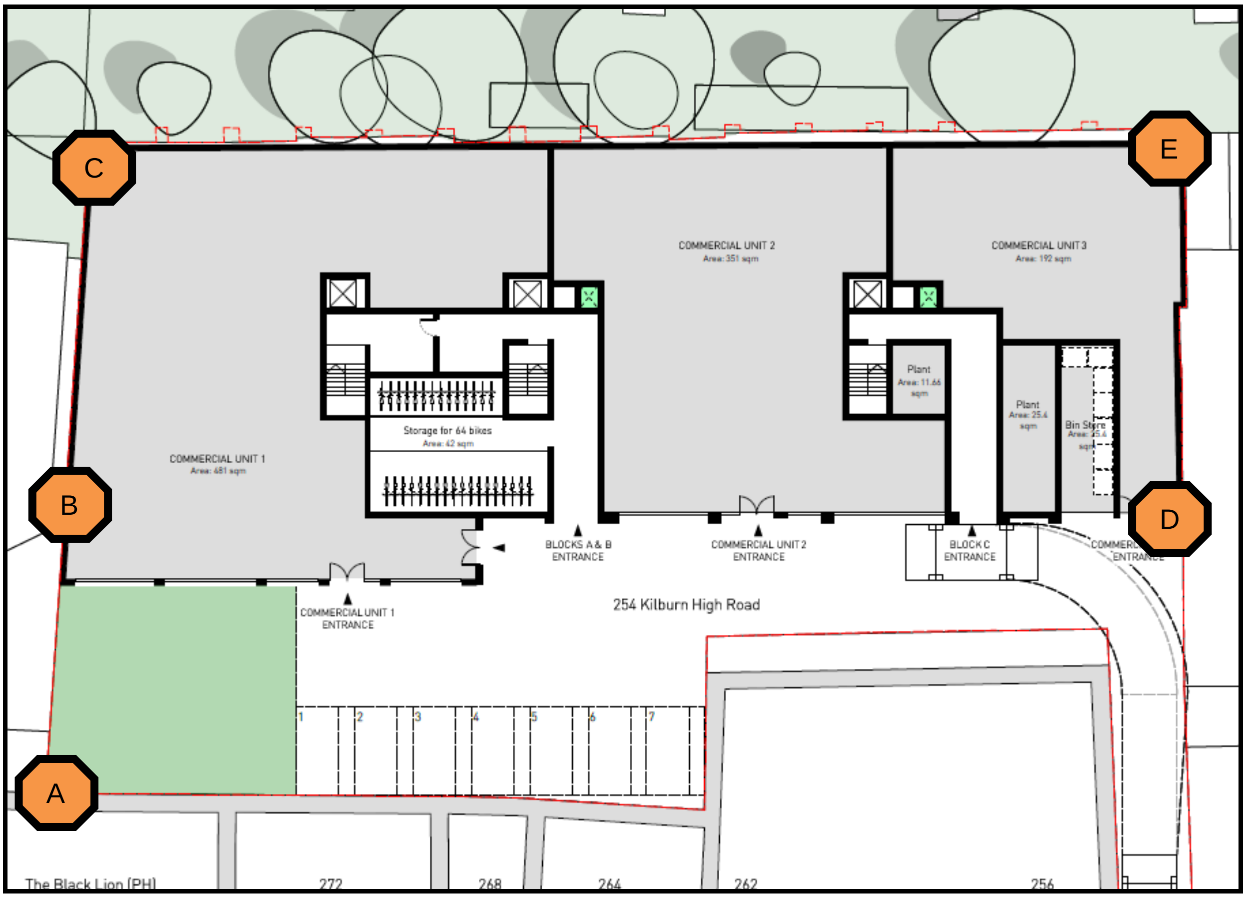


Table 9: Receptor Locations

Receptor ID	Location	Height above the ground (m)
A0	A – Ground Floor Amenity Space	1.5
B0	B – Ground Floor	1.5
B1	B – 1st Floor	5.1
B2	B – 2nd Floor	8.1
B3	B – 3rd Floor	11.1
B4	B – 4th Floor	14.1
B5	B – 5th Floor	17.1
C0	C – Ground Floor	1.5
C1	C – 1st Floor	5.1
C2	C – 2nd Floor	8.1
C3	C – 3rd Floor	11.1
C4	C – 4th Floor	14.1
C5	C – 5th Floor	17.1
D0	D - Ground	1.5
D1	D – 1st Floor	5.1
D2	D – 2nd Floor	8.1
D3	D – 3rd Floor	11.1
D4	D – 4th Floor	14.1
D5	D – 5th Floor Roof Terrace	17.1
E0	E – Ground Floor	1.5
E1	E – 1st Floor	5.1
E2	E – 2nd Floor	8.1
E3	E – 3rd Floor	11.1
E4	E – 4th Floor	14.1
E5	E – 5th Floor Roof Terrace	17.1

4 BASELINE CONDITIONS

Local Air Quality Management

4.1 The proposed development site is located adjacent to Kilburn High Road, which forms the boundary between the London Boroughs of Brent and Camden. Both local authorities have declared AQMAs due to measured exceedences of the annual mean NO_2 and 24-hour mean PM_{10} air quality objectives. The development site is to the east of Kilburn High Road in the LBC which has declared a Borough-wide AQMA. The AQMA for Brent does not cover the entire Borough, but includes the boundary with the LBC.

Nitrogen Dioxide

4.2 There are no automatic monitoring sites in the vicinity of the proposed development site. The nearest location where continuous monitoring of NO_2 concentrations is undertaken is Swiss Cottage in Camden, a kerbside location 1.7 km east of the Site. Urban background NO_2 concentrations are measured at Sion Manning School in North Kensington, approximately 2.8 km southwest of the proposed development. Until December 2010 urban background NO_2 concentrations were also measured at St Marys Primary School in Brent, 950 m south of the development site. All three sites are affiliated to the London Air Quality Network (LAQN) and are subject to high levels of quality control and assurance.

4.3 A summary of annual mean NO_2 concentrations measured at these sites between 2008 and 2012 is presented in Table 10. The number of measured exceedances of the hourly mean AQO is presented in Table 11.

Table 10: Annual Mean NO_2 Concentrations: LAQN Automatic Monitoring Sites ($\mu g/m^3$)

Site	Classification	Year				
		2008	2009	2010	2011	2012
Swiss Cottage	Kerbside	76	84	82	71	70
North Kensington Sion Manning School	Urban Background	33	33	37	36	37
Brent – St Mary's Primary School	Urban Background	-	36	35	-	-

Table 11: Number of Hours exceeding 200 µg/m^3 NO_2: LAQN Automatic Monitoring Sites

Site	Classification	Year				
		2008	2009	2010	2011	2012
Swiss Cottage	Kerbside	70	217	128	79	43
North Kensington Sion Manning School	Urban Background	0	0	0	0	0
Brent – St Mary's Primary School	Urban Background	-	4	0	-	-

4.4 The continuous monitoring results indicate likely exceedance of the annual mean and hourly mean air quality objectives at roadside locations in the Borough. The average annual mean background concentration measured at the North Kensington and Brent St Marys sites between 2008 and 2012 was 35.3 µg/m^3, 88% of the air quality objective.

4.5 For comparison, background NO_2 concentrations in the vicinity of the development site have been obtained from the DEFRA background pollutant maps[16]. These 1 km grid resolution maps are derived from a complex modelling exercise that takes into account emissions inventories and measurements of ambient air pollution from both automated and non-automated sites. The most recent set of maps are based on 2010 monitoring data, projected to future years. The mapped 2012 background NO_2 concentration for the proposed development site (determined from a contour plot of the mapped data) is 34.4 µg/m^3, which compares well with the measured concentrations.

4.6 There is no clear downward trend in the measured background concentrations presented in Table 7, therefore the average concentration of 35.3 µg/m^3 is assumed to be representative of the existing and future background NO_2 concentration at the development site.

4.7 Annual mean NO_2 concentrations are also measured using passive diffusion tubes by Brent Council at Kilburn Bridge (OSGR 525461,183558), approximately 800m southeast of the Site on Kilburn High Road. A summary of the bias adjusted annual mean concentrations measured at this location between 2008 and 2012 is presented in Table 12.

[16] http://laqm.defra.gov.uk/maps/maps2010.html

Table 12: Annual Mean NO_2 Concentrations Measured by Passive Diffusion Tube at Kilburn Bridge (µg/m^3)

Site	Classification	Year				
		2008	2009	2010	2011	2012
Kilburn Bridge	Roadside	119.3	84.2	76.3	81.6	100.8

Source: London Borough of Brent, Progress Report 2013

4.8 The diffusion tube data show that roadside concentrations on Kilburn High Road significantly exceed the air quality objective of 40 µg/m^3.

Particulate Matter

4.9 A summary of annual mean PM_{10} concentrations measured at the nearest monitoring stations to the proposed development is presented in Table 13. The number of exceedances of the 24-hour mean PM_{10} objective is presented in Table 14.

Table 13: Annual Mean PM_{10} Concentrations: LAQN Automatic Monitoring Sites (µg/m^3)

Site	Classification	Year				
		2008	2009	2010	2011	2012
Swiss Cottage	Kerbside	27	-	-	27	23
North Kensington Sion Manning School	Urban Background	21	21	20	23	20
Brent – St Mary's Primary School	Urban Background	-	21	20	-	-

Table 14: Number of Days Exceeding 50 µg/m^3 PM_{10} : LAQN Automatic Monitoring Sites

Site	Classification	Year				
		2008	2009	2010	2011	2012
Swiss Cottage	Kerbside	19	-	-	31	20
North Kensington Sion Manning School	Urban Background	12	6	2	15	7
Brent – St Mary's Primary School	Urban Background	-	5	2	-	-

4.10 With regards to PM_{10}, the data indicate that concentrations measured at roadside and urban background locations are ‘well below’ (<30 µg/m^3) the annual mean objective of 40 µg/m^3. The data also indicate that the daily objective for PM_{10} (50 µg/m^3, not to be exceeded more than 35 times per year) is unlikely to be exceeded at the development site.

4.11 The average annual mean PM_{10} background concentration measured at the North Kensington and Brent St Marys sites between 2008 and 2012 was 20.8 µg/m^3, 52% of the air quality objective. The DEFRA mapped 2012 background concentration for the proposed development site is 20.2 µg/m^3. The average measured annual mean background PM_{10} concentration of 20.8 µg/m^3 has been assumed for the purposes of the assessment.

4.12 There are no sites monitoring $PM_{2.5}$ in the vicinity of the proposed development. However, since there is good agreement between the measured and mapped NO_2 and PM_{10} background concentrations it has been assumed that the mapped $PM_{2.5}$ data will also be reasonably representative of the background concentration at the Site. The annual mean mapped 2012 $PM_{2.5}$ concentration for the proposed development is 14.3 µg/m^3, 57% of the EU limit value.

4.13 A summary of the background concentrations assumed for the assessment is presented in Table 15.

Table 15: Estimated background concentrations from DEFRA maps (µg/m^3)

Pollutant	2012
NO_2	35.3
PM_{10}	20.8
$PM_{2.5}$	14.3

5 ASSESSMENT OF IMPACT, MITIGATION AND RESIDUAL EFFECTS

IMPACT - Construction Phase

5.1 The proposed development site is situated in a predominantly residential area in northwest London. The Site is separated from Kilburn High Road by four storey buildings, the majority of which are commercial at ground-level with residential above. Kilburn Grange Park lies to the north and northeast of the Site.

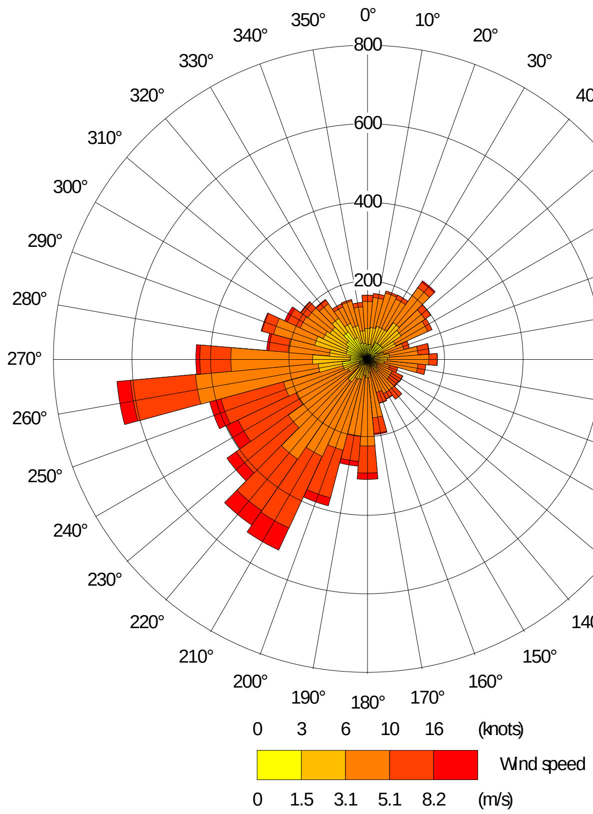
5.2 The assessment of dust impacts is dependent on the proximity of the most sensitive receptors to the site boundary, as described by Table 3. It is estimated that there are between 20 and 100 residential dwellings within 20 m of the site boundary, therefore *the sensitivity of the area to dust soiling impacts is high*. However, background PM_{10} concentrations in the area are well below the AQO, therefore the risk of an exceedance is considered small and *the sensitivity of the area to human health impacts is low*.

5.3 There are no ecologically sensitive sites within 50 m of the Development Site therefore the impact of dust emissions on ecologically sensitive receptors has not been considered any further in this assessment.

5.4 The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited will depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

5.5 A windrose from Heathrow is provided below in Figure 3, which shows that the prevailing wind is from the south-west and west, therefore properties to the east and northeast of the site are the most likely to experience dust impacts from the site.

Figure 3: Windrose for Heathrow Meteorological Station (2012)



Demolition

5.6 The majority of the site is currently occupied by single storey double height warehousing. There are also some 3.5 storey office buildings along the boundary with Kilburn Grange park. All of the existing structures will be demolished as part of the proposals.

5.7 The volume of buildings to be demolished is estimated to be less than 10,000m^3, however they are predominantly brick built and therefore have significant dust raising potential on demolition. The magnitude of the dust emission is therefore considered to be *medium*. The corresponding *dust risks for demolition are medium for soiling and low for health impacts*, prior to mitigation.

Earthworks

5.8 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling of the site and landscaping.

5.9 The Development Site is just over 2000 m^2 in size and it is unlikely that there will be large numbers of earth moving vehicles on site at any one time or sufficient room from long-term stockpiling of materials. The magnitude of the dust emission is therefore considered to be *small*, with corresponding *low and negligible risks of dust soiling and health impacts respectively*, prior to mitigation.

Construction

5.10 Dust emissions during construction will depend on the scale of the works, method of construction, construction materials and duration of build.

5.11 The proposed development is currently at outline planning stage; therefore detailed information is unavailable regarding the method and duration of construction. However, it is anticipated that due to the scale of the development the duration of construction will be over a period of up to two years. It is proposed that the residential block will be brick built with a glass / metal clad top floor. The construction materials will also include concrete, a potentially dusty material, therefore the dust emission magnitude is considered to be *medium*. The corresponding *dust risks for construction are medium for soiling and low for health impacts*, prior to mitigation.

Trackout

5.12 Factors influencing the degree of trackout and associated magnitude of effect include vehicle size, vehicle speed, vehicle numbers, geology and duration.

5.13 As a general guidance, significant trackout may occur up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. Due to the small size of the site the number of HGV movements is likely to be less than 10 in any given day and there will be no on-site roads. There dust emission magnitude due to drack out is considered to be *small*. The corresponding *dust risks are low for soiling and negligible for health impacts*, prior to mitigation.

Summary of Dust Risk Effects

5.14 A summary of the potential dust risk effects, prior to mitigation are presented in Table 16.

Table 16: Summary of Dust Risk Effects Prior to Mitigation

Source	Dust Soiling	Health Impacts
Demolition	Medium	Low
Earthworks	Low	Negligible
Construction	Medium	Low
Trackout	Low	Negligible

IMPACT - Operational Phase

NO_2 Concentrations

5.15 Predicted annual mean NO_2 concentrations at the selected receptor locations are presented in Table 17. The concentrations include the estimated background NO_2 concentration for the proposed development of 35.3 µg/m^3.

Table 17: Predicted Annual Mean NO_2 Concentrations (µg/m^3)

Receptor	Location	Annual Mean	Annual Mean (as a percentage of the AQO)
A0	A – Ground Floor Amenity Space	57.2	143%
B0	B – Ground Floor	47.3	118%
B1	B – 1st Floor	45.0	113%
B2	B – 2nd Floor	42.2	106%
B3	B – 3rd Floor	39.7	99%
B4	B – 4th Floor	37.8	94%
B5	B – 5th Floor	36.6	92%
C0	C – Ground Floor	42.9	107%
C1	C – 1st Floor	41.9	105%
C2	C – 2nd Floor	40.6	101%
C3	C – 3rd Floor	39.1	98%
C4	C – 4th Floor	37.9	95%
C5	C – 5th Floor	36.9	92%
D0	D - Ground	51.4	129%
D1	D – 1st Floor	48.1	120%
D2	D – 2nd Floor	44.2	111%
D3	D – 3rd Floor	40.7	102%
D4	D – 4th Floor	38.3	96%
D5	D – 5th Floor Roof Terrace	36.9	92%
E0	E – Ground Floor	45.0	112%
E1	E – 1st Floor	43.7	109%
E2	E – 2nd Floor	42.0	105%
E3	E – 3rd Floor	40.1	100%
E4	E – 4th Floor	38.5	96%
E5	E – 5th Floor Roof Terrace	37.3	93%

5.1 Nitrogen dioxide concentrations in excess of the AQO are predicted for the ground floor amenity space between the façade of the proposed building and the existing properties on Kilburn High Road (A0). Research has concluded[17] that exceedances of the 1-hour mean AQO may occur where annual mean concentrations are over 60 µg/m^3. The predicted concentrations at this location are 57 µg/m^3, which indicates that there is a possibility of an exceedance at this location. However, the primary use of the amenity area is for bicycle/bin storage and there is ample leisure space in the adjacent Kilburn Grange Park, therefore human exposure in this area is likely to be transient.

5.2 Predicted NO_2 concentrations also exceed the annual mean AQO at the proposed residential block. The concentrations are predicted to gradually decline vertically to below the AQO at 3rd or 4th floor level. The predicted concentrations at the rear of the building (facing the park) are slightly lower than those at the front façade. The maximum predicted annual mean concentration at the residential block is 51.4 µg/m^3, therefore it is considered unlikely that an exceedance of the short-term objective will occur.

5.3 In order to present a conservative assessment of the impact on future residents of the proposed development, the modelling has assumed that there is no decline in the background NO_2 concentration with height. In reality a significant reduction in the background would occur and it is likely that annual mean concentrations would be below air quality objective at lower elevations than are predicted.

PM_{10} Concentrations

5.4 Predicted annual mean PM_{10} concentrations at the selected receptor locations are presented in Table 18. The concentrations include the estimated background PM_{10} concentration for the proposed development of 20.8 µg/m^3.

[17] D. Laxen and B Marner (2003) Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites.

Table 18: Predicted PM_{10} Concentrations ($\mu g/m^3$)

Receptor	Location	Annual Mean	Annual Mean (as a percentage of the AQO)
A0	A – Ground Floor Amenity Space	23.4	58.4%
B0	B – Ground Floor	22.1	55.3%
B1	B – 1st Floor	21.8	54.6%
B2	B – 2nd Floor	21.5	53.8%
B3	B – 3rd Floor	21.2	53.1%
B4	B – 4th Floor	21.1	52.6%
B5	B – 5th Floor	20.9	52.3%
C0	C – Ground Floor	21.6	54.0%
C1	C – 1st Floor	21.5	53.7%
C2	C – 2nd Floor	21.3	53.4%
C3	C – 3rd Floor	21.2	53.0%
C4	C – 4th Floor	21.1	52.7%
C5	C – 5th Floor	21.0	52.4%
D0	D - Ground	22.6	56.5%
D1	D – 1st Floor	22.2	55.5%
D2	D – 2nd Floor	21.7	54.4%
D3	D – 3rd Floor	21.4	53.4%
D4	D – 4th Floor	21.1	52.8%
D5	D – 5th Floor Roof Terrace	21.0	52.4%
E0	E – Ground Floor	21.8	54.6%
E1	E – 1st Floor	21.7	54.2%
E2	E – 2nd Floor	21.5	53.7%
E3	E – 3rd Floor	21.3	53.2%
E4	E – 4th Floor	21.1	52.8%
E5	E – 5th Floor Roof Terrace	21.0	52.5%

5.5 Predicted annual mean PM_{10} concentrations are well within the AQO of 40 $\mu g/m^3$ at all locations. Maximum concentrations are predicted at the ground-level façade closest to Kilburn High Road (receptor D). The road traffic contribution falls to an imperceptible level (<0.4 $\mu g/m^3$) at the 4th Floor.

5.6 The number of exceedances of 50 µg/m^3, as a 24-hour mean PM_{10} concentration, has been calculated from the annual mean following the approach set out by DEFRA in LAQM.TG(09):

A = -18.5 + 0.00145 x annual mean^3 + (206/annual mean)

where A is the number of exceedances of 50 µg/m^3 as a 24-hour mean PM_{10} concentration.

5.7 Based on the above approach, the maximum number of days >50 µg/m^3 PM_{10} at the residential block is predicted to be 7 at ground-level, falling to 5 at the upper levels. Short-term PM_{10} concentrations are therefore not predicted to exceed the AQO.

$PM_{2.5}$ Concentrations

5.8 Predicted annual mean $PM_{2.5}$ concentrations at the selected receptor locations are presented Table 19. The concentrations include the estimated background $PM_{2.5}$ concentration for the proposed development of 20.8 µg/m^3.

Table 19: Predicted $PM_{2.5}$ Concentrations (µg/m^3)

Receptor	Location	Annual Mean	Annual Mean (as a percentage of the AQO)
A0	A – Ground Floor Amenity Space	16.0	63.9%
B0	B – Ground Floor	15.1	60.6%
B1	B – 1st Floor	15.0	59.9%
B2	B – 2nd Floor	14.8	59.1%
B3	B – 3rd Floor	14.6	58.4%
B4	B – 4th Floor	14.5	57.9%
B5	B – 5th Floor	14.4	57.6%
C0	C – Ground Floor	14.8	59.3%
C1	C – 1st Floor	14.7	59.0%
C2	C – 2nd Floor	14.7	58.6%
C3	C – 3rd Floor	14.6	58.2%
C4	C – 4th Floor	14.5	57.9%
C5	C – 5th Floor	14.4	57.6%
D0	D - Ground	15.5	61.9%
D1	D – 1st Floor	15.2	60.9%
D2	D – 2nd Floor	14.9	59.7%
D3	D – 3rd Floor	14.7	58.7%
D4	D – 4th Floor	14.5	58.0%
D5	D – 5th Floor Roof Terrace	14.4	57.6%

E0	E – Ground Floor	15.0	59.9%
E1	E – 1st Floor	14.9	59.5%
E2	E – 2nd Floor	14.8	59.0%
E3	E – 3rd Floor	14.6	58.5%
E4	E – 4th Floor	14.5	58.0%
E5	E – 5th Floor Roof Terrace	14.4	57.7%

Predicted annual mean $PM_{2.5}$ concentrations are well within the EU limit value of 25 µg/m^3 at all of the receptor locations. The road traffic contribution falls to an imperceptible level (<0.25 µg/m^3) by the 4th Floor.

MITIGATION

Construction Phase

5.9 It is recommended that the following 'best practice' measures be implemented, as appropriate during the construction phase:

- ensure effective site planning locating layout machinery and dust causing activities away from sensitive receptors;
- erect solid screens or barriers around the site boundary;
- vehicles carrying loose aggregate and workings should be sheeted at all times;
- all vehicles should switch of engines when not in use i.e. no idling vehicles should occur at the site;
- no site runoff off water or mud should be allowed;
- stockpiles should be kept for the shortest time possible and if necessary, the use of sprinklers and hoses for dampening of exposed soil and materials should be employed;
- observation of wind speed and direction prior to conducting dust-generating activities to determine the potential for dust nuisance to occur, avoiding potentially dust-generating activities during periods when wind direction may carry dust into sensitive areas and avoiding dust-generating operations during periods of high or gusty winds;
- stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of prevailing wind directions and seasonal variations in the prevailing wind;
- completed earthworks should be covered or vegetated as soon as is practicable;
- regular inspection of local highways and site boundaries to check for dust deposits and, if necessary removal and cleaning of any deposits;

- visual inspection of site perimeter to check for dust deposition (evident as soiling and marking) on vegetation, cars and other objects and taking remedial measures if necessary;
- minimise surface areas of stockpiles (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up;
- ensure concrete batcher, where used, has a permit to operate and is operated in accordance with Process Guidance Note 3/1 (04);
- use of dust-suppressed tools for all operations;
- ensuring that all construction plant and equipment is maintained in good working order; and
- no unauthorised burning of any material anywhere on site.

5.10 Construction vehicles should be kept clean and sheeted when on public highways. Timing of large-scale vehicle movements to avoid peak hours on the local road network will also be beneficial.

5.11 It is recommended that liaison with the Local Authority be maintained throughout the construction process, and any incidents which lead to excessive elevation of dust deposition and/or PM_{10} concentrations at neighbouring sensitive receptors are reported to the Environmental Health Department. If complaints are received from local residents, these will be documented in a diary or log held on site by the Site Manager. A nominated member of the construction team (e.g. Site Manager) will also act as a point of contact for residents who may be concerned about elevated deposition of dust.

5.12 The significance of potential dust impacts following appropriate best practice mitigation measures is considered to be negligible

Operational Phase

5.13 Annual mean NO_2 concentrations are predicted to exceed the objective of 40 µg/m^3 at the lower floors of the proposed development. It is recommended that whole house ventilation is installed throughout the development to provide a source of fresh air to each residential unit.

5.14 It also recommended that diffusion tubes are sited adjacent to the air inlets to ascertain NO_2 concentrations at the air intakes. If after 2 years, monitoring shows NO_2 concentrations to be above the annual mean objective appropriate filtering should be fitted to the ventilation system to reduce NO_2 concentrations entering the building.

6 CONCLUSIONS

6.1 The proposed development will be 'car-free' therefore the site impacts are limited to the construction phase only. However, a dispersion modelling assessment has also been carried out to determine the suitability of the site for residential development with regards to the exposure of future occupants to elevated pollution concentrations.

6.2 An assessment of the potential impacts during the construction phase has been carried out in accordance with the latest Institute of Air Quality Management guidance. This has shown that releases of dust and PM_{10} are likely to occur during site activities. The risk of dust soiling at neighbouring properties has been assessed as low to medium. The risk of health impacts is considered to be low to negligible since background PM_{10} concentrations in the area are well within the air quality objectives. Through good site practice and the implementation of suitable mitigation measures, the impact of dust and PM_{10} releases may be effectively mitigated and the resultant impacts are considered to be negligible.

6.3 The ADMS-Roads dispersion model has been used to predict air quality at the Development Site to assess its suitability for residential purposes. The assessment has shown that, due to the elevated background concentration, the NO_2 concentrations at the façade of the residential block will exceed the annual mean objective up to 4^{th} floor level. However, the predicted concentrations are conservative and assume that there will be no decline in the background concentration with height above the ground. In reality the NO_2 concentrations are likely to be below the objective at lower levels. The maximum predicted total concentrations (including the background) at the building façade is 51.4 $\mu g/m^3$, therefore an exceedence of the hourly mean AQO is considered unlikely. However, it is recommended that whole house ventilation is installed throughout the development to provide a source of fresh air to the residential units.

6.4 Annual mean PM_{10} and $PM_{2.5}$ concentrations are predicted to be 'well below' the AQO and EU limit value respectively. The number of predicted exceedences of the 24-hour mean objective is also well within the 35 allowable per year. Again, background pollution sources are contributing the most to particulate concentrations at the site, with the road traffic contribution falling to imperceptible levels by the 4^{th} floor for both PM_{10} and $PM_{2.5}$.

6.5 It should also be noted that a number of other residential developments in the area have recently been granted planning permission, despite elevated NO_2 concentrations.

APPENDIX A – AIR QUALITY TERMINOLOGY

Term	Definition
Accuracy	A measure of how well a set of data fits the true value.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
AQMA	Air Quality Management Area.
DEFRA	Department for Environment, Food and Rural Affairs.
Exceedence	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
Fugitive emissions	Emissions arising from the passage of vehicles that do not arise from the exhaust system.
LAQM	Local Air Quality Management.
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
Percentile	The percentage of results below a given value.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
ppb parts per billion	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppb means that for every billion (10^9) units of air, there is one unit of pollutant present.
ppm parts per million	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppm means that for every billion (10^6) units of air, there is one unit of pollutant present.
Ratification (Monitoring)	Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation).
$\mu g/m^3$ micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of $1\mu g/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
UKAS	United Kingdom Accreditation Service.
Uncertainty	A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation.
USA	Updating and Screening Assessment.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
Validation (monitoring)	Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification).
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.

APPENDIX B – MODEL VERIFICATION

Most nitrogen dioxide (NO_2) is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions. Verification of concentrations predicted by the ADMS-Roads model has followed the methodology presented in LAQM.TG(09).

Predicted 2013 annual mean concentrations of NO_2 have been compared with concentrations measured at Kilburn Bridge in 2012 (see Table 9). The monitoring site is located 0.5 m from the kerbside of Kilburn High Road. The model has assumed an AADT of 21,132 (13.2% HGVs). The monitoring site is situated close to several sets of traffic lights, therefore an average vehicle speed of 15 kph has been assumed to account for stationary traffic and congestion. There are two-storey buildings on either side of Kilburn High Road at this location, therefore a street canyon height of 8m and a building-to-building distance of 28m was incorporated into the model.

The measured NO_2 concentration has been converted into an equivalent measured Road-NOx (i.e. the component of total NOx coming from road traffic) concentrations using the DEFRA NOx from NO_2 calculator. The conversion has assumed a background NO_2 concentration of 35.3 µg/m^3.

The ratio of the measured and modelled Road-NOx contributions provides an adjustment factor for the modelled Road-NOx concentrations. This factor is then applied to the modelled road NOx concentrations, before they are converted to Road-NO_2 using the DEFRA NOx to NO_2 calculator and added to the background NO_2 concentration to produce a total adjusted modelled NO_2 concentration. The model verification calculation is presented Table B1.

In the absence of local monitoring data the NO_2 adjustment factor has also been applied to the modelled Road-PM_{10} and Road-$PM_{2.5}$ concentrations.

Table B1: Model Verification Calculation

Parameter	Value
Measured NO_2 Concentration	100.8 µg/m^3
Measured Road-NOx Concentration	219.2 µg/m^3
Modelled Road-NOx Concentration	48.6 µg/m^3
Adjustment Factor	**4.51**
Adjusted Modelled Road-NOx Concentration	219.2 µg/m^3
Adjusted Modelled Road-NO_2 Concentration	65.5 µg/m^3
Background NO_2 Concentration	35.3 µg/m^3
Final Adjusted Total NO_2 Concentration	100.8 µg/m^3