18 Pield Heath Rd, UB8 3NF

Air Quality Assessment

April 2022

Ref: 22-8959

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1. Introduction

Background

This report has been prepared to support the planning application for 18 Pield Heath Road. Planning reference number: 76760/PRC/2021/215.

The proposed development has the potential to cause air quality impacts at sensitive locations during the construction and operational phases, as well as expose future occupants to elevated pollution levels. As such, an air quality assessment was required to determine baseline conditions at the site, consider its suitability for the proposed end-use and assess potential effects associated with the scheme.

Site Location and Context

The site is located on land at 14-18 Pield Heath Road and 2 Pield Health Avenue, Pield Heath Avenue, Hillingdon, UB8 3NF, at approximate National Grid Reference (NGR): 507465, 181956. Reference should be made to Figure 1 for a map of the site and surrounding area. The application site comprises 4 individual curtilages (Nos. 14, 16 and 18 Pield Heath Road and No 2. Pield Heath Avenue), 3 of which are currently used for purely residential uses (C3 use class) and one of which (No. 18) is in use as a Bed and Breakfast (C1 use class).

The proposals comprise the consolidation and redevelopment to provide a Nursing Home (60 rooms) following demolition of existing Bed and Breakfast Hotel and 3 dwellings with associated access and landscaping works.

The development has the potential to cause impacts at sensitive locations. These may include fugitive dust emissions associated with construction works and road traffic exhaust emissions from vehicles travelling to and from the site during the operational phase. Further to this, the proposals may introduce future occupants to any existing air quality issues at the site. An air quality assessment was therefore undertaken to determine baseline conditions, consider location suitability for the proposed end-use and consider potential effects because of the proposals. This is detailed in the following report.

2. Legislation and Policy

UK Legislation

The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and include Air Quality Limit Values (AQLVs) for the following pollutants:

- NO_2;
- Sulphur dioxide;
- Lead;
- Particulate matter with an aerodynamic diameter of less than 10µm (PM_{10});
- Particulate matter with an aerodynamic diameter of less than 2.5µm;
- Benzene; and,
- Carbon monoxide.

Target Values were also provided for an additional 5 pollutants. These include:

- Ozone;
- Arsenic;
- Cadmium;
- Nickel; and,
- Benzo(a)pyrene.

Part IV of the Environment Act (1995) requires UK Government to produce a national Air Quality Strategy (AQS) which contains standards, objectives, and measures for improving ambient air quality. The most recent AQS was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in July 2007[1]. The AQS sets out Air Quality Objectives (AQOs) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

Table 1 presents the AQOs for pollutants considered within this assessment.

Table 1: Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration (µg/m^3)	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM_{10}	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum

Table 2 summarises the advice provided in DEFRA guidance[2] on where the AQOs for pollutants considered within this report apply.

[1] The AQS for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.
[2] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

Table 2: Examples of Where the Air Quality Objectives Apply

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean	All locations where the annual mean objective would apply, together with hotels Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This Review and Assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs.

If it is predicted that levels at locations of relevant exposure, as summarised in Table 2, are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

Dust Legislation

The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments, such as construction sites, is that provided in Section 79 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

> *"Any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance."*

Enforcement of the Act, regarding nuisance, is currently under the jurisdiction of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the LA is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Environmental Protection Act (1990). Enforcement can insist that there be no dust beyond the boundary of the works. The only defence is to show that the process to which the nuisance has been attributed and its operation are being controlled according to best practicable means.

National Planning Policy

The National Planning Policy Framework[3] (NPPF) was revised in July 2021 and sets out the Government's planning policies for England and how these are expected to be applied. This revised Framework replaces the previous National Planning Policy Framework published in March 2012, revised in July 2018, and updated in February 2019.

The purpose of the planning system is to contribute to the achievement of sustainable development. To ensure this, the NPPF recognises 3 overarching objectives, including the following of relevance to air quality:

> *"c) An environmental objective - to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."*

Chapter 15 of the NPPF details objectives in relation to conserving and enhancing the natural environment. It states that:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *[…]*
> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality […]"*

The NPPF specifically recognises air quality as part of delivering sustainable development and states that:

> *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to*

[3] NPPF, Ministry of Housing, Communities and Local Government, 2019.

ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local Air Quality Action Plan."

The implications of the NPPF have been considered throughout this assessment.

National Planning Practice Guidance

The National Planning Practice Guidance[4] (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 and updated on 1st November 2019 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. What air quality considerations does planning need to address?
2. What is the role of plan-making with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?
5. When could air quality considerations be relevant to the development management process?
6. What specific issues may need to be considered when assessing air quality impacts?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?

These were reviewed and the relevant guidance considered as necessary throughout the undertaking of this assessment.

[4] https://www.gov.uk/guidance/air-quality--3.

Local Planning Policy

The London Plan

The London Pan 2021 is the Spatial Development Strategy for Greater London. It sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. The Plan is part of the statutory development plan for London, meaning that the policies in the Plan should inform decisions on planning applications across the capital. Borough's Local Plans must be in 'general conformity' with the London Plan, ensuring that the planning system for London operated in a joined-up way and reflects the overall strategy for how London can develop sustainably, which the London Plan sets out. The following policy is relevant to this assessment:

"Policy S1 1 Improving Air Quality

A. Development Plans, through relevant strategic, site specific and area-based policies, should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.

B. To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:
  - *a. Development proposals should not:*
    - *i. lead to further deterioration of existing poor air quality*
    - *ii. create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits*
    - *iii. create unacceptable risk of high levels of exposure to poor air quality.*
  - *b. To meet the requirements in Part 1, as a minimum:*
    - *i. development proposals must be at least Air Quality Neutral*
    - *ii. development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retrofitted mitigation measures*
    - *iii. major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1*
    - *iv. development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure.*

C. Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating:
  - *a. how proposals have considered ways to maximise benefits to local air quality, and*
  - *b. what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this.*

D. In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance[5].

E. Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on site. Where it can be demonstrated that emissions cannot be further reduced by on site measures, off site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development."

The Local Plan

Development policies for the London Borough of Hillingdon is set out in the Local Plan. The Local Plan is the foundation for how planning will be controlled in Hillingdon. The 2 sections of the Local Plan forms the Council's future development strategy for the borough. It sets out a framework and detailed policies to guide planning decisions and it's the starting point for considering whether planning applications should be approved. The Local Plan Part 1 sets out the overall level and broad locations of growth up to 2026. It comprises a spatial vision and strategy, strategic objectives, core policies and a monitoring and implementation framework with clear objectives for achieving delivery. These policies are supported by more detailed policies and allocations set out in the Local Plan Part 2. Review of the Local Plan identified the following policy of relevance to this assessment.

The Local Plan Part 1, Strategic Policies[6] adopted in 2012, includes the following policies:

"Policy EM8: Land, Water, Air and Noise

[…]

Air Quality
All development should not cause deterioration in the local air quality levels and should ensure the protection of both existing and new sensitive receptors.

All major development within the Air Quality Management Area (AQMA) should demonstrate air quality neutrality (no worsening of impacts) where appropriate; actively contribute to the promotion of sustainable transport measures such as vehicle charging points and the increased provision for vehicles with cleaner transport fuels; deliver increased planting through soft landscaping and living walls and roofs; and provide a management plan for ensuring air quality impacts can be kept to a minimum.

The Council seeks to reduce the levels of pollutants referred to in the Government's National Air Quality Strategy and will have regard to the Mayor's Air Quality Strategy. London Boroughs should also take account of the findings of the Air Quality Review and Assessments and Actions plans, in particular where Air Quality Management Areas have been designated.

[5] The Control of Dust and Emissions During Construction and Demolition Supplementary Planning Guidance, Mayor of London, 2014

[6] Local Plan: Part 1: Strategic Policies. London Borough of Hillingdon. November 2012.

The Council has a network of Air Quality Monitoring stations but recognises that this can be widened to improve understanding of air quality impacts. The Council may therefore require new major development in an AQMA to fund additional air quality monitoring stations to assist in managing air quality improvements."

"Climate Change Adaption and Mitigation

[…]

SO11: Address the impacts of climate change and minimise emissions of carbon and local air quality pollutants from new development and transport"

The Local Plan Part 2, Development Management Policies[7] was adopted in 2020 and includes the following relevant policy:

Policy DMEI 14: Air Quality

A. *Development proposals should demonstrate appropriate reductions in emissions to sustain compliance with and contribute towards meeting EU limit values and national Air Quality Objectives for pollutants.*
B. *Development proposals should, as a minimum:*
   i. *be at least "air quality neutral";*
   ii. *include sufficient mitigation to ensure there is no unacceptable risk from air pollution to sensitive receptors, both existing and new; and*
   iii. *actively contribute towards the improvement of air quality, especially within the Air Quality Management Area.*

The implications of this policy were taken into consideration throughout the undertaking of the assessment.

[7] Local Plan Part 2: Development Management Policies. London Borough of Hillingdon. January 2020

3. Baseline

Existing air quality conditions in the vicinity of the proposed development site were identified to provide a baseline for the assessment. These are detailed in the following Sections.

Local Air Quality Management

As required by the Environment Act (1995), LBoH has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean concentrations of NO_2 are above the AQO within the borough. As such, one AQMA has been declared. This is described as follows:

> *"The area from the southern boundary north to the border defined by, the A40 corridor from the western borough boundary, east to the intersection with the Yeading Brook north until its intersection with the Chiltern-Marylebone railway line"*

The development is located within the AQMA. As such, there is the potential for vehicles travelling to and from the site to increase pollution levels in this sensitive area, as well as the exposure of future residents to poor air quality. These issues have been considered throughout the assessment.

LBoH has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs. As such, no further AQMAs have been designated.

Air Quality Focus Area

In 2013, 187 Air Quality Focus Areas (AQFAs) were defined across London in locations where the EU annual mean limit value for NO_2 was exceeded and there was high human exposure. These were not designed to be an exhaustive list of London's air pollution hotspots, but where the problem most acute. The Focus Areas have been used by Greater London Authority (GLA), TfL and the boroughs to inform LAQM, the development of air quality interventions and the planning process. Under London LAQM guidelines, boroughs are required to have regard to the Focus Areas in their borough when devising their air quality action plans.

The development is not located within an AQFA. This has been considered throughout the assessment, as necessary.

Air Quality Monitoring

Monitoring of pollutant concentrations is undertaken by LBoH throughout their area of jurisdiction. Annual mean NO_2 results recorded in the vicinity of the development taken from readily available information online are shown in Table 3. Exceedances of the relevant AQOs are shown in **bold**.

Table 3: Monitoring Results - NO_2

Monitoring Site		Distance to Site (Km)	Monitor Type	Data Capture [(a)] (%)	Monitored NO_2 Concentration (µg/m³)		
					2017	2018	2019
HILL04	Hillingdon Primary School	0.54	Roadside DT	75	28.2	28.5	27.8
HILL05	Hillingdon Hospital Monitoring Station Colham Road	0.41	Roadside DT	75	36.1	33.4	34.1
(a) For Latest year presented (b) DT = Diffusion Tube							

As shown in Table 3, NO_2 concentrations at the monitoring sites in close vicinity to the proposed development site are below the relevant AQO (40µg/m³). It is expected proposed development site will experience similar NO_2 concentrations than the monitored sites as it is also located on a major road.

Monitoring of PM_{10} concentrations is not undertaken within the vicinity of the proposed development.

Background Pollutant Concentrations

Predictions of background pollutant concentrations on a 1km-by-1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The proposed development site is in grid square NGR: 507500, 181500. Data for this location was downloaded from the DEFRA website[8] for the purpose of this assessment and is summarised in Table 4.

Table 4: Background Pollutant Concentrations

Pollutant	Predicted Background Concentration (µg/m³)		
	2019	2023	2025
NO_2	21.90	18.69	17.35
PM_{10}	16.56	15.63	15.25

As shown in Table 4, predicted background NO_2 and PM_{10} concentrations are below the relevant AQOs at the development site and expected to reduce in future years.

Sensitive Receptors

A sensitive receptor is defined as any location which may be affected by changes in air quality because of a development. These have been defined for dust and road vehicle exhaust emission impacts in the following Sections.

[8] http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018.

4. Methodology

Introduction

The proposed development has the potential to cause air quality impacts during the construction and operational phases, as well as expose future occupants to elevated pollution levels. These factors were assessed in accordance with the following methodology.

Construction Phase Fugitive Dust Emissions

There is the potential for fugitive dust emissions to occur because of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction V1.1'[9]

Activities on the proposed construction site have been divided into 4 types to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and,
- Trackout.

The potential for dust emissions was assessed for each activity that is likely to take place and considered 3 separate dust effects:

- 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 assessment steps are detailed below.

Step 1

Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 350m of the boundary or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment proceeds to Step 2. Additionally, should ecological receptors be identified within 50m of the site or the construction vehicle route, then the assessment also proceeds to Step 2.

Should sensitive receptors not be present within the relevant distances then **negligible** impacts would be expected and further assessment is not necessary.

[9] Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAWM, 2016

Step 2

Step 2 assesses the risk of potential dust impacts. A site is allocated a risk category based on 2 factors:

- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium, or large (Step 2A); and,
- The sensitivity of the area to dust impacts, which can be defined as low, medium, or high sensitivity (Step 2B).

The 2 factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied.

Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table 5.

Table 5: Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	Demolition	Total volume of building to be demolished greater than 50,000m^3 Potentially dusty material (e.g., concrete) On site crushing and screening Demolition activities more than 20m above ground level
	Earthworks	Total site area greater than 10,000m^2 Potentially dusty soil type (e.g., clay, which will be prone to suspension when dry due to small particle size) More than 10 heavy earth moving vehicles active at any one time Formation of bunds greater than 8m in height More than 100,000 tonnes of material moved
	Construction	Total building volume greater than 100,000m^3 On site concrete batching Sandblasting
	Trackout	More than 50 Heavy-Duty Vehicle (HDV) trips per day Potentially dusty surface material (e.g., high clay content) Unpaved road length greater than 100m
Medium	Demolition	Total volume of building to be demolished between 20,000m^3 and 50,000m^3 Potentially dusty construction material Demolition activities 10m to 20m above ground level
	Earthworks	Total site area 2,500m^2 to 10,000m^2 Moderately dusty soil type (e.g., silt) 5 to 10 heavy earth moving vehicles active at any one time Formation of bunds 4m to 8m in height Total material moved 20,000 tonnes to 100,000 tonnes
	Construction	Total building volume 25,000m^3 to 100,000m^3 Potentially dusty construction material (e.g., concrete) On site concrete batching
	Trackout	10 to 50 HDV trips per day Moderately dusty surface material (e.g., high clay content) Unpaved road length 50m to 100m

Small	Demolition	Total volume of building to be demolished less than 20,000m^3 Construction material with low potential for dust release (e.g., metal cladding or timber) Demolition activities less than 10m above ground and during wetter months
	Earthworks	Total site area less than 2,500m^2 Soil type with large grain size (e.g., sand) Less than 5 heavy earth moving vehicles active at any one time Formation of bunds less than 4m in height Total material moved less than 20,000 tonnes Earthworks during wetter months
	Construction	Total building volume less than 25,000m^3 Construction material with low potential for dust release (e.g., metal cladding or timber)
	Trackout	Less than 10 HDV trips per day Surface material with low potential for dust release Unpaved road length less than 50m

Step 2B defines the sensitivity of the area around the development to potential dust impacts. The influencing factors are shown in Table 6.

Table 6: Construction Dust - Examples of Factors Defining Sensitivity of an Area

Receptor Sensitivity	Examples	
	Human Receptors	Ecological Receptors
High	Users expect of high levels of amenity High aesthetic or value property People expected to be present continuously for extended periods of time Locations where members of the public are exposed over a time period relevant to the AQO for PM_{10}. e.g., residential properties, hospitals, schools, and residential care homes	Internationally or nationally designated site e.g., Special Area of Conservation
Medium	Users would expect to enjoy a reasonable level of amenity Aesthetics or value of their property could be diminished by soiling People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g., parks and places of work	Nationally designated site e.g., Sites of Special Scientific Interest
Low	Enjoyment of amenity would not reasonably be expected Property would not be expected to be diminished in appearance Transient exposure, where people would only be expected to be present for limited periods. e.g., public footpaths, playing fields, shopping streets, farmland, short term car parks and roads	Locally designated site e.g., Local Nature Reserve

The guidance also provides the following factors to consider when determining the sensitivity of an area to potential dust impacts:

- Any history of dust generating activities in the area;
- The likelihood of concurrent dust generating activity on nearby sites;
- Any pre-existing screening between the source and receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which works will take place;
- Any conclusions drawn from local topography;
- Duration of the potential impact, as a receptor may become more sensitive over time; and,
- Any known specific receptor sensitivities which go beyond the classifications given in the document.

These factors were considered during the undertaking of the assessment.

The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table 7.

Table 7: Construction Dust - Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 350
High	More than 100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low
	1 - 10	Medium	Low	Low	Low
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

Table 8 outlines the criteria for determining the sensitivity of the area to human health impacts.

Table 8: Construction Dust - Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the Source (m)				
			Less than 20	Less than 50	Less than 100	Less than 200	Less than 350
High	Greater than 32$\mu g/m^3$	More than 100	High	High	High	Medium	Low
		10 - 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32$\mu g/m^3$	More than 100	High	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 - 28$\mu g/m^3$	More than 100	High	Medium	Low	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	Less than 24$\mu g/m^3$	More than 100	Medium	Low	Low	Low	Low
		10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	-	More than 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
Low	-	More than 1	Low	Low	Low	Low	Low

Table 9 outlines the criteria for determining the sensitivity of the area to ecological impacts.

Table 9: Construction Dust - Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	Less than 20	Less than 50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Step 2C combines the dust emission magnitude with the sensitivity of the area to determine the risk of unmitigated impacts. Table 10 outlies the risk category from demolition activities.

Table 10: Construction Dust - Dust Risk Category from Demolition Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Medium
Medium	High	Medium	Low
Low	Low	Low	Negligible

Table 11 outlines the risk category from earthworks and construction activities.

Table 11: Construction Dust - Dust Risk Category from Earthworks and Construction Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

Table 12 outlines the risk category from trackout activities.

Table 12: Construction Dust - Dust Risk Category from Trackout Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Low	Negligible
Low	Low	Low	Negligible

Step 3

Step 3 requires the identification of site specific mitigation measures within the IAQM guidance[10] to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with **negligible** risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

Step 4

Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final Step is to determine the significance of any residual impacts. For almost all construction activity, the aim should be to control effects using effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be **not significant**.

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[10] Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

Operation Phase Road Vehicle Exhaust Emission Assessment

The proposed development has the potential to affect existing air quality because of road traffic exhaust emissions associated with vehicles travelling to and from the site, as well as expose future occupants to elevated pollution levels.

Potential Development Impacts

The development proposals have been screened against the IAQM indicative criteria for requiring an air quality assessment.

1. A change in Light-Duty Vehicle[11] (LDV) traffic flows on local roads with relevant receptors
    - more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA
    - more than 500 AADT elsewhere

2. A change in HDV[12] flows on local roads with relevant receptors
    - more than 25 AADT within or adjacent to an AQMA
    - more than 100 AADT elsewhere

3. A change in the alignment of roads by 5m or more and the road is within an AQMA

4. Introduction of a new junction or remove an existing junction near to relevant receptors
    - Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g., traffic lights, or roundabouts.

5. Introduce or change a bus station
    - Where bus flows will change by:
        (a) more than 25 AADT within or adjacent to an AQMA
        (b) more than 100 AADT elsewhere

6. Has an underground car park with an extraction system within 20 m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).

7. Has one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.
    - includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.

Where IAQM indicative criteria for requiring an air quality assessment was met, potential impacts were defined by predicting pollutant concentrations at sensitive locations using Design Manual for Roads and Bridges (DMRB)[13] and/or ADMS-Roads dispersion modelling.

Where necessary, locations sensitive to potential changes in pollutant concentrations were identified within 200m of the highway network following the guidance provided within DMRB on the likely limits

[11] Cars and small vans <3.5t gross vehicle weight
[12] Goods vehicles + buses >3.5t gross vehicle weight
[13] DMRB Volume 11, Section 3, Part 1, LA 105, Highways England, 2019.

of pollutant dispersion from road sources. The criteria provided within DEFRA guidance[14] on where the AQOs apply, as summarised in Table 2, was utilised to determine appropriate receptor positions.

Reference should be made to the Appendix for assessment input data and details of the verification process.

Dispersion Modelling Input Data

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 5.0.0.1). ADMS-Roads are developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

The model needs input data that details the following parameters:

- Assessment area;
- Traffic flow data;
- Vehicle emission factors;
- Spatial co-ordinates of emissions;
- Street canyon parameters;
- Street width;
- Meteorological data;
- Roughness length (z_0); and,
- Monin-Obukhov length.

Traffic Flow Data

Traffic data for use in the assessment, including 24-hour AADT flows and fleet composition, was obtained from the London Atmospheric Emission Inventory (LAEI). The LAEI data is deemed as being a suitable source of data for air quality assessments and is therefore considered to provide a reasonable estimate of traffic flows in the vicinity of the site.

2016 baseline traffic data were projected using the traffic growth projection factor derived by the Department for Transport (DfT)'S TEMPro model. Road widths were estimated from aerial photography and UK highway design standards.

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 10.1). This has been produced by DEFRA and incorporates COPERT 5 vehicle emission factors and fleet information.

[14] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

Meteorological Data

Meteorological data used in the assessment was taken from Heathrow Airport meteorological station over 1st January 2019 to 1st December 2019 (inclusive). Heathrow Airport meteorological station is found at NGR: 507343, 176313, which is approximately 5.6km north of the proposed development. It is expected that conditions would be similar over this magnitude. The data was therefore considered suitable for an assessment of this nature.

Reference should be made to Figure 3 for a wind rose of utilised meteorological data.

Roughness Length

The z_0 is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 1m was used to describe the modelling extents. This value of z_0 is considered right for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'cities, woodlands'.

A z_0 of 0.3m was used to describe the meteorological site. This value of z_0 is considered right for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'agricultural (max)'.

Monin-Obukhov Length

The Monin-Obukhov length supplies a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used to describe the modelling extents. This value is considered right for the nature of both areas and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

The same minimum Monin-Obukhov length was used to describe the meteorological site.

Background Concentrations

Annual mean NO_2 and PM_{10} background concentrations for use in the assessment were obtained from the DEFRA mapping study for the grid square containing the development site, as shown in Table 4.

NOx to NO_2 Conversion

Predicted annual mean NO_x concentrations were converted to NO_2 concentrations using the spreadsheet (version 8.1) provided by DEFRA, which is the method detailed within DEFRA guidance[15].

Impact Significance

The significance of predicted air quality impacts was determined following the guidance provided within the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'[16]. Using this methodology impacts were defined based on the interaction between the predicted pollutant concentration in the Do Something (DS) or With Development scenario and the magnitude of change between the Do Minimum (DM) or Without Development and DS scenarios, as outlined in Table 13.

15 DEFRA, Technical Guidance 2016 (LAQM.TG (16)), DEFRA, 2018.

16 Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

Table 13: Significance of Road Vehicle Exhaust Emissions Impact

Concentration at Receptor in Assessment Year	Predicted Concentration Change as a Proportion of AQO (%)			
	1	**2 - 5**	**6 - 10**	**> 10**
75% or less of AQO	Negligible	Negligible	Slight	Moderate
76 - 94% of AQO	Negligible	Slight	Moderate	Moderate
95 - 102% of AQO	Slight	Moderate	Moderate	Substantial
103 - 109% of AQO	Moderate	Moderate	Substantial	Substantial
110% or more of AQO	Moderate	Substantial	Substantial	Substantial

The matrix shown in Table 13 is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which makes it clearer which cell the impact falls within. It should be noted that changes of 0%, i.e., less than 0.5%, are described as **negligible**.

Following the prediction of impacts at discrete receptor locations, the IAQM document[17] provides guidance on determining the overall air quality impact significance of the operation of a development. The following factors are identified for consideration by the assessor:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and,
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

The IAQM guidance states that an assessment must conclude the likely significance of the predicted impact. It should be noted that this is a binary judgement of either it is **significant,** or it is **not significant**.

The determination of significance relies on professional judgement, and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts. The IAQM guidance[18] suggests the provision of details of the assessor's qualifications and experience. These can be provided upon request.

Future Exposure

The proposal has the potential to expose future occupants to poor air quality. To assess pollutant concentrations across the development site, consideration was made of the proximity of the site to major roads and background pollution concentrations.

Likely pollution concentrations at the development site were compared against the relevant AQOs to determine the potential for exposure of future occupants to elevated pollutant concentrations and identify any appropriate mitigation, if necessary.

[17] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.
[18] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

5. Assessment

Construction Phase Fugitive Dust Emissions

Step 1

The undertaking of activities such as demolition, excavation, ground works, cutting, construction, concrete batching and storage of materials has the potential to result in fugitive dust emissions throughout the construction phase. Vehicle movements both on site and on the local road network also have the potential to result in the re-suspension of dust from highway surfaces.

The potential for impacts at sensitive locations depends significantly on local meteorology during the undertaking of dust generating activities, with the most significant effects likely to occur during dry and windy conditions.

Receptors sensitive to potential dust impacts during demolition, earthworks and construction were identified from a desk top study of the area up to 350m from the development boundary. These are summarised in Table 14.

Table 14: Demolition, Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Less than 20	1-10	0
Less than 50	10-100	0
Less than 100	More than 100	-
Less than 350	More than 100	-

Receptors sensitive to potential dust impacts from trackout were identified from a desk top study of the area up to 50m from the road network within 500m of the site access. These are summarised in Table 15.

Table 15: Trackout Dust Sensitive Receptors

Distance from Access Route (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Less than 20	10-100	0
Less than 50	More than 100	0

There are no ecological receptors within 50m of the development boundary or the access route within 500m of the site entrance. As such, ecological impacts have not been assessed further within this report.

Several additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 16.

Table 16: Additional Area Sensitivity Factors to Potential Dust Impacts

Guidance	Comment
Whether there is any history of dust generating activities in the area	The desk top study did not indicate any dust generating activities in the local area
The likelihood of concurrent dust generating activity on nearby sites	A review of the planning portal did not indicate any additional development proposals likely to result in concurrent dust generation in the vicinity of the site
Pre-existing screening between the source and the receptors	There is no pre-existing screening between the site and surrounding receptors
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	As shown in Figure 3, the predominant wind bearing at the site is from the southwest. As such, receptors to the northeast are most likely to be affected by dust releases
Conclusions drawn from local topography	There are no significant topographical constraints to dust dispersion
Duration of the potential impact, as a receptor may become more sensitive over time	Currently it is unclear as to the duration of the construction phase. However, it is possible that it will extend over one year
Any known specific receptor sensitivities which go beyond the classifications given in the document	No specific receptor sensitivities identified during the baseline assessment

Based on the criteria shown in Table 6 the sensitivity of the receiving environment to potential dust impacts was determined as **high**. This was because the identified receptors included residential properties. It should be noted that all receptors were assumed to be of **high** sensitivity to provide a robust assessment.

The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 4, is shown in Table 17.

Table 17: Sensitivity of the Surrounding Area to Potential Dust Impacts

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	Low	Low	Low	Low

The potential risk of dust impacts at the identified receptors is considered in the following Sections.

Step 1

The undertaking of activities such as demolition, ground works, cutting, construction, concrete batching and storage of materials has the potential to result in fugitive dust emissions throughout the construction phase. Vehicle movements both on site and on the local road network also have the potential to result in the re-suspension of dust from haul roads and highway surfaces.

The potential for impacts at sensitive locations depends significantly on local meteorology during the undertaking of dust generating activities, with the most significant effects likely to occur during dry and windy conditions.

The desk-study undertaken to inform the baseline identified several sensitive receptors within 350m of the site boundary. As such, a detailed assessment of potential dust impacts was required.

Step 2

Demolition

Table 18 show the evaluation of the potential magnitude of impacts from demolition activities.

Table 18: Demolition Impact Magnitude

Category	Criteria	Evaluation
Large	Total volume of building to be demolished greater than 50,000m^3	No
	Potentially dusty material (e.g., concrete)	No
	On site crushing and screening	No
	Demolition activities more than 20m above ground level	No
Medium	Total volume of building to be demolished between 20,000m^3 and 50,000m^3	No
	Potentially dusty construction material	**Yes**
	Demolition activities 10m to 20m above ground level	No
Small	Total volume of building to be demolished less than 20,000m^3	**Yes**
	Construction material with low potential for dust release (e.g., metal cladding or timber)	**Yes**
	Demolition activities less than 10m above ground and during wetter months	**Yes**

Demolition will be undertaken at the start of the construction phase and will involve clearance inside the current building. There may be potentially dusty construction material. The total volume of the building to be demolished will be approximately 932m^3 and the tallest building to be demolished is 8.8m. In accordance with the criteria outlined in Table 18, the potential magnitude of construction impacts from demolition activities is estimated to be **medium.**

Table 17 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 10, the development is a **medium** risk site for dust soiling because of demolition activities.

Table 17 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 10, the development is a **low** risk site for human health impacts because of demolition activities.

Earthworks

Table 19 show the evaluation of the potential magnitude of impacts from earthworks.

Table 19: Earthworks Impact Magnitude

Category	Criteria	Evaluation
Large	Total site area greater than 10,000m^2	No
	Potentially dusty soil type (e.g., clay, which will be prone to suspension when dry due to small particle size)	No
	More than 10 heavy earth moving vehicles active at any one time	No
	Formation of bunds greater than 8m in height	No
	More than 100,000 tonnes of material moved	No
Medium	Total site area 2,500m^2 to 10,000m^2	No
	Moderately dusty soil type (e.g., silt)	No
	5 to 10 heavy earth moving vehicles active at any one time	No
	Formation of bunds 4m to 8m in height	No
	Total material moved 20,000 tonnes to 100,000 tonnes	No

Category	Criteria	Evaluation
Small	Total site area less than 2,500m^2	**Yes**
	Soil type with large grain size (e.g., sand)	**Yes**
	Less than 5 heavy earth moving vehicles active at any one time	**Yes**
	Formation of bunds less than 4m in height	**Yes**
	Total material moved less than 20,000 tonnes	**Yes**
	Earthworks during wetter months	**Yes**

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. There will be less than 5 heavy earth moving vehicles active at any one time and the total site area is less than 2,500m^3; thus, the potential magnitude of construction impacts from earthworks is estimated to be **small**.

Table 17 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 11, the development is a **low** risk site for dust soiling because of earthworks.

Table 17 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 11, the development is a **negligible** risk site for human health impacts because of earthworks.

Construction

Table 20 show the evaluation of the potential magnitude of impacts from construction activities.

Table 20: Construction Impact Magnitude

Category	Criteria	Evaluation
Large	Total building volume greater than 100,000m3	No
	On site concrete batching	No
	Sandblasting	No
Medium	Total building volume 25,000m^3 to 100,000m^3	No
	Potentially dusty construction material (e.g., concrete)	**Yes**
	On site concrete batching	**Yes**
Small	Total building volume less than 25,000m^3	**Yes**
	Construction material with low potential for dust release (e.g., metal cladding or timber)	**Yes**

The potential magnitude of impacts from construction activities is estimated to be **medium**. There will be on site concrete batching and potentially dusty construction material.

Table 17 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 11, the development is a **medium** risk site for dust soiling because of construction activities.

Table 17 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 11, the development is a **low** risk site for human health impacts because of construction activities.

Trackout

Table 21 show the evaluation of the potential magnitude of impacts from trackout.

Table 21: Trackout Impact Magnitude

Category	Criteria	Evaluation
Large	More than 50 HDV trips per day	No
	Potentially dusty surface material (e.g., high clay content)	No
	Unpaved road length greater than 100m	No
Medium	10 to 50 HDV trips per day	No
	Moderately dusty surface material (e.g., high clay content)	No
	Unpaved road length 50m to 100m	No
Small	Less than 10 HDV trips per day	**Yes**
	Surface material with low potential for dust release	**Yes**
	Unpaved road length less than 50m	**Yes**

The potential magnitude of impacts from trackout is estimated to be **small**. There will be less than 10 HDV trips per day and unpaved road length will be less than 50m.

Table 17 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 12, the development is a **low** risk site for dust soiling because of trackout activities.

Table 17 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 12, the development is a **negligible** risk site for human health impacts because of trackout activities.

Summary of Potential Unmitigated Dust Risks

A summary of the risk from each dust generating activity is provided in Table 22.

Table 22: Summary of Potential Unmitigated Dust Risks

Potential Impact	Risk				
	Demolition	**Earthworks**	**Construction**	**Trackout**	**Overall**
Dust Soiling	Medium	Low	Medium	Low	Medium
Human Health	Low	Negligible	Low	Negligible	Low
Overall					Medium

As indicated in Table 22, the potential unmitigated risk of dust soiling is **medium** from demolition and construction activities and **low** from earthworks and trackout activities. The potential unmitigated risk to human health is **low** from demolition and construction activities and **negligible** from earthworks and trackout activities. The overall potential unmitigated dust risk from the proposed development is **medium**.

It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during most of the construction phase.

Step 3

The Mayor of London's guidance[19] provides potential mitigation measures to reduce impacts because of fugitive dust emissions during the construction phase. These have been adapted for the development site as summarised in Table 23.

These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan or similar if required by the LA.

Table 23: Fugitive Dust Emission Mitigation Measures

Issue / Control Measure	**Site Risk**		
	Low	**Medium**	**High**
General			
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	-	Committed	
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager	Committed		
Display the head or regional office contact information	Committed		
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.	As required	Committed	
Site Management			
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	Committed		
Make the complaints log available to the Local Authority when asked	Committed		
Record any exceptional incidents that cause dust and/or air emissions, either on- or off site, and the action taken to resolve the situation in the logbook.	Committed		
Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the offsite transport/ deliveries which might be using the same strategic road network routes.	As required		Committed
Monitoring			
Undertake daily onsite and offsite inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the Local Authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars, and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.	As required		Committed
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and inspect log available to the Local Authority when asked	Committed		

[19] The Control of Dust and Emissions During Construction and Demolition Supplementary Planning Guidance, The Mayor of London, 2014.

Issue / Control Measure	Site Risk		
	Low	**Medium**	**High**
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	Committed		
Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least 3 months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks, and construction.	As required	Committed	
Preparing And Maintaining the Site			
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	Committed		
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	Committed		
Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period	As required	Committed	
Avoid site runoff of water or mud.	Committed		
Keep site fencing, barriers and scaffolding clean using wet methods.	As required	Committed	
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on site cover as described below	As required	Committed	
Cover, seed, or fence stockpiles to prevent wind whipping	As required	Committed	
Operating Vehicle/Machinery and Sustainable Travel			
Ensure all vehicles switch off engines when stationary - no idling vehicles.	Committed		
Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable	Committed		
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the Local Authority, where appropriate)	As required		Committed
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	-	Committed	
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)	-	As required	Committed
Operations			
Only use cutting, grinding, or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems	Committed		
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate	Committed		
Use enclosed chutes and conveyors and covered skips.	Committed		
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Committed		

Issue / Control Measure	Site Risk		
	Low	Medium	High
Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	As required	Committed	
Waste Management			
Avoid bonfires and burning of waste materials	Committed		
Measures Specific to Demolition			
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	As required		Committed
Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	Committed		
Avoid explosive blasting, using appropriate manual or mechanical alternatives	Committed		
Bag and remove any biological debris or damp down such material before demolition.	Committed		
Measures Specific to Earthworks			
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	-	As required	Committed
Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	-	As required	Committed
Only remove the cover in small areas during work and not all at once.	-	As required	Committed
Measures Specific to Construction			
Avoid scabbling (roughening of concrete surfaces) if possible.	As required		Committed
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	As required	Committed	
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	-	As required	Committed
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.	-	As required	
Measures Specific to Trackout			
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	As required	Committed	
Avoid dry sweeping of large areas.	As required	Committed	
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	As required	Committed	
Inspect on site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	-	Committed	
Record all inspections of haul routes and any subsequent action in a site logbook.	As required	Committed	
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	-	Committed	

Issue / Control Measure	Site Risk		
	Low	Medium	High
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	As required	Committed	
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	-	Committed	
Access gates to be located at least 10 m from receptors where possible.	-	Committed	

Step 4

Assuming the relevant mitigation measures outlined in Table 26 are implemented, the residual impacts from all dust generating activities are predicted to be **not significant**, in accordance with the IAQM guidance[20].

Operational Phase Road Vehicle Exhaust Emission Assessment

Future Impacts

The development proposals have been screened out against the following IAQM indicative criteria for requiring an air quality assessment

1. There will not be a change in more than 100 LDV[21] AADT flows on local roads with relevant receptors
2. There will not be a change in more than 25 HDV[22] AADT flows on local roads with relevant receptors
3. There will not be a change in the alignment of roads by 5m or more
4. There are no plans to introduce a new junction or remove an existing junction near to relevant receptors
5. There are no plans to introduce or change a bus station
6. There will not be an underground car park with an extraction system within 20 m of a relevant receptor
7. There will not be one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.

In accordance with the IAQM indicative criteria an air quality assessment of operation phase road traffic emissions is not required, and impacts are considered **not significant.**

Future Exposure

Following the guidance provided within the DMRB[21] locations sensitive to road traffic emissions within 200m of the highway network are likely to be within the limits of pollutant dispersion from road sources.

[20] Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2017.
[21] Cars and small vans <3.5t gross vehicle weight
[22] Goods vehicles + buses >3.5t gross vehicle weight

The annual mean NO_2 concentrations at the façade of the development were calculated using ADMS-Road's dispersion modelling. Predicted annual mean NO_2 concentrations surrounding the proposed development site are shown in Figure 4.

Based on the assessment results, future occupant exposure to exceedances of the annual mean NO_2 objective is unlikely. All results are not anticipated to exceed the AQS objective for annual mean NO_2 at the developments façade.

The annual mean PM_{10} concentrations at the façade of the development are predicted to be below the relevant AQOs, and therefore future occupant exposure to exceedances is unlikely.

6. Air Quality Neutral Assessment

The Air Quality Neutral Planning Support Update[23] was published in April 2014 aiming to provide support to the development of the Mayor's policy related to 'Air Quality Neutral' developments.

Within Greater London, Nitrogen Dioxide (NO_2) and Particulate Matter (PM_{10} and $PM_{2.5}$) are the principal pollutants of concern, and there is thus a strong evidence base to focus on both NOx and PM. In terms of particulate matter, either PM_{10} or $PM_{2.5}$ can be included. The following factors, however, suggest that it is best to focus on PM_{10}:

- If PM_{10} emissions are controlled, then, by definition, $PM_{2.5}$ will also be controlled (particulate matter emissions from combustion sources are predominantly in the $PM_{2.5}$ fraction); and
- There are, perhaps, greater obligations on the Mayor and London Boroughs to reduce PM_{10} emissions as there are more challenging EU limit values in place (the $PM_{2.5}$ limit value for 2015 is expected to be met across the UK without the need for further measures, and the exposure-reduction obligations are only set as national target values).

It is therefore proposed that the Air Quality Neutral policy should focus on NOx and PM_{10} emissions.

The process used to identify suitable benchmarks for both building and Transport Related Emissions is set out below.

Building Emissions

Building Emission Benchmark

Two Building Emission Benchmarks (BEBs) have been defined, one for NOx and one for PM_{10}, for a series of land-use classes. The benchmarks are expressed in terms of $g/m^2/annum$. The gross floor area (GFA) is used to define the area. The following information has been used in defining the benchmarks:

- fossil fuel energy density (kWh/m^2) for different land-use classes;
- percentage energy use for gas and oil, for domestic, commercial, and industrial activities;
- local gas consumption data; and
- NOx and PM_{10} emission factors for gas and oil, for domestic and commercial/industrial use.

The Department for Energy and Climate (DECC)[24] provides estimates of the energy consumption by fuel and end-use, see Table 24.

[23] GLA 80371 Air Quality Neutral Planning Support, 2014

[24] Department for Energy and Climate (DECC), 2011, Special Feature – Estimates of Heat Use in the UK

Table 24: Energy Consumption by Fuel Type (DECC)

	Usage (%)	
	Gas	Oil
Domestic	90.5	9.5
Commercial	88.0	12.0
Industrial	80.1	19.9

Emission factors for NOx and PM_{10} have been taken from the LAEI 2021, see Table 25. Factors are provided for both gas and oil.

Table 25: LAEI 2008 NOx and PM_{10} Emission Factors

	Gas (kg/kWh)		Oil (kg/kWh)	
	NOx	PM_{10}	NOx	PM_{10}
Domestic	0.0000785	0.00000181	0.000369	0.000080
Industrial/ Commercial	0.000194	0.00000314	0.000369	0.000080

The derived BEBs for NOx and PM_{10} are shown in Table 26.

Table 26: Building Emissions Benchmarks (BEBs)

Land-Use Class	NOx (g/m^2)	PM_{10}(g/m^3)
Class A1	22.6	1.29
Class A3-A5	75.2	4.32
Class A2 and Class B1	30.8	1.77
Class B2-B7	36.6	2.95
Class B8	23.6	1.90
Class C1	70.9	4.07
Class C2	68.5	5.97
Class C3	26.2	2.28
D1(a)	43.0	2.47
D2(b)	75.0	4.30
Class D1(c-h)	31.0	1.78
Class D2(a-d)	90.3	5.18
Class D2(e)	284	16.3

Applying the Building Emissions Benchmark (BEB)

To calculate the Building Related Emissions the following data requirements are needed for each land-use category:

- GFA (m^2) of development
- On site emissions of NOx associated with building use (kg/annum) calculated from energy use (kWh/annum) and default or site specific emission factors (kg/kWh)
- On site emissions of PM10 associated with oil or solid fuel use (kg/annum) calculated from energy use (kWh/annum) and default or site specific emission factors (kg/kWh)

The estimated on site emissions from NOx and PM_{10} associated with the building use can be calculated either a) from estimates of fossil fuel consumption per annum, shown in Table 25, or b) from knowledge of the emissions standards that would apply to the combustion source.

The NOx and PM_{10} emissions for each land-use class is calculated and a Total Building Emissions for the development is derived. The BEB emissions for the development are calculated using the annual emission rates set out in Table 26. The difference between the BEB and Total Building Emissions is calculated to assess whether the Building Emissions are within the benchmark.

Building Emission Benchmark Assessment

The BEB has been calculated based on the proposed floor areas. This is shown in Table 27.

Table 27: Building Emission Benchmark (BEBs)

Land-Use	Area (m^2)	Emission Benchmark (g/m^2/annum)		Annual Emission (Kg/annum)	
		NO_x	PM_{10}	NO_x	PM_{10}
Residential Institutions (C2)	3053	26.2	2.28	209.1	18.2
Total				209.1	18.2

As shown in Table 27, the BEB for the development is 209.1 kg/annum for NO_x and 18.2 kg/annum for PM_{10}.

The Building Emissions for the proposed development have been calculated based on the maximum energy use and fuel type (gas). This is shown in Table 28.

Table 28: Development Building Emissions

Land-Use	Area (m^2)	Emission Rate (Kg/kWh)		Maximum Fuel Usage (kWh/annum)	Annual Emission (Kg/annum)	
		NO_x	PM_{10}		NO_x	PM_{10}
Residential Institutions (C2)	3053	0.000079	0.000002	2,664,083	209.1	4.8
Total					209.1	4.8

As shown in Table 28, if the maximum fuel usage for the proposed development is below 2,664,083 kWh/annum for residential land-use, this will meet the BEB for the development of 209.1 kg/annum for NO_x and 18.2 kg/annum for PM_{10} respectively.

Where fuel use is below these limits Building Emissions are considered AQN.

Transport Emissions Benchmark

Two Transport Emissions Benchmarks (TEBs) have been defined, one for NOx and one for PM_{10}, for a series of land-use classes. Where a TEB has not been derived, it will be possible to demonstrate that a development would meet the benchmark if the scheme-generated trip rate for a particular land-use class is below the benchmark trip rate, but if it is above the benchmark trip rate it is not possible to calculate the excess emissions at this stage.

The benchmarks for residential dwellings are expressed in terms g/dwelling/annum; those for all other developments expressed in terms of g/m^2/annum. The GFA should be used to define the area, consistent with the definition used for the BEB.

To derive the TEBs for cars the following information is required:

- Number of car trips associated with different types and sizes of development (i.e., trips/dwelling/annum or trips/m^2 /annum);
- The typical distance travelled for each type of trip (i.e., km/trip); and
- The average emission per vehicle kilometre (i.e., g/km/annum).

Trip Rate Assessment Valid for London (TRAVL) is a multi-modal trip generation database used to estimate the effect of proposed changes in land-use on transport patterns and on the amount of road traffic in an area. Information on average trip rates was extracted from the TRAVL database by MVA Consultancy. Data over the period 2000-2021 have been used in the development of indicative TEBs. Table 29 shows the trip data for retail, residential and office development, which are the major land-use classes that will be covered by the Air Quality Neutral benchmarks.

Table 29: Average Number of Trips per Annum for Different Development Categories

Land-Use	Number of Trips (trips/m^2/annum)		
	CAZ	Inner	Outer
Retail (A1)	43	100	131
Office (B1)	1	4	18
A3	153	137	170
A4	2.0	8.0	-
A5	-	32.4	590
B2	-	15.6	18.3
B8	-	5.5	6.5
C1	1.9	5.0	6.9
C2	-	3.8	19.5
D1	0.07	65.1	46.1
D2	5.0	22.5	49.0
	Number of Trips (trips/dwelling/annum)		
Residential (C3)	129	407	386

The London Travel Demand Surveys (LTDS) provide information on trips originating and ending in CAZ, Inner and Outer London and outside London (known as CIOX data). These include data on the land-use of trip destinations and the length of these in km. Table 30 provides the average (arithmetic mean) journey lengths for residential, office and retail developments derived from the LTDS.

Table 30: Average Distance Travelled by Car per Trip

Land-Use	Distance (km)		
	CAZ	Inner	Outer
Retail (A1)	9.3	5.9	5.4
Office (B1)	3.0	7.7	10.8
Residential (C3)	4.3	3.7	11.4

Data are not provided within the guidance for all land-use classes, and where it is not provided it is necessary to use surrogate TEBs.

As a suitable TEB is not provided in the guidance, scheme-generated trip rates for particular land-use classes have been compared to surrogate benchmark trip rates.

By combining the trip generated (Table 29) with the trip distance (Table 30), the average distance travelled per annum can be derived.

The average distance driven is combined with the average emissions rates for cars, considering of the driving conditions. This is shown in Table 31.

Table 31: Emission Factors

Pollutant	g/vehicle-km		
	CAZ	Inner	Outer
NOx	0.4224	0.370	0.353
PM_{10}	0.0733	0.0665	0.0606

The derived TEBs for NOx and PM_{10} are shown in Table 32.

Table 32: Transport Emissions Benchmarks (TEBs)

Land-Use			
	CAZ	Inner	Outer
NOx (g/m²/annum)			
Retail (A1)	169	219	249
Office (B1)	1.27	11.4	68.5
NOx (g/dwelling/annum)			
Residential (C3)	234	558	1553
PM_{10} (g/m²/annum)			
Retail (A1)	29.3	39.3	42.9
Office (B1)	0.22	2.05	11.8
PM_{10} (g/dwelling/annum)			
Residential (C3, C4)	40.7	100	267

Applying the Transport Emissions Benchmark (TEB)

To calculate the Transport Related Emissions the following data requirements are needed for each land-use category:

- GFA (m^2) of development
- Number of dwellings
- Development trip rate
- Average distance travelled (km)
- Emissions of NOx and PM_{10} per km

The NOx and PM_{10} emissions for each land-use class is calculated and a Total Transport Emissions for the development is derived. The TEB emissions for the development are calculated using the values in Table 32. The difference between the TEB and Total Transport Emissions is calculated to assess whether the transport emissions are within the benchmark.

Transport Emission Benchmark Assessment

The TEBs have been calculated based on the quantum of proposed development. The guidance states C3 (Dwelling Houses) can be applied for this assessment. The NO_x TEB is shown in Table 33.

Table 33: Transport Emission Benchmark (NO_x)

Land-Use	No. Dwellings	Emission Benchmark (g/dwelling/annum)	Emission (g/NO_x/annum)
Residential Institute (C2)	60	1553	93,180
Total (tonnes/annum)			**0.093**

As shown in Table 33, the NOx TEB for the development is 0.093 tonnes/annum.

The PM_{10} TEB is shown in Table 34.

Table 34: Transport Emission Benchmark (PM_{10})

Land-Use	No. Dwellings	Emission Benchmark (g/dwelling/annum)	Emission (g/PM_{10}/annum)
Residential Institute (C2)	60	267	16020
Total (tonnes/annum)			**0.016**

As shown in Table 34, the PM_{10} TEB for the development is 0.016 tonnes/annum.

The anticipated NOx emissions from the development were calculated based on the maximum permitted trip generation. These are shown in Table 35.

Table 35: Transport Emissions (NOx)

Land-Use	Maximum Daily Trip Generation	Trip Length (km)	Annual Veh-Km	Emission Rate (g/km)	Emission (Tonnes NO_x/annum)
Residential Institute (C2)	63	11.4	262,143	0.353	0.093

As shown in Table 35, where daily trips from the development are below 63, the annual NOx transport emissions are 0.093 tonnes/annum, this meets the TEB of 0.093 tonnes/annum.

Where there are fewer than 63 daily trips from the development, transport emissions of NOx are considered Air Quality Neutral.

The anticipated PM_{10} emissions are shown in Table 36.

Table 36: Transport Emissions (PM_{10})

Land-Use	Maximum Daily Trip Generation	Trip Length (km)	Annual Veh-Km	Emission Rate (g/km)	Emission (tonnesPM_{10}/annum)
Residential Institute (C2)	63	11.4	262,143	0.0606	0.016

As shown in Table 36, where daily trips from the development are below 63, the annual PM_{10} transport emissions are 0.016 tonnes/annum, this meets the TEB of 0.016 tonnes/annum.

Where there are fewer than 63 daily trips from the development, transport emissions of PM_{10} are considered Air Quality Neutral.

7. Conclusion

This report has been prepared to support the planning application at 18 Pield Heath Road, UB8 3NF.

The proposals have the potential to cause air quality impacts because of fugitive dust emissions during construction and road traffic exhaust emissions associated with vehicles travelling to and from the site during operation, as well as expose future occupants to any existing air quality issues. As such, an air quality assessment was required to determine baseline conditions and assess potential effects because of the scheme.

During the construction phase of the development there is the potential for air quality impacts because of fugitive dust emissions from the site. These were assessed in accordance with the IAQM methodology. Assuming good practice dust control measures are implemented, the residual significance of potential air quality impacts from dust generated by demolition, earthworks, construction and trackout was predicted to be **not significant**.

During the operational phase of the development there is the potential for air quality impacts because of traffic exhaust emissions associated with vehicles travelling to and from the site. These were assessed against the screening criteria provided within IAQM guidance. Due to the size and nature of the proposals, road vehicle exhaust emissions impacts were predicted to be **not significant.**

The proposed development has the potential to expose future users to elevated pollution levels in the vicinity of the site during operation. Dispersion modelling was therefore undertaken using ADMS-Roads to predict pollutant concentrations because of emissions from the local highway network. Results were then verified using local monitoring data. Model results indicates that future users are unlikely to be exposed to pollutant concentrations that exceed AQOs.

Based on the assessment results, air quality factors are not considered a constraint to planning consent for the development.

8. Figures

Figure 1: Site Location

Figure 2 Monitored Sites

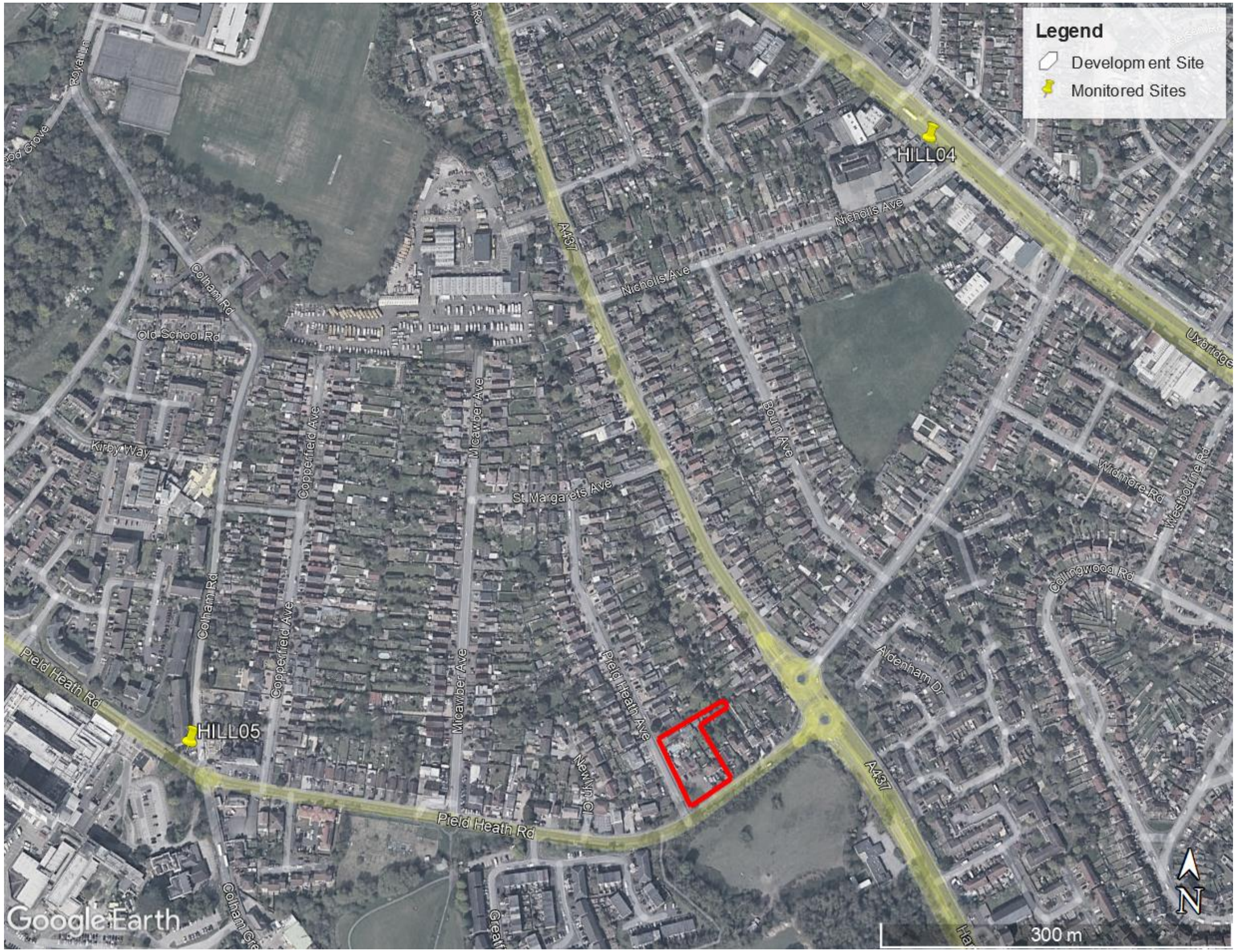


Figure 3: Meteorological Wind Rose

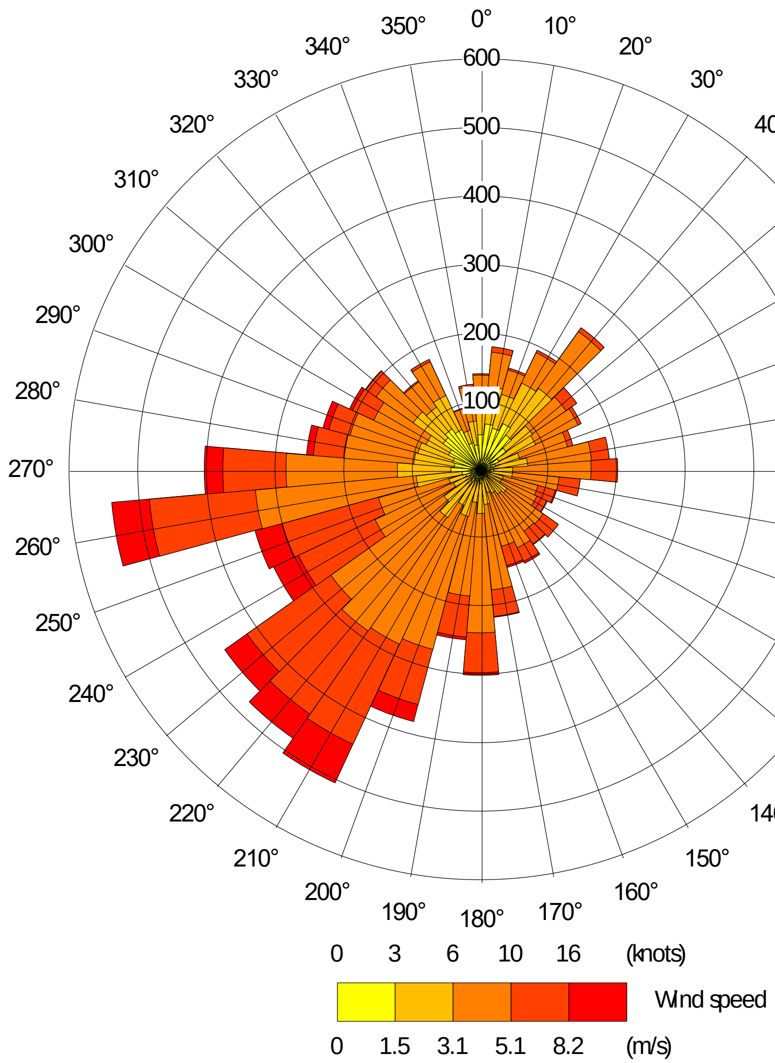


Figure 4: Modelled Total Annual Mean NO_2 Concentrations – 2025 Do Minimum Scenario

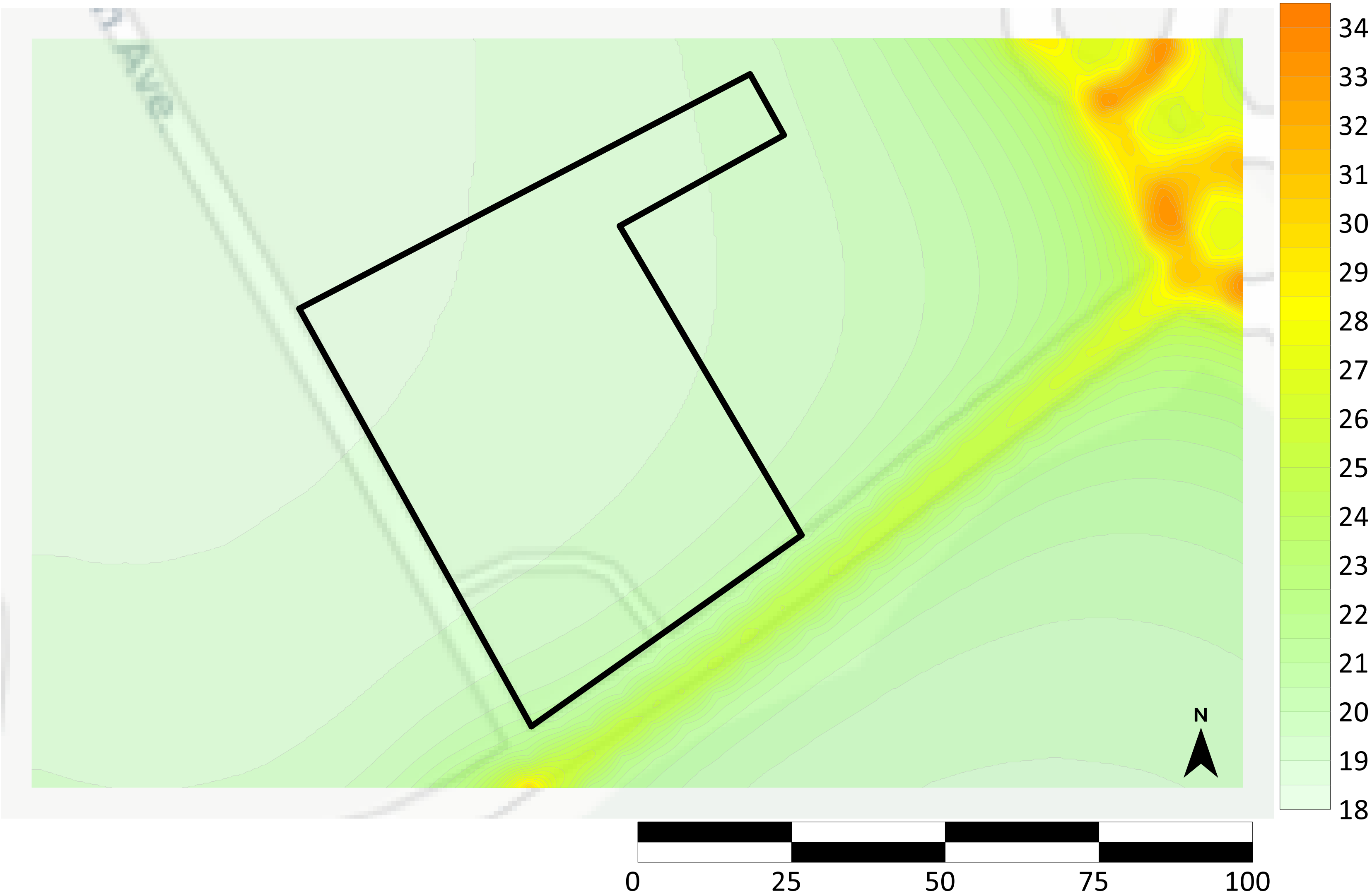


Figure 5: Modelled Total Annual Mean PM_{10} Concentrations – 2025 Do Minimum Scenario

9. Appendix

Limitations and Assumptions

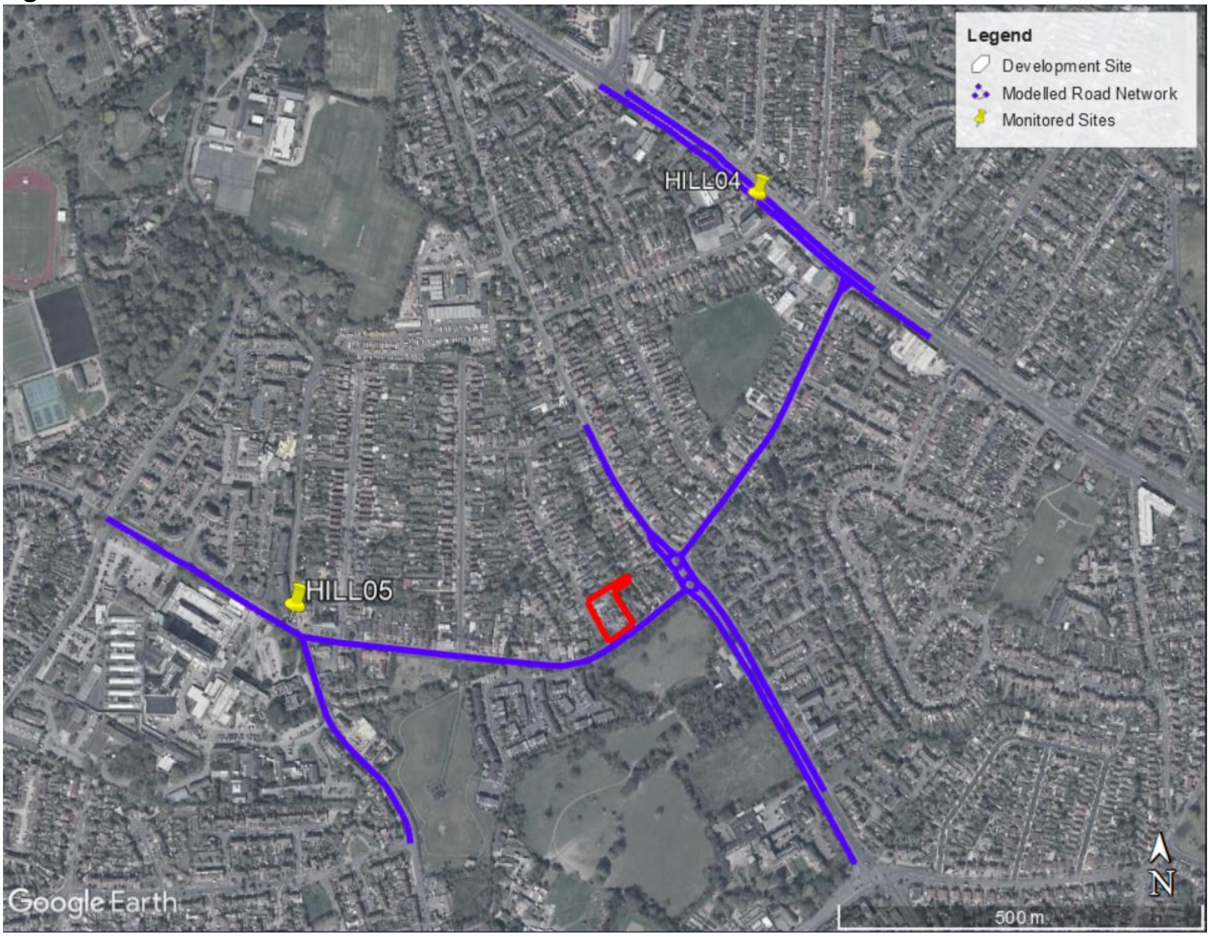
The assessment of the operational phase of the Proposed Development has adopted the following limitations and assumptions:

- Road's modelling has used traffic data provided by the LAEI;
- Local monitoring data available for 2019, same as verification year;
- 2019 DEFRA's background monitoring concentrations have been used for background concentration; and
- DEFRA's vehicle emission rates have been assumed to provide a very conservative estimate for assessment year.

Traffic Data

Traffic data was obtained from the LAEI database. Using TEMPro DfT tool, the data was factored up to 2019 by a production rate of 1.0382 for LDVs and 0.9661 for HDVs. The data was factored up to 2025 (first full year of occupancy) by a production rate of 1.0951 for LDVs and 0.955 for HDVs. The development site is located in the Hillingdon, 017 (E02000510) area group. The modelled network is shown in Figure 6.

Figure 6: Modelled Network



Verification

An evaluation of model performance has been undertaken to establish confidence in model results. LAQM.TG (16) identifies several statistical procedures that are appropriate to evaluate model performance and assess the uncertainty. The statistical parameters used in this assessment are:

- root mean square error (RMSE);
- fractional bias (FB); and
- correlation coefficient (CC).

A brief explanation of each statistic is provided in Table 37, and further details can be found in LAQM.TG (16) Box A3.7 (Defra, 2016).

Table 37: Model Performance Statistics

Statistical Parameter	Comments	Ideal Value
RMSE	RMSE is used to define the average error or uncertainty of the model. If the RMSE values are higher than 25% of the objective being assessed, it is recommended that the model inputs and verification should be revisited in order to make improvements. For example, if model predictions are of an annual mean NO_2 objective of 40µg/m^3 and the RMSE is 10µg/m^3 or above, it is advised to revisit the model parameters and model verification. Ideally an RMSE within 10% of the air quality objective would be derived, which equates to 4µg/m^3 for the annual mean NO_2 objective.	0.01
FB	It is used to identify if the model shows a systematic tendency to over or under predict. FB values vary between +2 and -2 and has an ideal value of zero. Negative values suggest a model over-prediction and positive values suggest a model under-prediction.	0.00
CC	It is used to measure the linear relationship between predicted and observed data. A value of zero means no relationship and a value of 1 means absolute relationship. This statistic can be particularly useful when comparing a large number of model and observed data points.	1.00

These parameters estimate how the model results agree or diverge from observations.

These calculations have been conducted prior to, and after, model adjustment and provide information on the improvement of the model predictions as a result of the application of the adjustment factor. The verification process involves a review of the annual mean modelled pollutant concentrations against corresponding monitoring data to determine how closely the air quality model agrees.

The acceptable limits of model verification are set out in LAQM.TG (16). Depending on the outcome it may be considered that there is no need to adjust any of the modelled results (LAQM.TG (16)).

Alternatively, the model may not correlate against the monitoring data. There is then a need to check all the input data to ensure that it is reasonable and accurately represented in the air quality modelling process.

Where all input data, such as traffic data, emissions rates, and background concentrations have been checked and considered reasonable, a model can be adjusted to better agree with locally monitored data. This may either be a single adjustment factor to be applied to modelled concentrations across the study area, or a range of different adjustment factors to account for different zones in the study area e.g., motorways, local roads. Suitable monitoring locations were selected and used in the verification process, considering the site types, position of the diffusion tubes and representation of local air quality environment.

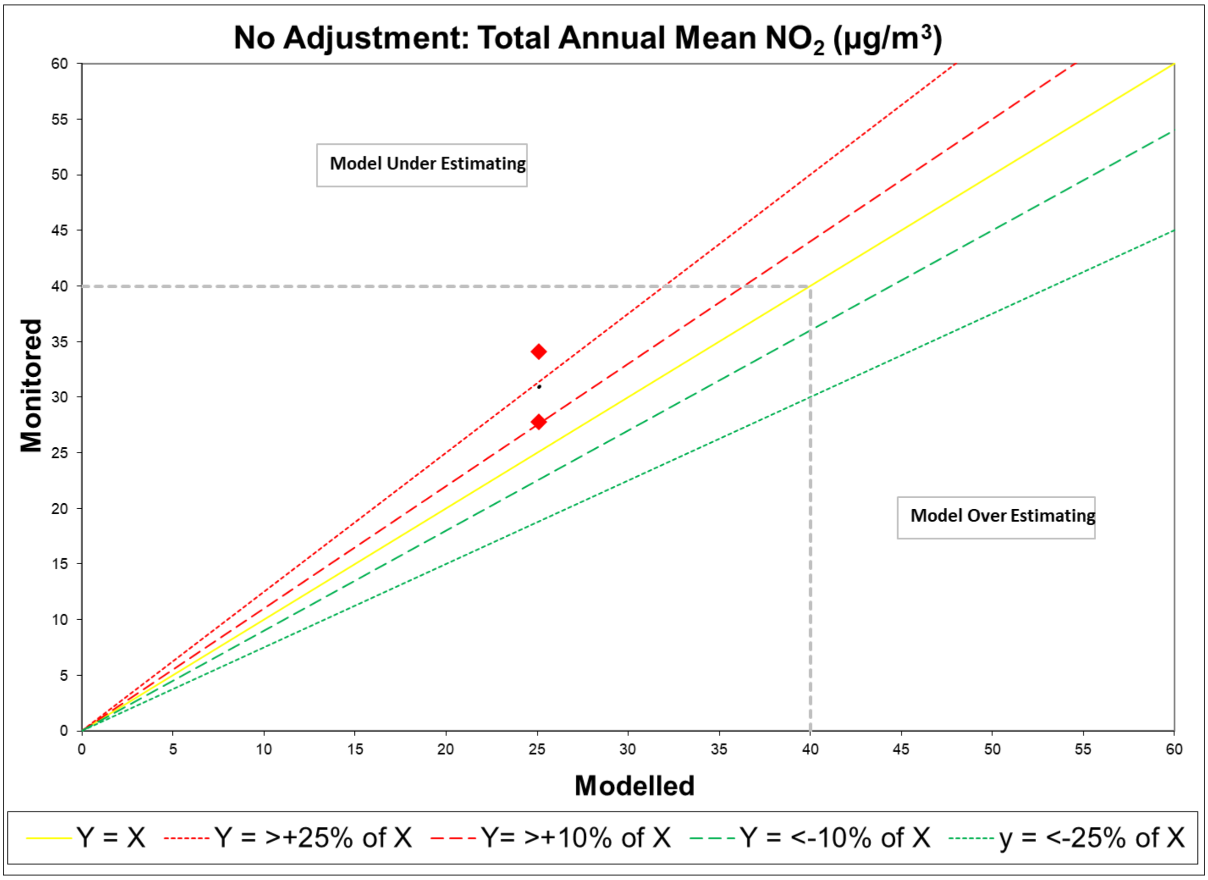
Two local monitoring sites were identified as suitable for use in the model verification process. The non-adjusted modelled versus monitored NO_2 concentrations at those locations determined to be suitable for model verification are presented in Table 38.

Table 38: Model Performance Statistics

Summary Table	No Adjustment	NOx Roads Adjustment	NO_2 Roads Adjustment	NO_2 Total Adjustment
Within +10%	0	1	1	0
Within -10%	1	1	1	1
Within +-10%	1	2	2	1
Within +10 to 25%	0	0	0	1
Within -10 to 25%	0	0	0	0
Within +-10 to 25%	0	0	0	1
Over +25%	0	0	0	0
Under -25%	1	0	0	0
Greater +-25%	1	0	0	0
Within +-25%	1	2	2	2
Total	2	2	2	2
Adjustment Factors				
NOx Roads Adjustment	n/a	2.535	2.535	2.535
NO_2 Roads Adjustment		n/a	0.995	0.995
NO_2 Total Adjustment			n/a	1.004
Uncertainties Assessment				
Correlation	1.000	1.000	1.000	1.000
RMSE (mg/m^3)	6.644	2.851	2.856	2.852
Fractional Bias	0.209	0.003	0.005	0.001

The initial comparison between the predicted concentrations and monitoring data illustrates that the model tends to under predict NO_2 concentrations over the modelled area, see Figure 7.

Figure 7: Modelled Total Annual Mean NO_2 (before adjustment) vs Monitored Total Annual Mean NO_2

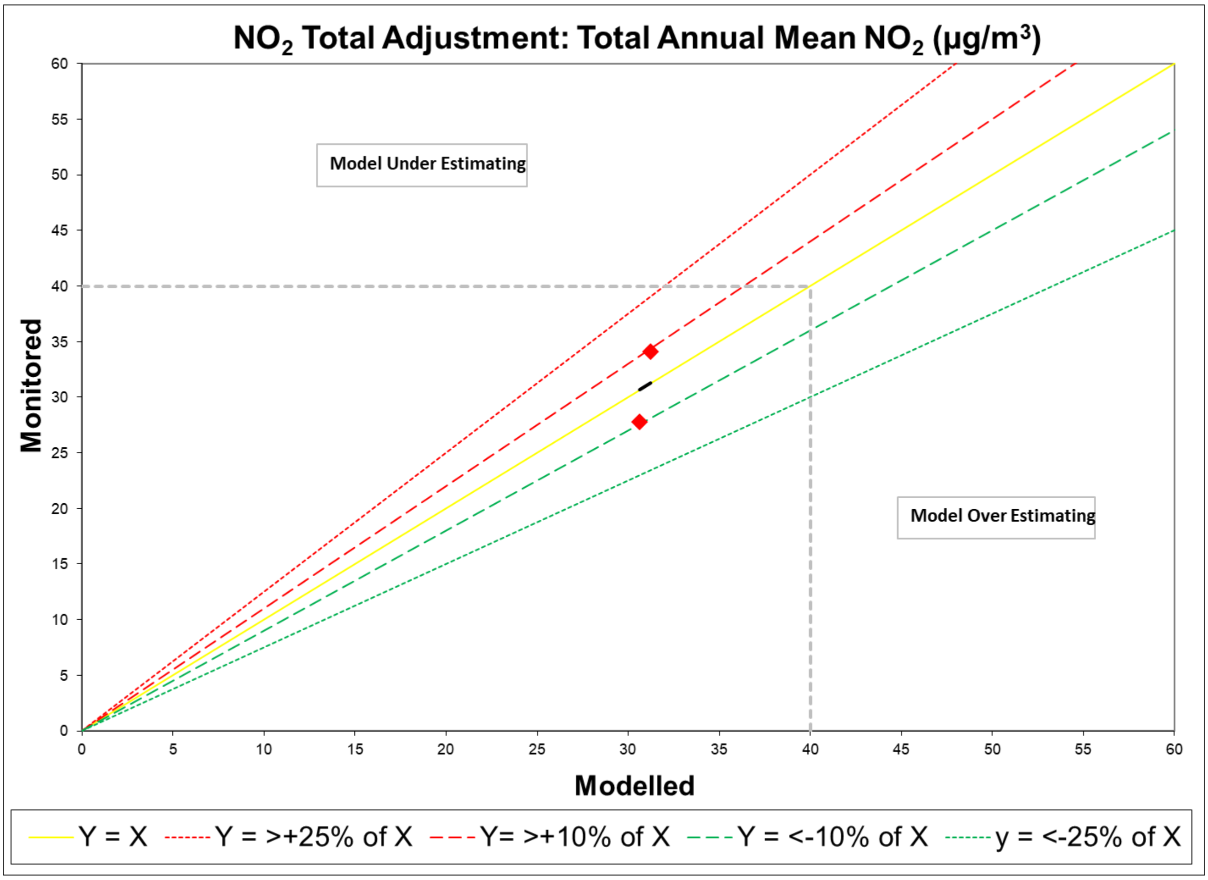


Model adjustment was undertaken in accordance with DEFRA guidance[25]. Modelled Road NO_x concentrations predicted at sensitive receptors in the opening year scenarios were multiplied by an adjustment factor of 2.535 to account for the under-prediction of annual mean Road NO_x in the model.

A Road NO_2 adjustment factor of 0.995 and a Total NO_2 adjustment factor of 1.004 was also applied. Figure 8 shows modelled total annual mean NO_2 (after adjustment) compared to the monitored total annual mean NO_2.

[25] Local Air Quality Management (LAQM), Technical Guidance 2016 (LAQM.TG (16)), DEFRA, 2021

Figure 8: Modelled Total Annual Mean NO_2 (after Adjustment) vs Monitored Total Annual Mean NO_2



The model performance statistics show that after adjustment the residual uncertainty in the predictions of total annual mean NO_2 was less than 4 µg/m^3 (RMSE of 2.852).