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Air Quality Assessment

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1. Introduction

Background

This Air Quality Assessment has been prepared by Syntegra Consulting on behalf of Lidl Stores Limited (the Applicant) in support of a planning application, (the Application), submitted to the London Borough of Hillingdon Council (the Council) for a new discount food store located on land adjacent to Ickenham Road, Ruislip, Hillingdon (the Site), as shown within a red line drawing within the planning statement.

The site is located approximately 10.8km north of London Heathrow Airport at Ordnance Survey (OS) National Grid Reference (NGR) TQ088871.

This Air Quality Assessment provides the Council with information relating to local air quality exposure and impacts relating to the development.

Site Location and Context

The site is bound by Church Avenue to the north, Ickenham Road to the East and Sharps Lane to the South. To the West of the Site are residential properties. The site 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. An air quality assessment was therefore undertaken to determine baseline conditions and consider the potential effects 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:

- Nitrogen Dioxide (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 ($PM_{2.5}$);
- 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 the 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/m³)	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 (TG22), DEFRA, 2022.

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, are 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 December 2023 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 and July 2021.

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 ensure a strategic approach and limit the need for issues to be*

[3] NPPF, Department for Levelling Up, Housing and Communities (2023).

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.

Development Plan Planning Policy

The London Plan

The current London Plan March 2021[5] which was published by the GLA and along with the adopted alterations, sets out a fully integrated economic, environmental, transport and social framework for the development of the capital to 2041. London boroughs' local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

The London Plan policies relating to air quality are outlined below:

Policy GG3 - Creating a healthy city

To improve Londoners' health and reduce health inequalities, those involved in planning and development must:

[…]

F. seek to improve London's air quality, reduce public exposure to poor air quality and minimise inequalities in levels of exposure to air pollution

Policy SD2 – Collaboration in the Wider South East

[…]

E. The Mayor will work with Wider South East (WSE) partners to find solutions to shared strategic concerns such as: barriers to housing and infrastructure delivery---; factors

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

[5] The London Plan March 2021, GLA, 2021.

that influence economic prosperity; the need to tackle climate change (including water management and flood risk); improvements to the environment (including air quality, biodiversity and green infrastructure), waste management, and the promotion of Circular Economies; wider needs for freight, logistics and port facilities; and scope for the substitution of business and industrial capacity where mutual benefits can be achieved.

Policy D1 – London's form, character and capacity for growth

A. Boroughs should undertake area assessments to define the characteristics, qualities and value of different places within the plan area to develop an understanding of different areas' capacity for growth. Area assessments should cover the elements listed below:

[…]

5) air quality and noise levels

Policy D3 – Optimising site capacity through the design-led approach
Experience

9) help prevent or mitigate the impacts of noise and poor air quality

Policy SI 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:

1) Development proposals should not:

a) lead to further deterioration of existing poor air quality

b) 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

c) create unacceptable risk of high levels of exposure to poor air quality.

2) In order to meet the requirements in Part 1, as a minimum:

a) development proposals must be at least Air Quality Neutral

b) 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 retro-fitted mitigation measures

c) 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

d) 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:

1) how proposals have considered ways to maximise benefits to local air quality, and

2) 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.*
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.*

Local Planning Policy

Hillingdon Council Local Plan

The council's Local Plan Part 1 and Part 2[6] was formally adopted in 2012 and sets out the strategic framework for the development and growth of the London Borough of Hillingdon, guiding planning decisions up to 2026. It focuses on promoting sustainable development, protecting green spaces, and enhancing the quality of life for residents. Key elements include the provision of new homes to meet local needs, the promotion of economic growth through supporting businesses and infrastructure, and the protection and enhancement of the natural and built environment. The plan also emphasises the importance of improving transport connectivity, addressing climate change, and ensuring that development is both environmentally and socially sustainable.

A review of the council's Local Plan indicated the following policies in relation to air quality that are relevant to this assessment:

Policy EM1: Climate Change Adaptation and Mitigation

The Council will ensure that climate change mitigation is addressed at every stage of the development process by: …Targeting areas with high carbon emissions for additional reductions through low carbon strategies. These strategies will also have an objective to minimise other pollutants that impact on local air quality. Targeting areas of poor air quality for additional emissions reductions.

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

[6] London Borough of Hillingdon Local Plan – Adopted October 2012.

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.

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.

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.

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

LBH has declared an AQMA for an 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 for exceedances of the NO_2 annual mean. As a result, LBH continues to implement measures outlined within its existing Air Quality Action Plan (AQAP). The development is not located within an AQMA.

As required by the Environment Act (2021), LBH has undertaken a Review and Assessment of air quality within their area of jurisdiction. This process has indicated a slight increase in annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ at most locations. In some locations, measurements indicate no change, though there have been more significant increases in measured concentration for a few, reasons for which need to be investigated. In the 2022 reporting year, two monitoring stations were not compliant with the nitrogen dioxide annual mean air quality objectives, diffusion tubes HILL32 and HILL41.

LBH's key priorities are to develop measures that deliver compliance with air quality objectives through a combination of strategic and locally focussed AQMA measures and continuation of air quality monitoring.

The council has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs.

Air Quality Monitoring

Monitoring of pollutant concentrations is undertaken by the council 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		Approximate Distance to Site (m)	Monitor Type	Monitored NO_2 Concentration (µg/m^3)				
				2018	2019	2020	2021	2022
HILL36	Lamp-post outside Vodafone, 69 High Street Ruislip. HA4 8JB	492	Diffusion Tube	-	38.5	28.1	31.6	32.7
HILL37	2/6 High St. Ruislip Lamp-post with Parking and church sign. HA4 7AW	510	Diffusion Tube	-	39.9	28.1	30.4	31.7

As shown in Table 3, there are two monitoring site in close vicinity to the proposed development site. NO_2 concentrations at the closest sites were well below the relevant AQO (40µg/m^3) between 2020

and 2022. There is currently no more recent monitoring data available for the borough. It is worth noting that concentrations in 2020 and 2021 were observed to be lower than in previous years, but this can be explained by the effects of the COVID-19 lockdown and the impacts on overall traffic and subsequently emissions.

Monitoring of PM_{10} and $PM_{2.5}$ 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: 508500 187500. Data for this location was downloaded from the DEFRA website[7] for the purpose of this assessment and is summarised in Table 4.

Table 4: Background Pollutant Concentrations

Pollutant	Predicted Background Concentration (µg/m^3)	
	2019	2026
NO_2	16.7	12.7
PM_{10}	15.0	13.8
$PM_{2.5}$	10.3	9.4

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

[7] http://uk-air.defra.gov.uk/data/laqm-background-maps

4. Methodology

Introduction

The proposed development has the potential to cause air quality impacts during the construction and operational phases. 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 V2.2[8]

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 250m of the boundary or 50m from the construction vehicle route up to 250m 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.

Step 2

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

[8] Guidance on the Assessment of Dust from Demolition and Construction V2.2, IAQM, 2024

- 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 building volume >75,000 m^3, Potentially dusty construction material (e.g., concrete), On-site crushing and screening, Demolition activities >12 m above ground level.
	Earthworks	Total site area >110,000 m^2, Potentially dusty soil type (e.g., clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, Formation of bunds >6 m in height;
	Construction	Total building volume >75,000 m^3, On site concrete batching, Sandblasting.
	Trackout	>50 HDV (>3.5t) maximum outward movements (a one-way journey. i.e., from A to B, and excludes the return journey) in any one day, Potentially dusty surface material (e.g., high clay content), Unpaved road length >100m.
Medium	Demolition	Total building volume 12,000 m^3 - 75,000 m^3, Potentially dusty construction material, Demolition activities 6-12 m above ground level.
	Earthworks	Total site area 18,000 m^2 – 110,000 m^2, Moderately dusty soil type (e.g., silt), 5-10 heavy earth moving vehicles active at any one time, Formation of bunds 3m - 6m in height.
	Construction	Total building volume 12,000 m^3 to 75,000 m^3, Potentially dusty construction material (e.g., concrete) On site concrete batching;
	Trackout	20-50 HDV (>3.5t) maximum outward movements (a one-way journey. i.e., from A to B, and excludes the return journey) in any one day, Moderately dusty surface material (e.g., high clay content), Unpaved road length 50m - 100m.
Small	Demolition	Total building volume <12,000 m^3, Construction material with low potential for dust release (e.g., metal cladding or timber), Demolition activities <6 m above ground, Demolition during wetter months.
	Earthworks	Total site area <18,000 m^2, Soil type with large grain size (e.g., sand), <5 heavy earth moving vehicles active at any one time, Formation of bunds <4 m in height.
	Construction	Total building volume less than 12,000 m^3, Construction material with low potential for dust release (e.g., metal cladding or timber).

Magnitude	Activity	Criteria
	Trackout	<20 HDV (>3.5t) maximum outward movements (a one-way journey. i.e., from A to B, and excludes the return journey) in any one day, Surface material with a low potential for dust release, Unpaved road length <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		
	Dust	**Health**	**Ecological**
High	Users can reasonably expect enjoyment of a high level of amenity; or The appearance, aesthetics or value of their property would be diminished by soiling; and The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Indicative examples include dwellings, museums and other culturally important collections, medium- and long-term car parks and car showrooms.	Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (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) Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	Locations with an international or national designation and the designated features may be affected by dust soiling; or Locations where there is a community of a particular dust sensitive species such as vascular species included in the Red Data List for Great Britain Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or	Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10}	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown;

Receptor Sensitivity	Examples		
	Dust	Health	Ecological
Medium	The appearance, aesthetics or value of their property could be diminished by soiling; or	(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).	Locations with a national designation where the features may be affected by dust deposition.
Small	The 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. Indicative examples include parks and places of work.	Indicative examples include office and shop workers but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.

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 250
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 250
High	Greater than 32µg/m^3	More than 100	High	High	High	Medium
		10 - 100	High	High	Medium	Low
		1 - 10	High	Medium	Low	Low
	28 - 32µg/m^3	More than 100	High	High	Medium	Low
		10 - 100	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low
	24 - 28µg/m^3	More than 100	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low
		1 - 10	Medium	Low	Low	Low
	Less than 24µg/m^3	More than 100	Medium	Low	Low	Low
		10 - 100	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Medium	-	More than 10	High	Medium	Low	Low
		1 - 10	Medium	Low	Low	Low
Low	-	More than 1	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	Medium	Low
Low	Low	Low	Negligible

Step 3

Step 3 requires the identification of site-specific mitigation measures within the IAQM guidance 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**.

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.

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[9] (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[10] 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

[9] Cars and small vans <3.5t gross vehicle weight
[10] Goods vehicles + buses >3.5t gross vehicle weight

(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)[11] 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 of pollutant dispersion from road sources. The criteria provided within DEFRA guidance[12] on where the AQOs apply, as summarised in **Table 2,** was utilised to determine appropriate receptor positions.

Reference should be made to Appendix 7 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 5.0.0.3). ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used 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.

These are detailed in the following Sections.

Traffic Flow Data

Traffic data for use in the assessment, including 24-hour AADT flows and fleet composition, was provided by the Transport Consultants (Cora IHT).

[11] DMRB Volume 11, Section 3, Part 1, LA 105, Highways England, 2019.
[12] Defra Local Air Quality Management (LAQM)), Technical Guidance 2022 (LAQM.TG (22)), Defra, 2022.

A summary of traffic data is provided in the Appendices. Road widths were estimated from aerial photography and UK highway design standards. Despite minor updates to the site layout plan, Cora IHT have stated that there will be no changes to the original traffic data provided for the assessment.

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 12.0.1). This has been produced by DEFRA and incorporates COPERT 5 vehicle emission factors and fleet information.

Meteorological Data

Meteorological data used in the assessment was taken from London Heathrow Airport meteorological station over the period 1st January 2019 to 31st December 2019 (inclusive). London Heathrow Airport is located approximately 10.8km south of the proposed development. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for use in the dispersion model. Figure 2 shows the wind rose of the meteorological data used in the assessment.

Roughness Length

The z_0 is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 1.5m was used to describe the modelling extent. This value of z_0 is considered right for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'Large Urban Areas'.

A z_0 of 0.5m 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 'Parklands and Open Suburbia'.

Monin-Obukhov Length

The Monin-Obukhov length supplies a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 100m was used to describe the modelling extent. This value is considered right for the nature of the area and is suggested within ADMS-Roads as being suitable for the nature of the area and is suggested within ADMS-Roads as being suitable for 'large conurbations > 1 million'.

A minimum Monin-Obukhov length of 30m was used to describe the meteorological site and is suggested within ADMS-Roads as being suitable for 'Mixed Urban/Industrial'.

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.

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'[13].
The IAQM document 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:

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

- 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 suggests the provision of details of the assessor's qualifications and experience. These can be provided upon request.

Future Exposure

As the Site is for commercial use, future exposure has not been considered within this assessment.

5. Assessment

Construction Phase Fugitive Dust Emissions

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 250m from the development boundary. These are summarised in Table 13.

Table 13: 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	10-100	0
Less than 50	10-100	0

Distance from Site Boundary (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Less than 100	More than 100	-
Less than 250	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 250m of the site access. These are summarised in Table 14.

Table 14: 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	10-100	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 15.

Table 15: 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	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 16.

Table 16: 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 250m of the site boundary. As such, a detailed assessment of potential dust impacts was required.

Step 2

Demolition

Table 17 show the evaluation of the potential magnitude of impacts from demolition activities.

Table 17: Demolition Impact Magnitude

Category	Criteria	Evaluation
Large	Total volume of building to be demolished greater than 75,000m^3	Yes
	Potentially dusty material (e.g., concrete)	
	On-site crushing and screening	
	Demolition activities more than 12m above ground level	
Medium	**Total volume of building to be demolished between 12,000m^3 and 75,000m^3**	Yes
	Potentially dusty construction material	
	Demolition activities 6m to 12m above ground level	
Small	Total volume of building to be demolished less than 12,000m^3	No
	Construction material with low potential for dust release (e.g., metal cladding or timber)	
	Demolition activities less than 6m above ground and during wetter months	
	Demolition during wetter months	

The potential magnitude of impacts from demolition activities is estimated to be **large**.

Earthworks

Table 18 show the evaluation of the potential magnitude of impacts from earthworks.

Table 18: Earthworks Impact Magnitude

Category	Criteria	Evaluation
Large	Total site area greater than 110,000m^2	No
	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 6m in height	
Medium	Total site area 18,000m^2 to 110,000m^2	Yes
	Moderately dusty soil type (e.g., silt)	
	5 to 10 heavy earth moving vehicles active at any one time	
	Formation of bunds 3m to 6m in height	
Small	**Total site area less than 18,000m^2**	Yes
	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 3m in height	

The potential magnitude of impacts from construction activities is estimated to be **medium**.

Construction

Table 19 show the evaluation of the potential magnitude of impacts from construction activities.

Table 19: Construction Impact Magnitude

Category	Criteria	Evaluation
Large	Total building volume greater than 75,000m^3	No
	On site concrete batching	
	Sandblasting	
Medium	Total building volume 12,000m^3 to 75,000m^3	No
	Potentially dusty construction material (e.g., concrete)	
	On site concrete batching	
Small	**Total building volume less than 12,000m^3**	Yes
	Construction material with low potential for dust release (e.g., metal cladding or timber)	

The potential magnitude of impacts from construction activities is estimated to be **small**.

Trackout

Table 20 show the evaluation of the potential magnitude of impacts from trackout.

Table 20: Trackout Impact Magnitude

Category	Criteria	Evaluation
Large	More than 50 HDV trips per day	No
	Potentially dusty surface material (e.g., high clay content)	
	Unpaved road length greater than 100m	
Medium	20 to 50 HDV trips per day	No
	Moderately dusty surface material (e.g., high clay content)	
	Unpaved road length 50m to 100m	
Small	**Less than 20 HDV trips per day**	Yes
	Surface material with low potential for dust release	
	Unpaved road length less than 50m	

The potential magnitude of impacts from trackout is estimated to be **small**.

Summary of Potential Unmitigated Dust Risks

A summary of the risk from each dust generating activity is provided in Table 21.

Table 21: Summary of Potential Unmitigated Dust Risks

Potential Impact		Risk				
		Demolition	Earthworks	Construction	Trackout	Overall
Magnitude/ Sensitivity		Large	Medium	Small	Small	
Dust Soiling	High	High	Medium	Low	Low	High
Human Health	Low	Medium	Low	Negligible	Negligible	Medium
Overall						**High**

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 IAQM guidance 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 22.

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. Based on a High site risk, mitigation in accordance with the level of risk should be applied at the Site.

Table 22: 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		
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	

Issue / Control Measure	Site Risk		
	Low	Medium	High
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		
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	Committed		

Issue / Control Measure	Site Risk		
	Low	Medium	High
addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.			
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	
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 (high risk) mitigation measures outlined in Table 26 are implemented, dust emissions from the Proposed Development will be minimised and the residual impacts from all dust generating activities are predicted to be **not significant**, in accordance with the IAQM guidance[14].

The residual effects of emissions to air from construction vehicles and plant on local air quality is expected to be not significant.

Operational Phase Road Vehicle Exhaust Emission Assessment

Future Impacts

Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified existing receptor locations for 2026 Opening Year without and with development, to consider the impact of development-generated vehicles on local air quality.

Predicted pollutant concentrations are detailed in Table 23, Table 24 and Table 25 for NO_2, PM_{10} and $PM_{2.5}$ respectively for the 2026 Opening Year with and without development concentrations for comparison purposes. The predicted change in pollutant concentrations resulting from development-generated traffic and the associated impact are also provided.

Table 23: Annual Mean NO_2 Concentrations at Discrete Receptor Locations

Receptors	Location (x,y)	Predicted Annual Mean Concentration (µg/m³)			
		2026 without development (µg/m³)	2026 with development (µg/m³)	Change in Concentration (µg/m³)	Impact
1	508581, 187010	17.9	18.0	0.1	Negligible
2	508709, 187025	17.5	17.6	0.1	Negligible
3	508736, 187071	17.6	17.7	0.1	Negligible
4	508788, 187047	18.1	18.3	0.1	Negligible
5	508788, 187090	17.4	17.6	0.1	Negligible
6	508860, 187106	17.2	17.3	0.1	Negligible
7	508857, 187134	17.3	17.5	0.2	Negligible
8	508870, 187161	17.4	17.5	0.1	Negligible
9	508883, 187211	16.2	16.2	0.1	Negligible
10	508863, 187240	14.9	14.9	0.0	Negligible
11	508905, 187284	14.9	14.9	0.0	Negligible

[14] Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2017.

12	508891, 187340	14.4	14.5	0.0	Negligible
13	508961, 187503	14.8	14.8	0.0	Negligible
14	508969, 187450	15.0	15.0	0.0	Negligible
15	509075, 187563	17.6	17.6	0.0	Negligible
16	509024, 187519	16.3	16.4	0.0	Negligible
17	508926, 187516	13.9	13.9	0.0	Negligible
18	508791, 187456	13.6	13.6	0.0	Negligible
19	508679, 187465	13.6	13.6	0.0	Negligible
20	508675, 187386	13.5	13.5	0.0	Negligible
21	508717, 187292	13.7	13.7	0.0	Negligible
22	508764, 187151	14.3	14.3	0.0	Negligible
23	508919, 187119	15.6	15.7	0.0	Negligible
24	509184, 187110	16.4	16.4	0.0	Negligible
25	508965, 187093	15.8	15.8	0.0	Negligible
26	508862, 187050	16.6	16.7	0.1	Negligible
27	509093, 186952	15.6	15.6	0.0	Negligible
28	508870, 187010	15.5	15.6	0.0	Negligible
29	508909, 187177	15.8	15.9	0.1	Negligible
30	509007, 187227	16.4	16.4	0.0	Negligible
31	509162, 187305	16.1	16.1	0.0	Negligible
32	509296, 187420	15.8	15.8	0.0	Negligible
33	509381, 187439	15.5	15.5	0.0	Negligible
34	509117, 187596	20.1	20.2	0.0	Negligible

Table 24: Annual Mean PM_{10} Concentrations at Discrete Receptor Locations

Receptors	Location (x,y)	Predicted Annual Mean Concentration (µg/m³)			
		2026 without development (µg/m³)	2026 with development (µg/m³)	Change in Concentration (µg/m³)	Impact

1	508581, 187010	15.9	15.9	0.1	Negligible
2	508709, 187025	15.7	15.8	0.0	Negligible
3	508736, 187071	15.7	15.8	0.0	Negligible
4	508788, 187047	16.0	16.0	0.1	Negligible
5	508788, 187090	15.7	15.7	0.0	Negligible
6	508860, 187106	15.6	15.6	0.0	Negligible
7	508857, 187134	15.6	15.7	0.1	Negligible
8	508870, 187161	15.7	15.7	0.1	Negligible
9	508883, 187211	15.2	15.2	0.0	Negligible
10	508863, 187240	14.6	14.6	0.0	Negligible
11	508905, 187284	14.6	14.7	0.0	Negligible
12	508891, 187340	14.5	14.5	0.0	Negligible
13	508961, 187503	14.6	14.6	0.0	Negligible
14	508969, 187450	14.7	14.7	0.0	Negligible
15	509075, 187563	15.7	15.7	0.0	Negligible
16	509024, 187519	15.2	15.2	0.0	Negligible
17	508926, 187516	14.3	14.3	0.0	Negligible
18	508791, 187456	14.1	14.1	0.0	Negligible
19	508679, 187465	14.1	14.1	0.0	Negligible
20	508675, 187386	14.1	14.1	0.0	Negligible
21	508717, 187292	14.2	14.2	0.0	Negligible
22	508764, 187151	14.4	14.4	0.0	Negligible
23	508919, 187119	14.9	15.0	0.0	Negligible
24	509184, 187110	15.2	15.2	0.0	Negligible
25	508965, 187093	15.0	15.0	0.0	Negligible
26	508862, 187050	15.3	15.4	0.0	Negligible
27	509093, 186952	15.1	15.1	0.0	Negligible

28	508870, 187010	14.9	14.9	0.0	Negligible
29	508909, 187177	15.0	15.0	0.0	Negligible
30	509007, 187227	15.2	15.2	0.0	Negligible
31	509162, 187305	15.1	15.1	0.0	Negligible
32	509296, 187420	14.9	14.9	0.0	Negligible
33	509381, 187439	14.8	14.8	0.0	Negligible
34	509117, 187596	16.7	16.7	0.0	Negligible

Table 25: Annual Mean $PM_{2.5}$ Concentrations at Discrete Receptor Locations

Receptors	Location (x,y)	Predicted Annual Mean Concentration (µg/m³)			
		2026 without development (µg/m³)	2026 with development (µg/m³)	Change in Concentration (µg/m³)	Impact
1	508581, 187010	13.4	13.5	0.1	Negligible
2	508709, 187025	13.1	13.2	0.1	Negligible
3	508736, 187071	13.2	13.3	0.1	Negligible
4	508788, 187047	13.6	13.7	0.1	Negligible
5	508788, 187090	13.1	13.1	0.1	Negligible
6	508860, 187106	12.8	12.9	0.1	Negligible
7	508857, 187134	13.0	13.1	0.1	Negligible
8	508870, 187161	13.0	13.1	0.1	Negligible
9	508883, 187211	12.0	12.1	0.0	Negligible
10	508863, 187240	11.0	11.1	0.0	Negligible
11	508905, 187284	11.0	11.1	0.0	Negligible
12	508891, 187340	10.7	10.7	0.0	Negligible
13	508961, 187503	11.0	11.0	0.0	Negligible
14	508969, 187450	11.1	11.1	0.0	Negligible
15	509075, 187563	12.4	12.4	0.0	Negligible
16	509024, 187519	11.5	11.5	0.0	Negligible

17	508926, 187516	10.3	10.3	0.0	Negligible
18	508791, 187456	10.1	10.1	0.0	Negligible
19	508679, 187465	10.0	10.0	0.0	Negligible
20	508675, 187386	10.0	10.0	0.0	Negligible
21	508717, 187292	10.1	10.1	0.0	Negligible
22	508764, 187151	10.6	10.6	0.0	Negligible
23	508919, 187119	11.6	11.7	0.0	Negligible
24	509184, 187110	11.5	11.5	0.0	Negligible
25	508965, 187093	11.7	11.7	0.0	Negligible
26	508862, 187050	12.4	12.4	0.0	Negligible
27	509093, 186952	11.2	11.2	0.0	Negligible
28	508870, 187010	11.5	11.6	0.0	Negligible
29	508909, 187177	11.8	11.8	0.0	Negligible
30	509007, 187227	11.5	11.5	0.0	Negligible
31	509162, 187305	11.3	11.3	0.0	Negligible
32	509296, 187420	11.0	11.0	0.0	Negligible
33	509381, 187439	10.8	10.8	0.0	Negligible
34	509117, 187596	14.5	14.5	0.0	Negligible

All 2026 opening year without and with development results are not predicted to exceed the AQS objective for annual mean NO_2 and PM_{10}, with concentrations predicted to be well below the pollutant objectives. In addition, predicted concentrations of $PM_{2.5}$ are also unlikely to exceed the indicative 20µg/m^3 threshold.

The results in Table 23 indicate that for the opening year (2026) both without and with development, the NO_2 annual mean concentrations are not predicted to exceed the NO_2 objective at any of the sensitive receptors modelled. The highest concentration (20.2µg/m^3) is predicted at receptor R34.

The results in Table 24 indicate that for the opening year (2026) both without and with development, the PM_{10} annual mean concentrations are not predicted to exceed the PM_{10} objective at any of the sensitive receptors modelled. The highest concentration (16.7µg/m^3) is predicted at receptor R34.

The results in Table 25 indicate that for the opening year (2026) both without and with development, the $PM_{2.5}$ annual mean concentrations are not predicted to exceed the $PM_{2.5}$ indicative objective at

any of the sensitive receptors modelled. The highest concentration (14.5 µg/m^3) is predicted at receptor R34.

In accordance with technical guidance, the change in pollutant concentrations with the development in place and associated impact is predicted to be **negligible** at all receptors.

The annual mean NO_2 concentrations predicted by the model were all well below 60µg/m^3, and therefore exceedances of the hourly mean NO_2 concentration objective are unlikely to occur in accordance with Defra guidance.

The objective for 24 hourly mean PM_{10} concentrations is 50µg/m^3 to be exceeded no more than 35 times a year. The calculation detailed in the Defra guidance was used to determine potential exceedance of the 24-hour PM_{10} short term objective; the results of the dispersion modelling indicate that this objective will be met at all receptor locations.

Impact Significance Summary

Relevant guidance, legislation and professional judgement was utilised to determine the significance of the findings of the air quality assessment. The air quality assessment was undertaken by a full member of the Institute of Air Quality Management. A summary of the impact significance and justification of this are provided below.

It is considered that the impact of the proposed development on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations would be negligible. In addition, as all the NO_2 annual mean concentrations are below 60µg/m^3, it is considered that the Site would also have a negligible impact on hourly NO_2 concentrations. Furthermore, 24-hour mean PM_{10} concentrations are not predicted to be exceeded, therefore the Site would also have a negligible impact on 24-hourly PM_{10} concentrations.

The impact of the proposed development on air quality is considered to be negligible:

- Consideration was given to local planning policy and the development proposals are considered to be in accordance with this policy with regard to air quality.
- Existing concentrations of NO_2, PM_{10} and $PM_{2.5}$ in the study area are predicted to be well below the air quality objectives.
- The air quality assessment undertaken utilized robust model inputs including traffic data.
- The impact of development-generated road traffic on local air quality is defined as not significant in accordance with IAQM and EPUK guidance.

Using professional judgement, based on the severity of the impact and the concentrations predicted at the existing sensitive receptors (all predicted to be below the annual and short-term mean objectives), it is considered that the effect of the Proposed Development on pollutant concentrations would be not significant as the Proposed Development is not predicted to lead to any new objective exceedances or the designation, or extension, of an AQMA.

Air Quality Neutral

The London Plan[15] requires that all developments are 'air quality neutral' to ensure proposals do not lead to further deterioration of existing poor air quality. To support this policy, guidance[16] has been produced on behalf of the GLA. 'Air Quality Neutral' is a term for developments that do not contribute

[15] The London Plan, Greater London Authority, 2011.
[16] Air Quality Neutral London Plan Guidance: Greater London Authority, 2023.

to air pollution beyond allowable benchmarks. The benchmarks, set out in the GLA's London Plan Guidance Air Quality Neutral Guidance (February 2023), are based on research and evidence carried out by building and transport consultants.

There are two sets of benchmarks, which cover the two main sources of air pollution from new developments:

- Building Emissions Benchmark (BEB) - emissions from equipment used to supply heat and energy to the buildings; and
- Transport Emissions Benchmark (TEB) - emissions from private vehicles travelling to and from the development.

A development must meet both benchmarks separately in order to be Air Quality Neutral. If one or both benchmarks are not met, appropriate mitigation or offsetting will be required.

Developments, including major developments which do not include additional emissions sources are assumed to be Air Quality Neutral and do not need an Air Quality Neutral assessment. This would include, for example, developments that have no additional motor vehicle parking, do not lead to an increase in motor vehicle movements, and do not include new combustion plant such as gas-fired boilers.

The proposed development is located in outer London and has a total site area of approximately 6,460m^2, including up to 1,212m^2 of retail space (GIA).

Building Emissions

Anticipated building emissions from the scheme were assumed to be negligible as the development will use non-combustion heat sources including air source or aero-thermal heat pumps, along with photovoltaic panels. The site will therefore not result in significant building emissions. As such, building emissions associated with the development are predicted to be **negligible**, and therefore the development is air quality neutral in terms of building emissions.

Transport Emissions

The transport assessment predicted that the development will generate a total of 594,600 car trips per annum for the A1 Food Retail land use (1,212m^2). The Transport Emission Benchmark (TEB) has been calculated using the GLA Air Quality Neutral Planning Support guidance document based on the land-use class of the proposed development. This is provided in Table 26. The floorspace schedule was provided by the architects for the project.

Table 26 Transport Emission Benchmark

Land Use	GIA (m^2)	Benchmark Trip Rate	Total Benchmark Trip Rate (trips/year)
A1 Food Retail	1,212	216	261,792
Total (TEB)			**261,792**

The total development trip rate is greater than the TEB. The development is therefore not Air Quality Neutral in terms of transport emissions.

Entire Development

While the development was Air Quality Neutral regarding building emissions, the total trip rate exceeded the TEB. Therefore, mitigation of the transport-related emissions would be required should no changes to the proposal be made.

Offsetting

If suitable mitigation cannot be agreed between the applicant and the local planning authority, an offsetting payment would need to be approved to mitigate the excess transport emissions.

To calculate the relevant offsetting payment, the TEB and total transport trip rates must be converted into NO_x and $PM_{2.5}$ emissions.

Table 27 shows the benchmark emissions calculated for the proposed development site.

Table 27 Calculation of Benchmark Emissions

Land Use	Benchmark Trip Rate	Average Distance per trip (km)	Emissions (g/veh-km)		Total emissions (kg)	
			NOx	PM2.5	NOx	PM2.5
A1 Food Retail	261,792	5.4	0.35	0.028	494.8	39.6
Total					**494.8**	**39.6**

Table 28 shows the development emissions calculated for the proposed development site.

Table 28 Calculation of development emissions

Land Use	Development Trip Rate	Average Distance per trip (km)	Emissions (g/veh-km)		Total emissions (kg)	
			NOx	PM2.5	NOx	PM2.5
A1 Food Retail	594,600	5.4	0.35	0.028	1,123.8	89.9
Total					**1,123.8**	**89.9**

As seen in Table 29, the excess emissions are then multiplied by the relevant damage costs and multiplied over 30 years, with a 2 per cent annual uplift, to give the total offsetting payment of **£360,486.84**

Table 29 Calculation of development emissions

	Benchmark (tonnes / annum)	Total predicted emissions (tonnes / annum)	Excess emissions (tonnes / annum)	Damage Cost (£ / tonne)*	Annual offsetting amount (£)
Building NOx emissions	n/a	n/a	n/a	n/a	n/a

Building PM2.5 emissions	n/a	n/a	n/a	n/a	n/a
Transport NOx emissions	0.4948	1.1238	0.629	8,148	5,125.09
Transport PM2.5 emissions	0.0396	0.0899	0.0503	74,769	3,760.88
Total annual offsetting amount					**8,885.97**

*Based on central damage cost (£/t)

Proposed Mitigation and Residual Effects

The effect of the Proposed Development on local air quality is expected to be not significant. The following good practice principles are suggested to be implemented as part of the Proposed Development. These will go towards reducing emissions from the development and contributing to better air quality management.

Default Mitigation:

- 10% of parking spaces designated for EV charging, with 2 no. rapid charging parking bays to be active initially, and the remainder provided at an agreed trigger level' (usage).
- Travel Plan including agreed mechanisms for discouraging high emission vehicle use and encouraging modal shift (i.e. public transport, cycling and walking) as well as the uptake of low emission fuels and technologies.
- Improved pedestrian links to public transport stops.
- Provision of new bus stops infrastructure including shelters, raised kerbing, information displays.
- Site layout to include improved pedestrian pathways to encourage walking.
- Improved convenient and segregated cycle paths to link to any existing local cycle network.
- Commercial vehicles should comply with current or most recent European Emission Standards from scheme opening, to be progressively maintained for the lifetime of the development.
- Fleet operations should provide a strategy to be implemented for reducing emissions, including the uptake of low emission fuels and technologies such as ultra-low emission service vehicles.

Other Mitigation Options:

- Green infrastructure must be integrated into the design from the beginning, for example through the use of appropriate tree planting and soft landscaping.
- Dust Management Plan, where appropriate (for major sites, this may be incorporated into a Construction and Environmental Management Plan).
- Support measures to reduce polluting motorized vehicle use:
    - Contribution to the emerging low emission vehicle refueling infrastructure.
- All commercial vehicles should comply with current European Emission Standards.
- Fleet operations should provide a strategy for considering reduced emissions, low emission fuels and technologies.

Incorporating the above mitigation measures, the effect of the Proposed Development on local air quality is expected to be not significant and there are no air quality grounds for refusal.

6. Conclusion

This report has been prepared to support the planning application at Ickenham Road, Ruislip, Hillingdon, HA4 7DR.

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 such, an air quality assessment was required to determine baseline conditions and assess potential effects 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. A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified existing receptor locations. Road traffic emissions were modelled using the dispersion model ADMS-Roads and concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified sensitive receptor locations. The development was not predicted to result in any new exceedances of the relevant air quality objectives and the impact of the development on local air quality was predicted to be negligible in accordance with IAQM and EPUK guidance. The road vehicle exhaust emissions impacts were therefore predicted to be not significant.

An Air Quality Neutral Assessment was undertaken as per the GLA guidance document. While the development was Air Quality Neutral regarding building emissions, the total trip rate exceeded the TEB. Therefore, mitigation of the transport-related emissions would be required should no changes to the proposal be made.

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

Figure 1 Site Location and Approximate Redline Boundary

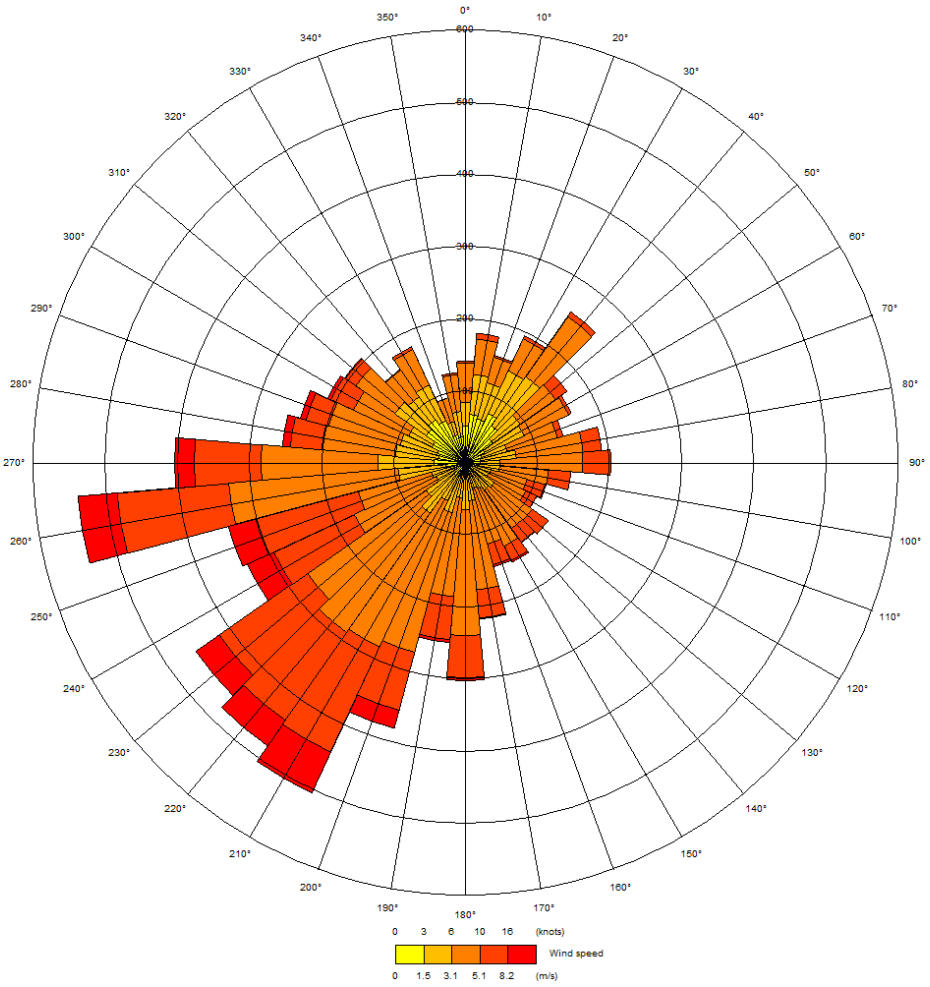


Figure 2 2019 London Heathrow Airport Meteorological Station Windrose

7. Appendix

Limitations and Assumptions

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

- Roads modelling has used traffic data provided by the DfT;
- Local monitoring data available for 2019, same as verification year; and
- 2019 and 2026 Defra background pollution concentrations and Defra's vehicle emission rates have been assumed to provide a very conservative estimate for baseline and future years of assessment.

Worst Case Receptor

Worst case receptors have been assumed, which represent the anticipated location of maximum exposure of air pollutants within an area. Details of the receptors are summarised in Table 30.

Table 30 Details of Worst-Case Receptors

ID	X	Y	Z	Representative
R1	508581	187010	1.5	B466 Ickenham Road South
R2	508709	187025	1.5	B466 Ickenham Road South
R3	508736	187071	1.5	B466 Ickenham Road South
R4	508788	187047	1.5	B466 Ickenham Road South
R5	508788	187090	1.5	B466 Ickenham Road South
R6	508860	187106	1.5	Kingsend
R7	508857	187134	1.5	B466 Ickenham Road North
R8	508870	187161	1.5	B466 Ickenham Road North
R9	508883	187211	1.5	Church Avenue
R10	508863	187240	1.5	Church Avenue
R11	508905	187284	1.5	Church Avenue
R12	508891	187340	1.5	Church Avenue
R13	508961	187503	1.5	Church Avenue
R14	508969	187450	1.5	Church Avenue
R15	509075	187563	1.5	Manor Road
R16	509024	187519	1.5	Manor Road
R17	508926	187516	1.5	Manor Road
R18	508791	187456	1.5	Manor Road
R19	508679	187465	1.5	Sharps Lane
R20	508675	187386	1.5	Sharps Lane
R21	508717	187292	1.5	Sharps Lane
R22	508764	187151	1.5	Sharps Lane

R23	508919	187119	1.5	Kingsend
R24	509184	187110	1.5	Kingsend
R25	508965	187093	1.5	Kingsend
R26	508862	187050	1.5	Wood Lane
R27	509093	186952	1.5	Wood Lane
R28	508870	187010	1.5	Wood Lane
R29	508909	187177	1.5	B466 Ickenham Road
R30	509007	187227	1.5	B466 Ickenham Road
R31	509162	187305	1.5	B466 Midcroft
R32	509296	187420	1.5	Midcroft
R33	509381	187439	1.5	Midcroft
R34	509117	187596	1.5	A4180 High Street

Traffic Data

The traffic provided by the Transport Consultant are summarised in Table 31.

Table 31 Traffic Data Used in the Dispersion Modelling Assessment

ID	Road Name	2019 AADT	2026 DM AADT	2026 DS AADT	Mean Vehicle Speed (km/h)	%HGV
1	Church Avenue (North)	5868	6072	6158	32.2	0.3
2	B466 Ickenham Road (North)	12270	12696	13442	32.2	1.0
3	Kingsend	7522	7783	7796	32.2	0.3
4	Wood Lane	7296	7549	7630	32.2	0.4
5	B466 Ickenham Road (South)	24238	25079	25729	32.2	0.6
6	Sharps Lane	1950	2018	2019	32.2	0.3
7	B466 Ickenham Road	12476	12909	13084	32.2	1.0
8	B466 Ickenham Road	6827	7064	7153	32.2	1.5
9	Church Avenue (South)	5739	5938	6023	32.2	0.3
10	Manor Road (East)	5630	5825	5910	32.2	0.4
11	Manor Road (West)	1757	1818	1818	32.2	0.2
13	B466 Midcroft	6910	7150	7239	32.2	1.5
14	A4180 High Street (North)	13660	14134	14186	32.2	0.9
15	Midcroft	2934	3036	3052	32.2	0.3
16	A4180 High Street (South)	9413	9740	9762	32.2	1.1

17	A4180 Bury Street (DfT Data)	17072	18204	18204	32.2	2.1

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 32, and further details can be found in LAQM.TG (22) Box A3.7 (Defra, 2022).

Table 32 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/m3 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 corresponds. The acceptable limits of model verification are set out in LAQM.TG (22). Depending on the outcome it may be considered that there is no need to adjust any of the modelled results (LAQM.TG (22)).

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, then the model requires adjustment to best align with the monitoring data. This may either be a single adjustment factor to be applied to the 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.

There are two monitoring sites in the study area, available for traffic emission verification with suitable data capture. The non-adjusted modelled versus monitored NO_2 concentrations at those locations determined as suitable for the verification process are presented in Table 33.

Table 33 Model Performance Statistics

Statistical Parameter	No Adjustment	NO_x Roads Adjustment
Adjustment a	-	5.817
Correlation Co-efficient	1.0	1.0
RMSE	16.7	0.2
Fractional Bias	0.5	0.0
Within +10%	0	1
Within -10%	0	1
Within +-10%	0	2
Within +10 to 25%	0	0
Within -10 to 25%	0	0
Within +-10 to 25%	0	0
Over +-25%	2	0

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.

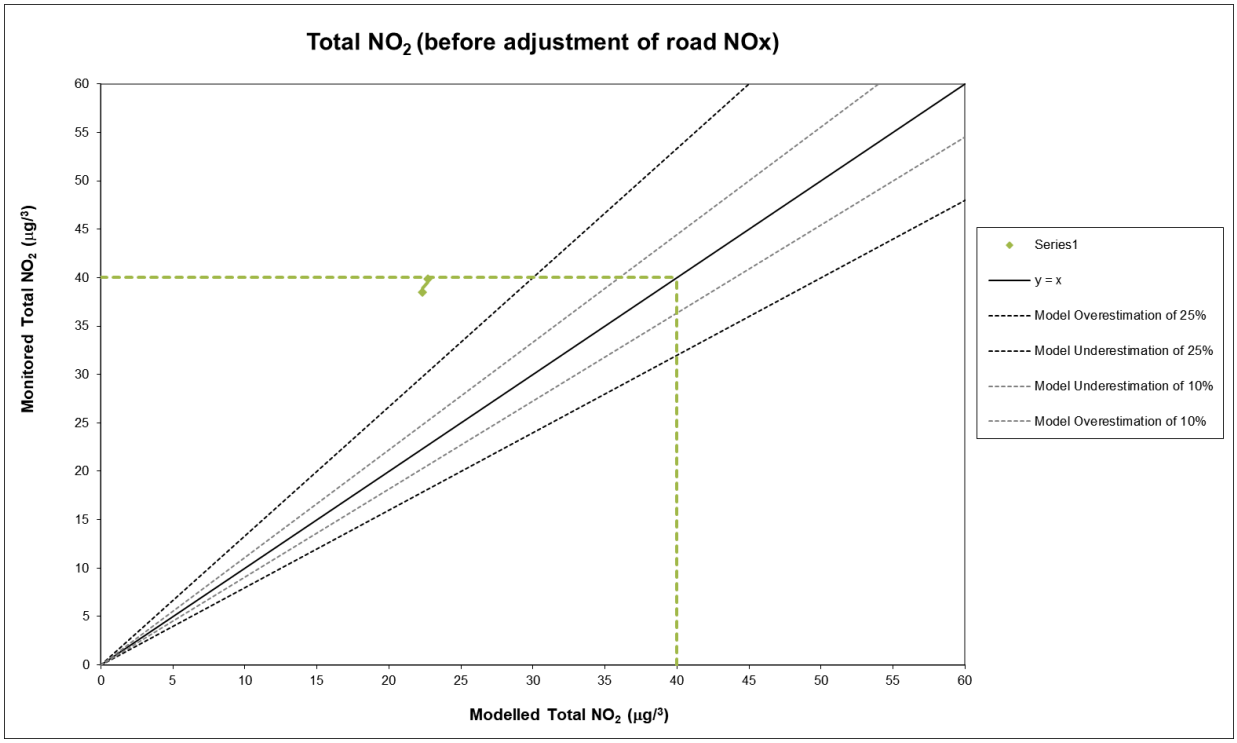
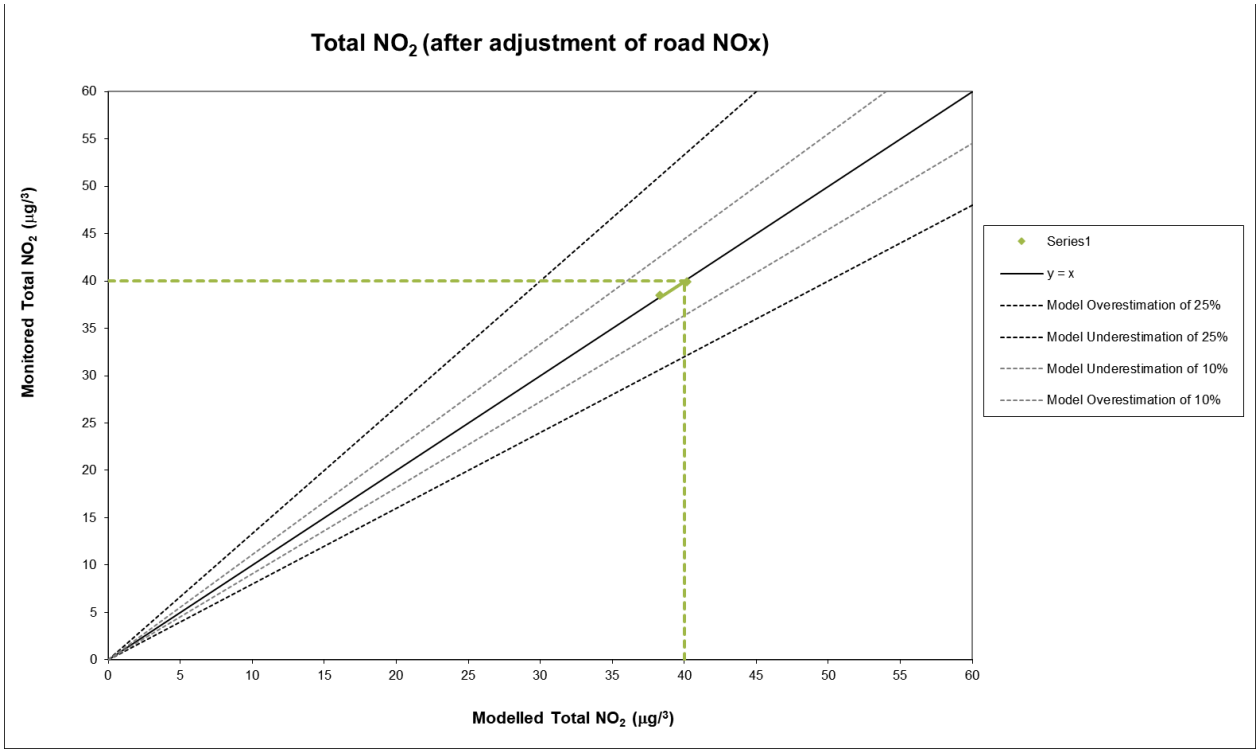


Figure 2 Modelled NO_2 vs Monitoring NO_2 before Adjustment

Model adjustment was undertaken in accordance with DEFRA guidance[17]. Modelled Road NOx concentrations predicted at sensitive receptors in the base and opening year scenarios were multiplied by the adjustment factor (5.817) to account for the under-prediction of Road NO_x by the model. Shown in Figure 5.



[17] Local Air Quality Management (LAQM), Technical Guidance 2022 (LAQM.TG (22)), DEFRA, 2022

Figure 3 Modelled NO_2 vs Monitoring NO_2 after Adjustment

The model performance statistics show that the uncertainty in the predictions of adjusted total NO_2 was acceptable as the RMSE of 0.2, and so within 10 µg/m^3.