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1 Introduction

1.1. Proposed Development

1.1.1 Air Quality Assessments Ltd (AQA) has been commissioned by MBH Heathrow Ltd to undertake an air quality assessment for the proposed residential development at Land at Status Park, Nobel Drive, Hillingdon, UB3 5EY. The application site is shown in **Figure 1** on **Page 10**. The proposed development is described as follows:

"Redevelopment of the existing site to provide a 6 storey residential building to provide 67no. residential units, together with associated landscaping and car parking. Reconfiguration of car parks at Nobel Drive and provision of additional landscaping."

1.2. Scope of Assessment

1.2.1 This report describes the existing air quality conditions in proximity to the site. Hillingdon Council has declared an AQMA for exceedances of the annual mean nitrogen dioxide (NO_2) objective and the application site lies within that area.

1.2.2 Planning consent has been granted for a hotel at the application site. The proposed development would lead to a net reduction in traffic on local roads of -86 daily vehicle trips; therefore, the impacts on local air quality due to emissions from traffic generated by the proposed development have been screened out of the assessment.

1.2.3 The new residential properties will be subject to the impacts of road traffic emissions from the adjacent road network, and this has been assessed. The main air pollutants of concern related to traffic emissions are NO_2 and fine particulate matter (PM_{10} and $PM_{2.5}$).

1.2.4 There is also the potential for construction activities to impact upon existing properties. The main pollutants of concern related to construction activities are dust and PM_{10}.

1.2.5 Heat and hot water at the proposed development will be provided using an air source heat pump (ASHP) system; therefore, the proposed development would be Air Quality Neutral with regard to building emissions. As the proposed development would not lead to an increase in motor vehicle movements, it would also be Air Quality Neutral with regard to transport emissions (GLA, 2023).

1.2.6 The assessment has been prepared taking into account all relevant local and national guidance and regulations.

1.2.7 The references and a glossary of common air quality terminology used in this assessment are shown in **Section 10** and **Section 11** respectively.

2 Air Quality Legislation and Policy

2.1. EU Limit Values

2.1.1 The European Union's Directive on ambient air quality and cleaner air for Europe (European Parliament, Council of the European Union, 2008) set legally binding limit values for NO_2, PM_{10} and $PM_{2.5}$. The Air Quality Standards Regulations 2010 (as amended) implement the EU Directive limit values in English legislation (The Stationary Office, 2010). Achievement of the limit values is a national obligation rather than a local one.

2.1.2 The United Kingdom left the European Union on 31st January 2020; however, the EU legislation currently remains enshrined in UK law through the Air Quality Standards Regulations.

2.1.3 The limit values for NO_2 and PM_{10} are the same as the objective values (see **Section 2.2** below); however, the annual mean limit value for $PM_{2.5}$ is 20µg/m^3. Limit values apply at all locations, apart from where the public does not have access, where health and safety at work provisions apply and on the road carriageway. The limit value compliance dates differ from the objectives; the PM_{10} and NO_2 limit value applied from 2005 and 2010 respectively, whereas the $PM_{2.5}$ limit value applied from 2020.

2.2. National Legislation

2.2.1 Part IV of The Environment Act 1995 required the UK Government to prepare a national Air Quality Strategy (Defra, 2007). The Air Quality Strategy provides an overview and outline of ambient air quality policy in the UK and the devolved administrations. The strategy sets out air quality standards and objectives intended to protect human health and the environment. Standards are the concentrations of pollutants in the atmosphere, below which there is a minimum risk of health effects or ecosystem damage; they are set with regard to scientific and medical evidence. Objectives are the policy targets set by the Government, taking account of economic efficiency, practicability, technical feasibility and timescale, where the standards are expected to be achieved by a certain date.

2.2.2 The Government has also published a Clean Air Strategy, which provides an overview of the actions that the government will take to improve air quality and promises new legislation that will tackle air pollution (Defra, 2019). The actions focus on emissions from transport, the home, farming, and industry.

2.2.3 The Air Quality Strategy also describes the system of Local Air Quality Management (LAQM), which was introduced in Part IV of the Environment Act 1995. LAQM requires every local authority to carry out regular review and assessments of air quality in its area. Where an objective has not been, or is unlikely to be achieved, the local authority must declare an Air Quality Management Area (AQMA) and prepare an action plan which sets out appropriate measures to be introduced in pursuit of the objectives.

2.2.4 The objectives for NO_2 and PM_{10}, as prescribed by the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002 (The Stationary Office, 2000; The Stationary Office, 2002), are shown in **Table 1**. The

objectives for PM_{10} and NO_2 were to have been achieved by 2004 and 2005 respectively and continue to apply in all future years thereafter.

2.2.5 The Air Quality Strategy $PM_{2.5}$ objective, also shown in **Table 1**, was to be achieved by 2020; however, there is no obligation for local authorities to try to meet the $PM_{2.5}$ objective, and it is not included in the Regulations. Local authorities have a flexible role in working towards reducing emissions and concentrations of $PM_{2.5}$.

2.2.6 Amendments in The Environment Act 2021 established a legally binding duty on the government to bring forward at least two new air quality targets. The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 set out an annual mean $PM_{2.5}$ target of 10µg/m³ to be achieved by the end of 2040 and a $PM_{2.5}$ population exposure reduction target of 35% by the end of 2040, as compared with the average population exposure in the three-year period from 1st January 2016 to 31st December 2018 (The Stationery Office, 2023). The Environmental Improvement Plan 2023 sets interim targets for $PM_{2.5}$ of an annual mean concentration of 12µg/m³ to be achieved by the end of January 2028 and a reduction in population exposure in the most recent full calendar year of at least 22% when compared to 2018 (Defra, 2023a).

Table 1: The Objectives for NO_2, PM_{10} and $PM_{2.5}$

Pollutant	Concentration Measured As	Objective
NO_2	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
PM_{10}	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3
$PM_{2.5}$	Annual Mean	25 µg/m^3

2.2.7 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective. Examples of where the objectives should apply are provided in the London Local Air Quality Management Technical Guidance (Mayor of London, 2019). The annual mean NO_2 and PM_{10} objectives should apply at the building façades of residential properties, schools, hospitals, care homes etc.; they should not apply at the building façades of places of work, hotels, gardens or kerbside sites. The 24-hour mean PM_{10} objective should apply at all locations where the annual mean objective applies, as well as the gardens of residential properties and hotels. The 1-hour mean NO_2 objective should apply at all locations where the annual and 24-hour mean objectives apply, as well as at kerbside sites where the public have regular access, e.g., the pavements of busy shopping streets.

2.3. Planning Policy

National Policies and Guidance

2.3.1 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these should be applied (Ministry of Housing, Communities & Local Government, 2021). It provides a framework within which locally prepared plans for development can be produced. At Paragraph 8c, the NPPF states that the purpose of the planning system is to contribute to the achievement of sustainable development and includes an overarching 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."

2.3.2 With regard to environmental impacts from traffic, at Paragraph 104 the NPPF states that:

"Transport issues should be considered from the earliest stages of plan-making and development proposals, so that: …

d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; …"

2.3.3 The NPPF also states at Paragraph 174 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, taking into account relevant information such as river basin management plans; …"

2.3.4 The NPPF goes on to state at Paragraph 185:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."

2.3.5 With specific reference to air quality, the NPPF states at Paragraph 186 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 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."

2.3.6 The NPPF also includes the following statement at Paragraph 188:

"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

2.3.7 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019). The PPG states that:

"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with relevant Limit Values. It is important that the potential impact of new development on air quality is taken into account where the national assessment indicates that relevant limits have been exceeded or are near the limit, or where the need for emissions reductions has been identified."

2.3.8 The PPG goes on to state that:

"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity."

2.3.9 The PPG also sets out the information that may be required in an air quality assessment, stating that:

"Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific."

2.3.10 It also provides guidance on options for mitigating air quality impacts, and makes clear that:

"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact."

2.3.11 The PPG makes clear that:

"… dust can also be a planning concern, for example, because of the effect on local amenity."

Regional Policies

2.3.12 The London Plan sets out the spatial development strategy for London and presents a London-wide policy framework, including Policy SI1 Improving Air Quality, which states (GLA, 2021a):

"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."

2.3.13 Guidance on the assessment of construction dust impacts is set out in the London Plan Supplementary Planning Guidance (SPG) on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014).

2.3.14 Guidance on quantifying and assessing air quality performance against relevant Air Quality Neutral benchmarks is provided in the London Plan Guidance Air Quality Neutral (GLA, 2023).

2.3.15 The Mayor's London Environment Strategy sets out objectives, policies and proposals that will improve air quality in London, with the aim of reducing exposure of Londoners to harmful pollution, achieving compliance with the EU limit values as soon as possible and establishing and achieving tighter air quality targets (GLA, 2018). Proposals include improving information about air quality, encouraging new developments to take into account local air quality, maintaining the LAEI and monitoring networks, promoting and prioritising sustainable transport modes, phasing out the use of fossil fuels with the aim of a zero emissions transport system, tackling unnecessary idling, and reducing emissions from engines and plant.

Local Policies

2.3.16 The Hillingdon Local Plan Part 1 Strategic Policies includes Policy EM8: Land, Water, Air and Noise, the relevant parts of which state (Hillingdon Council, 2012):

"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.

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."

2.3.17 The Hillingdon Local Plan Part 2 Development Management Policies includes Policy DMEI 14: Air Quality, which states (Hillingdon Council, 2020):

"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."

Air Quality Action Plan

2.3.18 Hillingdon Council have published an Air Quality Action Plan (Hillingdon Council, 2004; Hillingdon Council, 2022). The action plan aims to achieve its objectives through a range of measures, such as encouraging the use of sustainable transport modes, reducing idling engines, increased energy efficiency, controls on energy plant.

3 Methodology

3.1. Existing Conditions

3.1.1 Information on existing air quality within the study area has been collated from the following sources:

- The results of monitoring and the LAQM Air Quality Annual Status Reports undertaken by Hillingdon Council (Hillingdon Council, 2022);
- Background pollutant concentration maps published by Defra (Defra, 2023). These cover the whole country on a 1 x 1 km grid.

3.2. Construction Impacts

3.2.1 A construction dust risk assessment has been undertaken following the guidance in the London Plan SPG on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014), which utilises the methodology in the Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014).

3.2.2 The guidance divides activities on construction sites into four main types: demolition, earthworks, construction and trackout. The methodology is based on a sequence of steps. Step 1 screens the requirement for more detailed assessment; if there are no receptors within 50 m of the site boundary, or within 50 m of roads used by construction vehicles, then there is no need for further assessment. Step 2 assesses the risk of dust impacts from each of the four activities, considering the scale and magnitude of the works (Step 2A), and the sensitivity of the area (Step 2B). Site-specific mitigation for each of the four activities is then determined based on a dust risk category defined at Step 2C. **Appendix A1** sets out the construction dust assessment methodology in more detail.

3.2.3 The London Plan SPG is clear that the primary aim of the risk assessment is to identify site specific mitigation that, once adopted, will ensure that there will be no significant effect. Therefore, the assessment has been used to determine an appropriate level of mitigation for the construction phase.

3.3. Road Traffic Impacts

Modelling Methodology

3.3.1 Concentrations have been predicted using the ADMS Roads (v5.0.1.3) dispersion model (CERC, 2022). The model requires the input of a range of data, details of which are provided in **Appendix A2**, along with details of the model verification calculations.

Sensitive Locations

3.3.2 Receptors have been identified at the façade of the proposed development, where there is relevant exposure to the air quality objectives and where the impact from existing sources is likely to be greatest. The receptors are described in **Table 2** and are shown in **Figure 1**. Concentrations have been modelled at receptor heights of 1.5m and 4.5m to represent exposure at the ground and first-floor levels respectively.

Assessment Scenarios

3.3.3 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been predicted at the receptors assuming an opening year of 2026.

Table 2: Description of Receptors

Receptor	Location	OS Grid Ref		Height (m)
		x	y	
R1	Development Façade	509148.1	176947.1	1.5 & 4.5
R2	Development Façade	509148.1	176932.7	1.5 & 4.5
R3	Development Façade	509188.8	176932.8	1.5 & 4.5
R4	Development Façade	509195.0	176939.1	1.5 & 4.5
R5	Development Façade	509204.9	176969.9	1.5 & 4.5

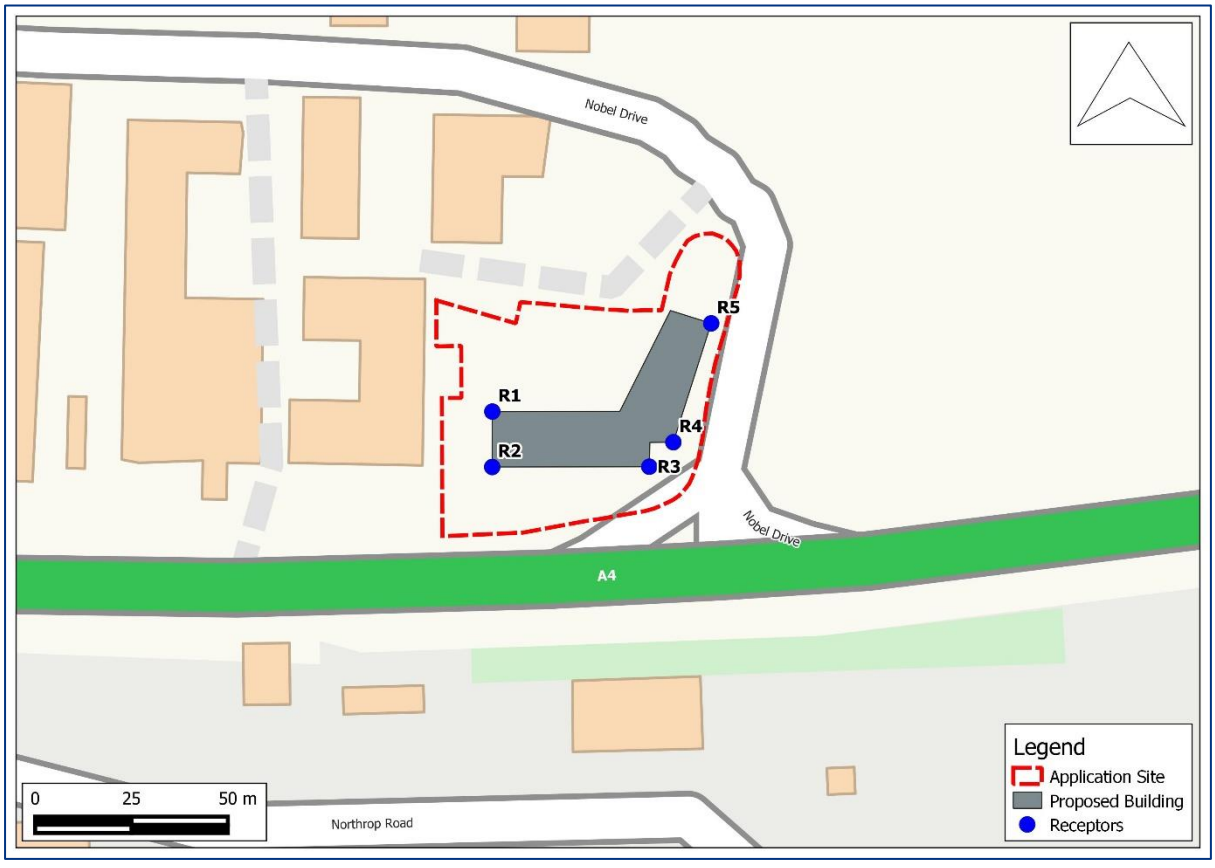

Figure 1: Location of Receptors
Contains Ordnance Survey data © Crown copyright and database right 2023

Uncertainty

3.3.4 There are many factors that contribute to uncertainty when predicting pollutant concentrations. The emission factors utilised in the air quality model are dependent

on traffic data, which have inherent uncertainties associated with them. There are also uncertainties associated with the model itself, which simplifies real world conditions into a series of algorithms. The model verification process, as described in **Appendix A2**, minimises the uncertainties; however, future year predictions use projected traffic data, emissions data, and background concentrations. The most recent emission factors and background data have been used in this assessment.

Assessment Criteria and Significance

3.3.5 There is no official guidance in the UK on how to describe air quality impacts, nor how to assess their significance. The approach suggested by Environmental Protection UK (EPUK) and the IAQM in guidance on Land-Use Planning & Development Control: Planning for Air Quality has been used for this assessment (EPUK and IAQM, 2017).

3.3.6 A predicted exceedance of an air quality assessment level (AQAL) will be considered as significant, unless provision is made to reduce the exposure by some other means. Predicted concentrations below the AQALs will be considered as insignificant.

3.3.7 The AQAL for NO_2 is 40µg/m^3, based on the annual mean objective, as shown in **Table 1**.

3.3.8 The AQAL for PM_{10} is an annual mean concentration of 32 µg/m^3 as measured data show that the 24-hour PM_{10} objective could be exceeded where annual mean concentrations are above 32 µg/m^3 (Mayor of London, 2019).

3.3.9 To show progress towards the 2028 interim target value, the AQAL for $PM_{2.5}$ has been derived using the 25µg/m^3 2020 annual mean objective and the 2028 interim target of an annual mean concentration of 12µg/m^3. Assuming a linear reduction, annual mean $PM_{2.5}$ concentrations would need to fall by 1.6µg/m^3/year in order to achieve the 2028 interim target value from the 2020 objective. Therefore, the 2026 AQAL for annual mean $PM_{2.5}$ concentrations is 15.3µg/m^3.

3.3.10 The determination of the significance of the effects includes elements of professional judgement and the professional experience of the consultant preparing the report is set out in **Appendix A3**.

4 Baseline Conditions

4.1. LAQM Review and Assessment

4.1.1 Hillingdon Council has declared an AQMA for exceedances of the annual mean NO_2 objective that covers 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.

4.1.2 In terms of PM_{10}, Hillingdon Council has concluded that there are no exceedances of the objectives; therefore, it is highly unlikely concentrations in the vicinity of the application site exceed the objectives.

4.2. Local Air Quality Monitoring

4.2.1 Hillingdon Council operates 12 automatic monitoring sites across the borough and an NO_2 diffusion tube monitoring network. Data from monitoring sites located within 2km of the application site, or used for model verification, are shown in **Table 3**, **Table 4** and **Table 5**, with the monitoring locations shown in **Figure 2**.

4.2.2 Measured annual mean roadside NO_2 concentrations ranged from 22 to 48.7 µg/m^3 between 2015 and 2021, with exceedances measured at the Oxford Avenue roadside automatic monitoring site in 2016 and at diffusion tube monitoring sites HILL10 and HILL25 in 2017 and sites HILL38, HILL39 and HILL41 in 2019. There has been an overall decreasing trend in annual mean NO_2 concentrations, and by 2021 the maximum measured concentration was 34 µg/m^3 at the Bath Road automatic monitoring site.

4.2.3 High annual mean NO_2 concentrations have been measured within Heathrow Airport close to the runway at automatic monitoring site LHR2.

4.2.4 The low concentrations measured in 2020 and 2021 are likely to be due to travel restrictions brought in to control the Covid-19 pandemic and would not be representative of the usual air quality.

4.2.5 Measurements across the UK have shown that there is a risk of exceedances of the 1-hour mean nitrogen dioxide objective where the annual mean concentration is above 60 µg/m^3; therefore, it is unlikely that the 1-hour mean objective has been exceeded at any of the diffusion tube monitoring sites. No exceedances of the 1-hour mean NO_2 limit value have been measured at the automatic monitoring sites.

4.2.6 Measured PM_{10} concentrations have remained well below the objectives at the automatic monitoring sites.

4.3. Background Concentrations

4.3.1 Estimated background concentrations at the application site are shown in **Table 6**. The background concentrations have been derived from data in the national maps published by Defra. The background concentrations are all well below the objectives.

Table 3: Measured Annual Mean NO_2 Concentrations [a]

Site ID	Location	Site Type [b]	Annual Mean (µg/m³)						
			2015	2016	2017	2018	2019	2020	2021
Automatic Monitor									
LHR2	London Heathrow	A	**44.2**	**47.0**	**48**	**43**	**42**	25	25
HI3	Oxford Avenue	R	34.5	**41.9**	35	35	33	22	25
LHRBR	Bath Road	R	-	-	-	-	-	-	34
Diffusion Tubes									
HILL09	25 Cranford Lane	R	35.6	35.5	39.4	37.2	36.4	23.8	24.5
HILL10	Brendan Close	R	37.2	34.2	**47.5**	39.6	39.7	25.2	26.4
HILL25	10 West End Lane	B	37	37.4	**45.6**	39.3	38.7	28.3	28.5
HILL38	Bath Road	R	-	-	-	-	**44.0**	33.0	28.9
HILL39	Pinglestone Close Bath Road	R	-	-	-	-	**45.7**	29.2	29.1
HILL41	Bath Road	R	-	-	-	-	**48.7**	31.8	32.9
Objective			**40**						

a Exceedances are shown in bold.
b R = Roadside, B = Background, A = Airport.

Table 4: Exceedance Statistics for the 1-hour Mean NO_2 Objective

Site ID	Location	Site Type [a]	Number of Hours > 200 µg/m³						
			2015	2016	2017	2018	2019	2020	2021
LHR2	London Heathrow	A	2	8	12	0	1	0	0
HI3	Oxford Avenue	R	2	0	1	0	0	0	0
LHRBR	Bath Road	R	-	-	-	-	-	-	0
Objective			**18**						

a R = Roadside, A = Airport.

Table 5: Summary of PM_{10} Monitoring Data

Site ID	Location	Site Type [a]	2015	2016	2017	2018	2019	2020	2021
Annual Mean (µg/m³)									
LHR2	London Heathrow	A	13	15	15	14	13	11	11
HI3	Oxford Avenue	R	21	20	19	24	24	23	20
LHRBR	Bath Road	R	-	-	-	-	-	-	14
Objective			**40**						
Number of Days > 50 µg/m³									
LHR2	London Heathrow	A	3	3	7	1	6	0	0
HI3	Oxford Avenue	R	3	11	4	2	4	6	0
LHRBR	Bath Road	R	-	-	-	-	-	-	0
Objective			**35**						

a R = Roadside, A = Airport.

Table 6: Estimated Annual Mean Background Concentrations (µg/m³)

Year	NOx	NO_2	PM_{10}	$PM_{2.5}$
2019	68.4	36.8	16.0	11.1
2026	60.9	33.8	14.7	10.1
Objective	**-**	**40**	**40**	**25**

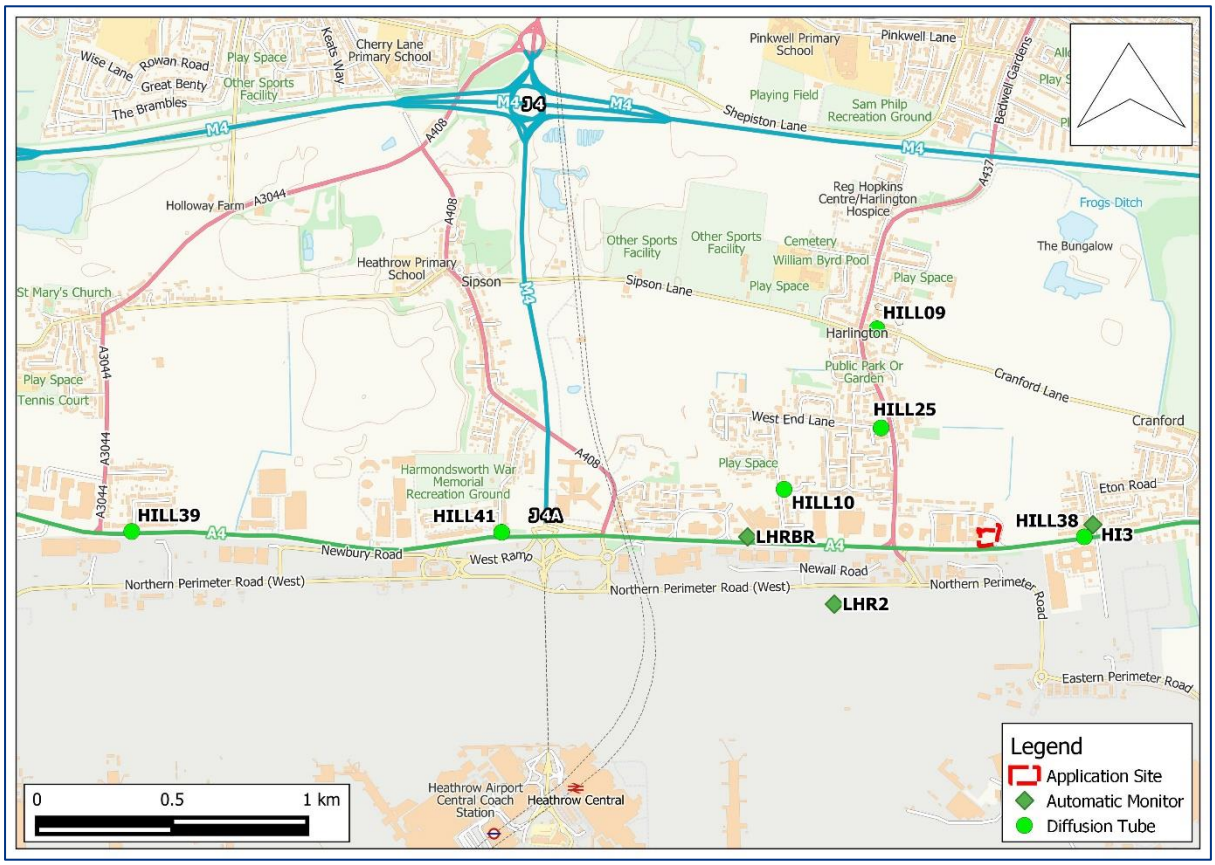

Figure 2: Air Quality Monitoring Sites
Contains Ordnance Survey data © Crown copyright and database right 2023

5 Impact Assessment

5.1. Construction Phase

5.1.1 Without mitigation, there is a risk that the construction phase of the development will lead to dust soiling and elevated concentrations of PM_{10}. These impacts may occur during demolition, earthworks and construction, as well as from track-out of dust onto the public highway, as vehicles leave the construction site.

Screening

5.1.2 There are dust sensitive human receptors within 50 m of the application site in all directions. There are also receptors within 50 m of the route used by construction vehicles on the public highway, up to 500 m from the site entrance. Therefore, further assessment of the construction phase impacts on human receptors is necessary and a risk assessment has been undertaken below. There are no dust sensitive ecological receptors within 50m, and this element will not be considered further.

Risk of Dust Impacts

Potential Dust Emission Magnitude

5.1.3 No demolition is required at the application site; therefore, the effects due to demolition during the construction phase are not considered further.

5.1.4 An area of around 1,025m^2 will be affected by earthworks. Data from the UK Soil Observatory have been used to determine that the soil at the site is a medium to light (silty) to heavy with a clay to clayey loam texture which may be prone to suspension when dry (NERC, 2023). Based on the example definitions in **Table A1** of **Appendix A1**, the dust emission class for earthworks is considered to be small.

5.1.5 The proposed development involves the construction of buildings with a volume of around 19,250m^3. Based on the example definitions in **Table A1** of **Appendix A1**, the dust emission class for construction is considered to be small.

5.1.6 The number of daily outward heavy-duty vehicle (HDV) movements from the application site during the construction phase is likely to be less than 10. Based on the example definitions in **Table A1** of **Appendix A1**, the dust emission class for trackout is considered to be small.

5.1.7 A summary of the likely dust emission magnitudes is shown in **Table 7**.

Table 7: Likely Dust Emission Magnitudes

Source	Dust Emission Magnitude
Demolition	n/a
Earthworks	Small
Construction	Small
Trackout	Small

Sensitivity of the Area

5.1.8 The sensitivity of the area depends on the specific sensitivities of local receptors, the proximity and number of receptors, local PM_{10} background concentrations and other site-specific factors, e.g., natural screening by trees.

Sensitivity of the Area to Dust Soiling

5.1.9 The Atlantico House residential block to the north of the application site is considered to be a high sensitivity receptors to dust soiling, whereas the office block to the west is a medium sensitivity receptor (see **Table A2** of **Appendix A1**). There are no dwellings within 20m of construction work, but likely to be between 10-100 dwellings within 50m; therefore, with reference to **Table A5** of **Appendix A1**, the area is considered to be of medium sensitivity to dust soiling from on-site works.

5.1.10 **Table 7** shows that the dust emission magnitude for trackout is small, therefore there is a risk of material being tracked up to 50 m from the site exit. There may be between 10-100 residential properties within 50 m of the edge of the road along which material could be tracked; therefore, with reference to **Table A5** of **Appendix A1**, the area is thus considered to be of high sensitivity to dust soiling from track-out.

Sensitivity of the Area to the Health Effects of PM_{10}

5.1.11 Residential properties are considered to be 'high' sensitivity receptors to the health effects of PM_{10} (see **Table A3** of **Appendix A1**). The 2019 annual mean PM_{10} concentration predicted at the façade of the proposed development furthest from Bath Road (R5), where concentrations will be similar to those at the existing residential receptors, is 18.7 $\mu g/m^3$. Therefore, with reference to **Table A6** of **Appendix A1**, the area is described to be of low sensitivity to the health effects of PM_{10} during on-site works and from track-out.

5.1.12 A summary of the sensitivity of the area to the effects of the construction works is shown in **Table 8**.

Table 8: Summary of the Area Sensitivity

Potential Effect	Sensitivity of the Area	
	On-site Works	**Trackout**
Dust Soiling	Medium	High
Health	Low	Low

Risk of Impact and Significance

5.1.13 The dust emission magnitudes in **Table 7** have been combined with the area sensitivities in **Table 8** and a risk category has been assigned to each construction activity using the matrix in **Table A8** of **Appendix A1**. The resultant risk categories, shown in **Table 9**, have then been used to determine the appropriate level of mitigation necessary for a residual effect that is likely to be 'not significant'.

Table 9: Summary of the Risk of Impacts Without Mitigation

Construction Activity	Dust Soiling	Health
Demolition	n/a	n/a
Earthworks	Low	Negligible
Construction	Low	Negligible
Trackout	Low	Negligible

5.2. Road Traffic Impacts

5.2.1 Predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ at the ground and first-floor façade of the proposed development are shown in **Table 10**. Annual mean concentrations are predicted to be below the AQALs at all the receptors. Therefore, air quality at the proposed development will be acceptable and the application site is suitable for residential use.

Table 10: Predicted Impacts on the Proposed Development in 2026

Receptor	Annual Mean (µg/m^3)					
	NO_2		PM_{10}		$PM_{2.5}$	
	1.5m	4.5m	1.5m	4.5m	1.5m	4.5m
R1	35.7	35.4	20.3	19.4	13.2	12.7
R2	36.5	35.9	22.9	20.9	14.6	13.5
R3	36.6	35.9	23.5	21.2	14.9	13.7
R4	36.1	35.6	22.1	20.5	14.1	13.3
R5	35.0	34.9	18.7	18.3	12.3	12.0
AQAL	**40**		**32**		**15.3**	

6 Mitigation

6.1. Construction Phase

6.1.1 The application site has been identified as a low-risk site overall due to dust soiling, and a negligible risk site for health effects, as set out in **Table 9**. The dust risk category has been used, along with the professional judgement of the consultant, to determine the appropriate level of mitigation at the site. The mitigation measures, taken from the London Plan SPG on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014), are described in **Appendix A4**.

6.1.2 The mitigation measures will be included in an Air Quality and Dust Management Plan (AQDMP), which can be secured by condition to the planning permission and provided prior to commencement of work on the site.

6.2. Operational Phase

6.2.1 The assessment has demonstrated that the scheme will not introduce receptors into an area where the objectives are exceeded, and no additional air quality mitigation will be required at the proposed development.

6.2.2 Cycle parking provision and electric vehicle charging points are proposed at the scheme in line with design standards and the London Plan. Mitigation measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation.

7 Residual Impacts

7.1. Construction Phase

7.1.1 The London Plan SPG is clear that, with appropriate mitigation in place, the residual effect will normally be 'not significant'. With the implementation of the mitigation measures set out in **Appendix A4**, the residual effects are judged to be insignificant.

7.1.2 During adverse weather conditions, or where there is an interruption to the water supply, there may be occasional, short-term dust annoyance; however, the likely scale and duration of these effects would not change the conclusion that the residual effects are insignificant.

7.2. Operational Phase

7.2.1 The residual impacts will be the same as those identified in **Section 5.2**.

8 Conclusions

8.1.1 The construction phase will have the potential to create dust. It will therefore be necessary to implement mitigation measures to minimise dust emission. With these measures in place, it is expected that any residual effects will be insignificant.

8.1.2 The impacts on air quality at the proposed development due to emissions from the local road network have been shown to be acceptable, with predicted concentrations being below the air quality objectives.

8.1.3 The operational air quality impacts on the development are judged to be insignificant. This professional judgement takes account of the conclusion that no residents of the proposed development will be exposed to exceedances of the objectives.

8.1.4 The proposed development will be air quality neutral with regard to transport and buildings emissions.

8.1.5 There should be no constraints to the development with regard to air quality, as the proposed development is consistent with the relevant parts of:

- The NPPF and PPG;
- The London Plan;
- Policy EM8 of the Hillingdon Local Plan Part 1 Strategic Policies; and
- Policy DMEI 14 of the Hillingdon Local Plan Part 2 Development Management Policies.

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10 Glossary

AQAL	Air quality assessment level
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
Defra	Department for Environment, Food and Rural Affairs
EPUK	Environmental Protection UK
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
IAQM	Institute of Air Quality Management
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LEZ	Low Emission Zone
µg/m^3	Microgrammes per cubic metre
MAQS	Mayor's Air Quality Strategy
NO	Nitric oxide
NO_2	Nitrogen dioxide
NOx	Nitrogen oxides (taken to be NO_2 + NO)
NPPF	National Planning Policy Framework
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
SPG	Supplementary Planning Guidance
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal

11 Appendices

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A1 Dust Risk Assessment Methodology

A1.1. Introduction

A1.1.1 The London Plan SPG on the Control of Dust and Emissions During Construction and Demolition (GLA, 2014) divides activities on construction sites into four types to reflect their different potential impacts:

- demolition;
- earthworks;
- construction; and
- trackout.

A1.1.2 A series of steps then consider the potential impact due to:

- the risk of health effects from an increase in exposure to PM_{10} and $PM_{2.5}$;
- annoyance due to the deposition of dust;
- harm to the natural environment.

A1.2. Step 1: Screen the Need for a Detailed Assessment

A1.2.1 An assessment is required where there is a human receptor within 50 m of the site boundary, and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), or where there is an ecological receptor within 50 m of the site boundary, and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

A1.2.2 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is negligible, and any effects will be not significant.

A1.3. Step 2: Assess the Risk of Dust Impacts

A1.3.1 A site is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emissions magnitude (Step 2A); and
- the sensitivity of the area to dust impacts (Step 2B).

A1.3.2 These two factors are combined at Step 2C to determine the risk of dust impacts from each type of construction activity, with no mitigation applied.

Step 2A: Potential Dust Emissions Magnitude

A1.3.3 The dust emission magnitude is classified as small, medium or large. Examples of how the potential dust emission magnitude for each activity can be defined are shown in **Table A1**.

Table A1: Examples of How the Dust Emission Magnitude can be Defined

Class	Example
Demolition	
Large	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >20 m above ground level.
Medium	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level.
Small	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months.
Earthworks	
Large	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes.
Medium	Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes.
Small	Total site area <2,500 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, total material moved <20,000 tonnes, earthworks during wetter months.
Construction	
Large	Total building volume >100,000 m^3, piling, on site concrete batching; sandblasting.
Medium	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching.
Small	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).
Trackout [a]	
Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m.
Medium	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m.
Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m.

a These numbers are for vehicles that leave the site after moving over unpaved ground.

Step 2B: Define the Sensitivity of the Area

A1.3.4 The sensitivity of the area takes account of:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of PM_{10}, the local background concentrations; and
- site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

A1.3.5 The specific sensitivities of different types of receptor to dust soiling and PM_{10} are shown in **Table A2**, **Table A3** and **Table A4**. Professional judgement should be used to identify where on the spectrum of sensitivity a receptor lies, taking account of specific circumstances, i.e. the first occupants of residential units on a phased development may be expected to be less sensitive to dust soiling.

A1.3.6 The sensitivity of the area is then determined from the specific sensitivities of the receptors using the matrices set out in **Table A5**, **Table A6** and **Table A7**. Professional judgement should be used to determine the final sensitivity of the area, taking account of:

- any history of dust generating activities in the area:
- the likelihood of concurrent dust generating activity on nearby sites;
- any pre-existing screening between source and receptors;
- any conclusions drawn from analysing local meteorological data which accurately represents the area; and if relevant, the season during which the 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 other known specific receptor sensitivities.

Step 2C: Define the Risk of Impacts

A1.3.7 The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts with no mitigation applied. The level of risk for each activity is determined using the matrix in **Table A8**.

A1.4. Determine Site Specific Mitigation

A1.4.1 The dust risk category determined at Step 2C has been used, along with the professional judgement of the consultant, to determine the appropriate level of mitigation at the site. The highly recommended and desirable mitigation measures set out in the London Plan SPG will form the basis of the mitigation.

A1.4.2 The mitigation measures will inform an Air Quality and Dust Management Plan (AQDMP), which will be submitted to the local authority for approval prior to works commencing on-site.

A1.4.3 The London Plan SPG is clear that the primary aim of the risk assessment is to identify site specific mitigation that, once adopted, will ensure that there will be no significant effect.

Table A2: Sensitivities of People to Dust Soiling

Class	Principles	Examples
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 a to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.	Dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms.
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 the appearance, aesthetics or value of their property could be diminished by soiling; or 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.	Parks and places of work.
Low	The enjoyment of amenity would not reasonably be expected; or property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.	Playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.

Table A3: Sensitivities of People to PM_{10}

Class	Principles	Examples
High	Locations where members of the public may be exposed for eight hours or more in a day.	Residential properties, hospitals, schools and residential care homes.
Medium	Locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day.	Office and shop workers, but will generally not include workers occupationally exposed to PM_{10}
Low	Locations where human exposure is transient.	Public footpaths, playing fields, parks and shopping streets.

Table A4: Sensitivities of Receptors to Ecological Effects

Class	Principles	Examples
High	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 particularly dust sensitive species.	Special Areas of Conservation (SAC) with dust sensitive features.
Medium	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or locations with a national designation where the features may be affected by dust deposition.	Sites of Special Scientific Interest (SSSI) with dust sensitive features.
Low	Locations with a local designation where the features may be affected by dust deposition.	Local Nature Reserves with dust sensitive features.

Table A5: Sensitivity of the Area to Dust Soiling Effects on People and Property [a]

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	**>100**	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	**>1**	Medium	Low	Low	Low
Low	**>1**	Low	Low	Low	Low

a For demolition, earthworks and construction, the distances are measured from the dust source, or the application site boundary. For trackout, the distances are measured from the side of the roads used by construction traffic. Without site-specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge or the road.

Table A6: Sensitivity of the Area to Human Health Effects [a]

Receptor Sensitivity	Annual Mean PM_{10}	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	**>32 µg/m³**	**>100**	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m³	**>100**	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m³	**>100**	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m³	**>100**	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	**>10**	High	Medium	Low	Low	Low
	-	**1-10**	Medium	Low	Low	Low	Low
Low	-	**>1**	Low	Low	Low	Low	Low

a For demolition, earthworks and construction, the distances are measured from the dust source, or the application site boundary. For trackout, the distances are measured from the side of the roads used by construction traffic. Without site-specific mitigation, trackout may occur from roads up to 500 m from large

sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge or the road.

Table A7: Sensitivity of the Area to Ecological Effects [a]

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

a For demolition, earthworks and construction, the distances are measured from the dust source, or the application site boundary. For trackout, the distances are measured from the side of the roads used by construction traffic. Without site-specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge or the road.

Table A8: Defining the Risk of Dust Impacts

Sensitivity of the Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Earthworks			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

A2 Modelling Methodology

A2.1. Model Inputs

Traffic Data

A2.1.1 The AADT flows, vehicle fleet composition data and vehicle speeds have been derived from the London Atmospheric Emissions Inventory (LAEI) 2019 (GLA, 2021b). The traffic data have been factored forward to the assessment year using the TEMPro System v8.0 (DfT, 2023a). The traffic data are shown in **Table A9** and the modelled road network is shown in **Figure 3**. Diurnal flow profiles for the traffic have been derived from the national diurnal profiles published by the DfT (DfT, 2023b).

Table A9: Summary of Traffic Data used in the Assessment

LAEI TOID	AADT		Fleet Composition (%)							Speed (km/h)
	2019	2026	Car	Taxi	LGV	Rigid HGV	Artic HGV	Bus and Coach	MCycle	
30201951	10,053	10,776	76.0	1.4	9.4	2.2	0.9	8.5	1.7	31.9
30201952	10,913	11,697	79.0	3.5	6.7	3.5	1.4	4.2	1.7	23.2
30127649	5,700	6,110	75.2	0.4	14.6	0.7	0.3	7.1	1.7	20.8
30449070	12,029	12,894	79.4	0.7	10.6	2.6	1.0	3.9	1.8	57.2
30095486	10,517	11,273	76.7	0.6	7.4	4.4	1.7	7.5	1.7	17.7
30095488	10,495	11,249	76.8	0.6	7.4	4.4	1.7	7.4	1.7	53.8
30398744	2,274	2,437	74.2	0.1	15.1	0.3	0.1	8.6	1.7	27.4
30201953	10,058	10,781	76.0	1.4	9.3	2.2	0.9	8.5	1.7	31.9
30201922	6,277	6,728	75.1	0.5	11.2	3.3	1.3	7.0	1.7	49.7
30201923	6,515	6,983	78.9	0.8	9.4	2.2	0.8	6.1	1.7	64.8
30127659	10,913	11,697	79.0	3.5	6.7	3.5	1.4	4.2	1.7	23.2
30201950	20,969	22,476	77.6	2.5	8.0	2.9	1.1	6.2	1.7	27.5
30309812	12,792	13,712	77.0	0.7	10.3	2.7	1.0	6.6	1.7	57.2
30127642	9,829	10,536	75.8	0.8	12.5	3.4	1.3	4.5	1.7	15.9
30398746	3,426	3,672	75.9	0.6	14.3	0.9	0.4	6.2	1.7	14.3
30602663	2,125	2,278	76.7	0.1	15.6	0.3	0.1	5.6	1.7	27.4
30317406	10,500	11,255	76.7	0.6	7.4	4.4	1.7	7.4	1.7	53.8
30127641	15,522	16,638	76.2	0.3	11.3	4.7	1.8	4.0	1.7	80.7
30095487	12,998	13,932	78.6	1.5	7.1	3.4	1.3	6.4	1.7	56.8
30398779	10,052	10,775	76.0	1.4	9.4	2.2	0.9	8.4	1.7	31.9
30403821	22,358	23,965	79.7	1.1	7.4	3.9	1.5	4.5	1.7	27.3
30803719	10,485	11,239	76.8	0.6	7.4	4.5	1.7	7.4	1.7	53.8
30398780	10,052	10,775	76.0	1.4	9.4	2.2	0.9	8.4	1.7	31.9
30131637	13,008	13,943	78.6	1.5	7.1	3.4	1.3	6.4	1.7	37
30602639	9,674	10,369	76.4	0.8	12.6	3.5	1.3	3.7	1.7	15.9
30131646	10,485	11,239	76.8	0.6	7.4	4.5	1.7	7.4	1.7	53.8
30094317	12,782	13,701	77.0	0.7	10.3	2.7	1.0	6.5	1.7	57.2

LAEI TOID	AADT		Fleet Composition (%)							Speed (km/h)
	2019	2026	Car	Taxi	LGV	Rigid HGV	Artic HGV	Bus and Coach	MCycle	
30317390	13,008	13,943	78.6	1.5	7.1	3.4	1.3	6.4	1.7	37
30131645	12,968	13,900	78.7	1.5	7.1	3.4	1.3	6.3	1.7	56.8
30127665	6,111	6,550	86.6	5.0	5.6	0.5	0.1	1.1	1.2	26.5
30309865	35,632	38,193	82.8	4.5	5.6	4.7	0.9	0.4	1.2	69.4
30094327	901	966	86.3	0.1	2.0	0.0	0.0	10.1	1.4	23.7
31191418	901	966	86.3	0.1	2.0	0.0	0.0	10.1	1.4	27.4
30201956	6,111	6,550	86.6	5.0	5.6	0.5	0.1	1.1	1.2	26.5
30472317	35,632	38,193	82.8	4.5	5.6	4.7	0.9	0.4	1.2	69.4
30309852	813	871	91.1	0.1	2.2	0.0	0.0	4.9	1.6	27.4
30209611	14,699	15,756	86.6	0.8	7.7	0.2	0.0	3.6	1.2	67.2
30209612	11,480	12,305	84.5	2.4	7.8	0.1	0.0	3.9	1.2	67.5
30131639	14,696	15,752	86.6	0.8	7.7	0.2	0.0	3.6	1.2	67.2
30209613	26,178	28,060	85.7	1.5	7.7	0.2	0.0	3.7	1.2	32.3
30309846	6,111	6,550	86.6	5.0	5.6	0.5	0.1	1.1	1.2	20.6
30309871	35,632	38,193	82.8	4.5	5.6	4.7	0.9	0.4	1.2	69.4
30131640	11,481	12,306	84.5	2.4	7.8	0.1	0.0	3.9	1.2	67.5
30309877	5,304	5,685	85.6	1.3	5.2	4.1	0.8	1.9	1.2	5
31211006	901	966	86.3	0.1	2.0	0.0	0.0	10.1	1.4	27.4
30398784	67	72	0.0	0.0	0.0	0.0	0.0	98.5	1.5	25.4
30451705	25,501	27,334	86.8	1.5	7.8	0.2	0.0	2.5	1.2	67.3
30201974	31,043	33,275	82.6	4.8	5.7	1.4	0.7	4.1	0.8	82.8
30201975	32,378	34,705	82.8	5.7	3.1	1.7	0.8	5.0	0.8	76

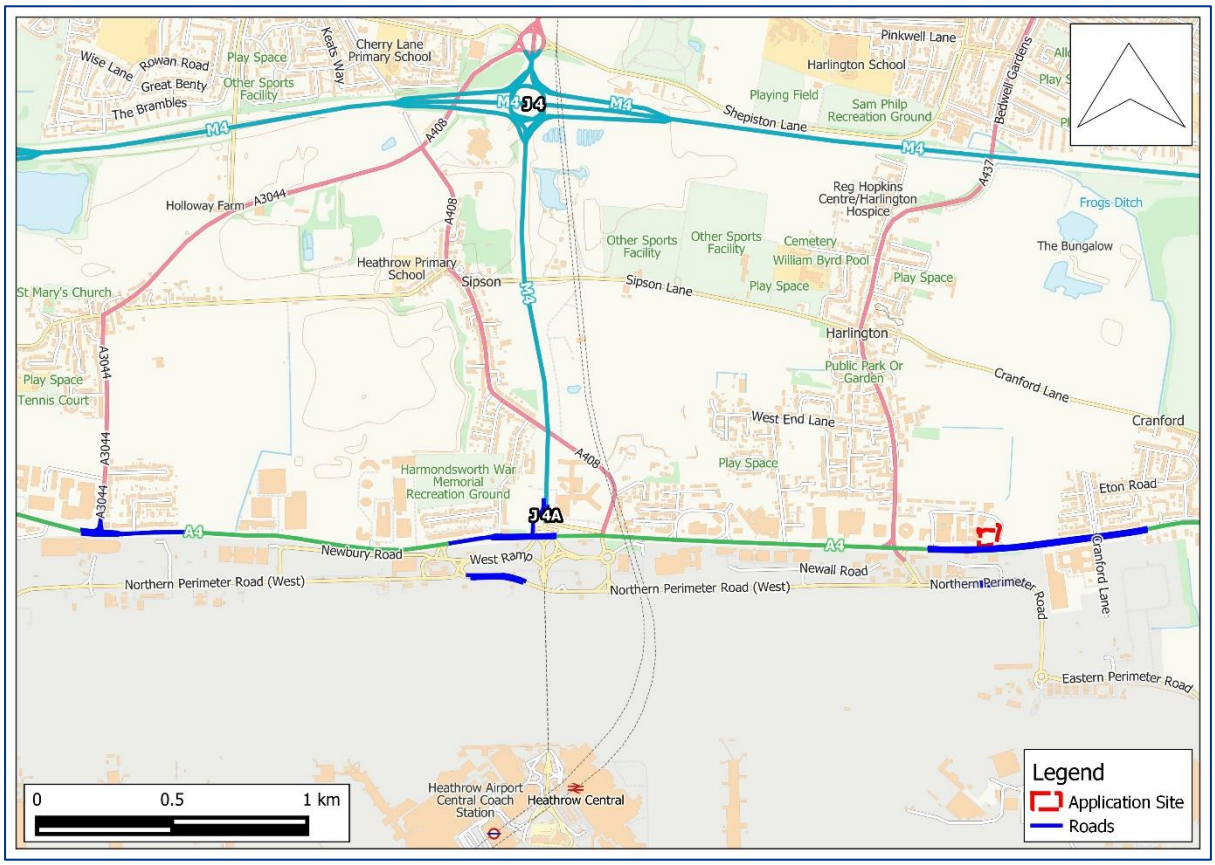

Figure 3: Modelled Roads
Contains Ordnance Survey data © Crown copyright and database right 2023

Emissions

A2.1.2 Emissions have been calculated using the most recent version of the Emissions Factor Toolkit (EFT) v11.0 (Defra, 2023). The traffic data have been entered into the EFT in order to calculate a combined emission rate for each of the road links in the modelled network.

Meteorological Data

A2.1.3 The model has been run using the full year of 2019 meteorological data taken from the monitoring station located at Heathrow Airport, which is considered suitable for the area.

A2.2. Background Concentrations

A2.2.1 Background concentrations have been assumed to be the same as those published by Defra (Defra, 2023). These cover the whole country on a 1 km by 1 km grid and are published for each year from 2018 to 2030. The current maps have been verified against measurements undertaken during 2018.

A2.3. Verification

A2.3.1 The verification process seeks to minimise uncertainties associated with the air quality model by comparing the model output with locally measured concentrations.

A2.3.2 The model has been verified against 2019 data from the HI3 automatic monitoring site and the HILL38, HILL39 and HILL41 diffusion tube monitoring sites, as shown in **Table 3** and **Figure 2**. The HI3 automatic monitoring site was excluded from the NO_2 verification calculation as the Defra predicted background annual mean NO_2 concentration was higher than the measured concentration. 2020 and 2021 monitoring data was not used for the model verification. Travel restrictions to control the Covid-19 pandemic resulted in low measured concentrations and the use of 2020 or 2021 data for verification would likely result in an underprediction of future concentrations. The verification methodology is described below.

NO_2

A2.3.3 The model output of road-NOx has been compared with the 'measured' road-NOx, calculated from the measured annual mean NO_2 concentrations and the background concentrations using the NOx from NO_2 calculator v8.1 published by Defra (Defra, 2023).

A2.3.4 The slope of the best-fit line between the 'measured' road-NOx contribution and the model derived road-NOx contribution, forced through zero, has been used to determine the adjustment factor (**Figure 4**). The adjustment factor of 1.2 has been applied to the modelled road-NOx concentration for each receptor to provide adjusted modelled road-NOx concentrations. The NOx to NO_2 calculator has then been used to determine total NO_2 concentrations from the adjusted modelled road-NOx concentrations and the background NO_2 concentrations.

A2.3.5 A comparison of the final adjusted modelled total NO_2 at each monitoring site to the measured total NO_2 shows close agreement (**Figure 5**).

A2.3.6 The results imply that the model has under-predicted the road-NOx contribution. This is a common experience with this and most other models. An evaluation of the model performance using statistical methods is shown in **Table A10**.

PM_{10} and $PM_{2.5}$

A2.3.7 The measured road-PM_{10} and modelled road-PM_{10} concentrations at the HI3 automatic monitoring site have been compared to provide a factor for PM. The data used to calculate the adjustment factor are provided below:

- Measured PM_{10}: 24 µg/m^3
- 'Measured' road-PM_{10} (measured – background at monitor): 24 – 16.0 = 8.0 µg/m^3
- Modelled road-PM_{10} = 0.9 µg/m^3
- Road-PM adjustment factor: 8.0/0.9 = **9.1**

A2.4. Model Post-processing

NO_2

A2.4.1 The NOx to NO_2 calculator v8.1 published by Defra has been used to convert the modelled, verified road-NOx output for each receptor to road-NO_2. The background NO_2 concentrations have then been added to the predicted road-NO_2 concentrations to give the final predicted concentrations.

PM_{10} and $PM_{2.5}$

A2.4.2 The verified road-PM outputs need no further processing and have been added to the background concentrations to give the final predicted concentrations.

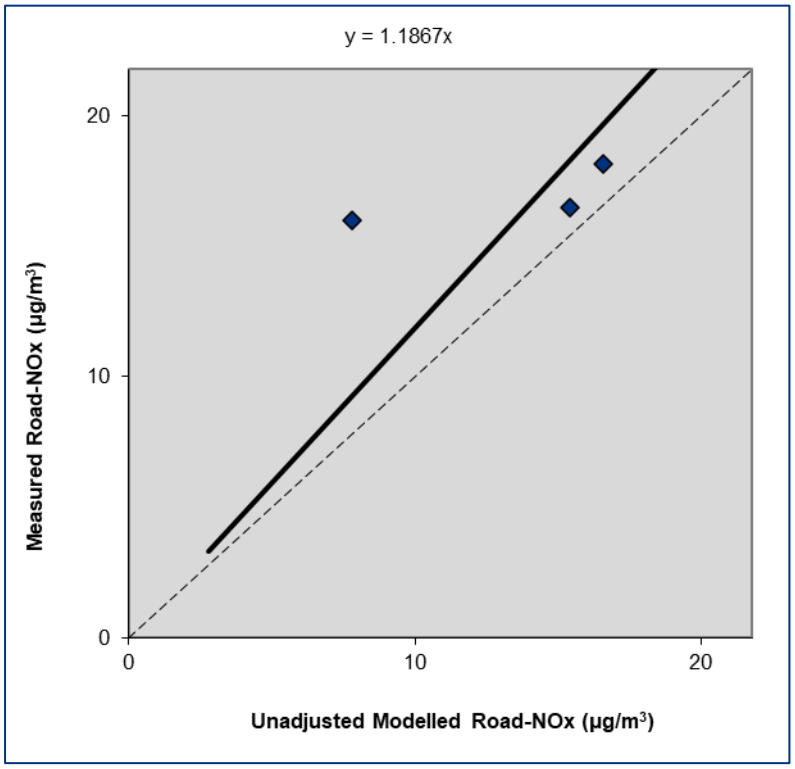

Figure 4: Comparison of Measured Road NOx to Unadjusted Modelled Road NOx Concentrations.

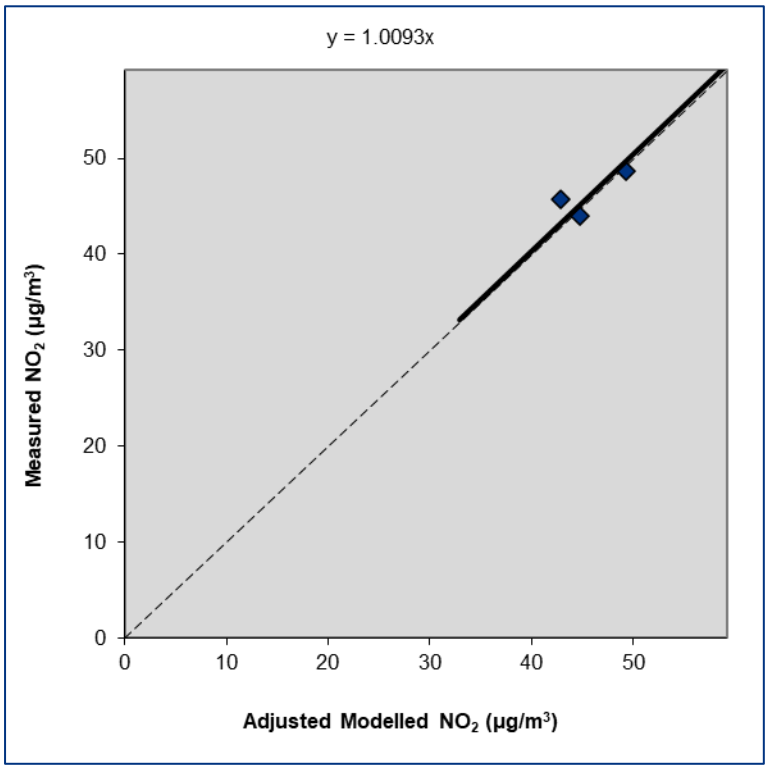

Figure 5: Comparison of Measured Total NO_2 to Primary Adjusted Modelled Total NO_2 Concentrations.

Table A10: Evaluation of Model Performance

Statistical Parameter	Description	Values		
		Before verification (Figure 4)	After verification (Figure 5)	Ideal
Correlation coefficient	Linear relationship between predicted and observed data. Less useful for small datasets as single high/low values can have a large effect.	0.76	0.80	1
Fractional bias	Identifies systematic tendency to over/under predict (negative = over-predict, positive = under-predict).	0.24	0.01	0.0
Root mean square error (RMSE)	Average error of the model (µg/m^3). Ideally within 10% of the annual mean NO_2 objective, i.e., 4 µg/m^3; however, within 25% acceptable, i.e., 10 µg/m^3.	4.88	1.73	0.0

A3 Professional Experience

Bob Thomas, BSc (Hons) PgDip MSc MIEnvSc MIAQM CSci

Bob Thomas is a Director at AQA, with over fifteen years' experience in the field of air quality management and assessment. He has carried out air quality assessments for a wide range of developments, including residential, commercial, industrial, minerals and waste developments. He has been responsible for air quality projects that include ambient air quality monitoring of nitrogen dioxide, dust and PM_{10}, the assessment of nuisance odours and dust, and the preparation of Review and Assessment reports for local authorities. He has extensive dispersion modelling experience for road traffic, energy centre and industrial sources, and has completed many stand-alone reports and chapters for inclusion within an Environmental Statement. Bob has worked with a variety of clients to provide expert air quality services and advice, including local authorities, planners, developers, architects and process operators, and has provided expert witness services at public inquiry. He is a Chartered Scientist, a Member of the Institute of Air Quality Management and a Member of the Institution of Environmental Sciences.

A full CV for Bob Thomas is available at http://aqassessments.co.uk/about

A4 Construction Mitigation

A4.1.1 The following is a set of measures that should be incorporated into the Air Quality and Dust Management Plan for the works:

A4.2. Site Management

- Display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary;
- display the head or regional office contact information;
- record and respond to all dust and air quality pollutant emissions complaints;
- make a complaints log available to the local authority when asked;
- carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the local authority when asked;
- increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions and dust are being carried out, and during prolonged dry or windy conditions; and
- record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation in the log book.

A4.3. Preparing and Maintaining the Site

- Plan the site layout: machinery and dust-causing activities should be located away from receptors;
- erect solid screens or barriers around dust activities or the site boundary that are, at least, as high as any stockpiles on site;
- fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- avoid site runoff of water or mud;
- keep site fencing, barriers and scaffolding clean using wet methods;
- remove materials from site as soon as possible; and
- cover, seed or fence stockpiles to prevent wind whipping.

A4.4. Operating Vehicle/Machinery and Sustainable Travel

- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone;
- ensure all non-road mobile machinery (NRMM) comply with the standards set within the London Plan SPG on The Control of Dust and Emissions During Construction and Demolition;
- ensure all vehicles switch off their engines when stationary – no idling vehicles;
- avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where possible;
- impose and signpost a maximum-speed-limit of 10 mph on surfaced 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); and
- implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

A4.5. 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;
- ensure an adequate water supply on the site for effective dust/particulate matter mitigation (using recycled water where possible);
- use enclosed chutes, conveyors and covered skips; and
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

A4.6. Waste Management

- Reuse and recycle waste to reduce dust from waste materials; and
- No bonfires and burning of waste materials.

A4.7. Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible; and
- 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.

A4.8. Measures Specific to Trackout

- Regularly use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site;
- avoid dry sweeping of large areas;
- ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport; and
- implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).