

# **AIR QUALITY ASSESSMENT**

Charville Children's Homes, Charville Lane, Hayes

Produced by XCO<sub>2</sub> for London Borough of Hillingdon

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### EXECUTIVE SUMMARY

An assessment has been undertaken to quantify the potential impact on local air quality associated with the construction and operation of the proposed development on Charville Lane, in the London Borough of Hillingdon.

Traffic associated with the proposed development will not significantly affect local air quality.

During the construction phase, the site has the potential to generate dust nuisance beyond the application boundary. However, through the implementation of a Dust Management Plan, the impacts will be effectively minimised and are unlikely to be significant.

Dispersion modelling of emissions from traffic on the local road network has been undertaken to ascertain the likely level of exposure of future users of the proposed development to elevated nitrogen dioxide and particulate concentrations. The assessment indicates that NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations at the proposed development will be well within the relevant long and short-term air quality standards (exposure category APEC-A).

The proposed development is air quality neutral with respect to both transport and building-related emissions.

Based on the results of the assessment and with the implementation of the recommended construction and operational phase mitigation measures, it is considered that redevelopment of the site would not cause a significant impact on local air quality.

### INTRODUCTION

This report presents an assessment of the potential impact on local air quality of the construction and operation of a proposed Children's Home on Charville Lane, in the London Borough of Hillingdon (LBH). The site location is presented in Figure 1.

The proposal is for redevelopment of an existing Children's Home to provide new build residential institution development (use class C2), consisting of 3 No. 2 storey buildings, providing accommodation for 12 young people, with associated staff facilities, plant, access, parking, amenity gardens, soft landscaping and a Multi Uses Games Area. The proposed site plan is presented in Figure 2.

The site falls within the LBH Air Quality Management Area (AQMA) which covers approximately two-thirds of the borough (south of the A40) and was designated in 2003 due to measured exceedances of the long-term air quality objective for nitrogen dioxide (NO<sub>2</sub>). The primary source of NO<sub>2</sub> in the borough is road traffic.

An assessment has been undertaken to determine the potential impact on local air quality during both the construction and operational phases of the development, with recommendations made for mitigation where appropriate.

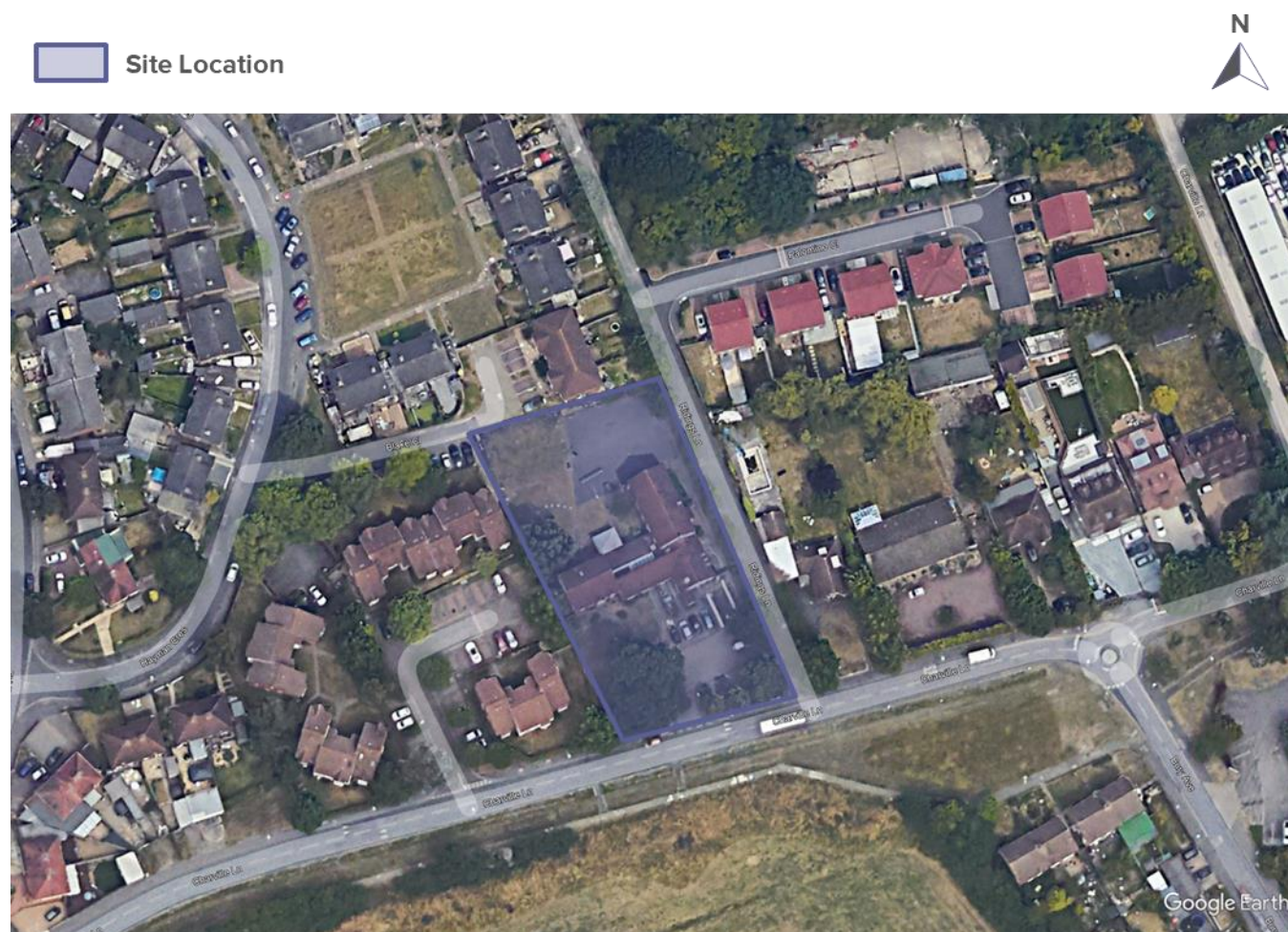


Figure 1: Site Location

## AIR QUALITY ASSESSMENT



Figure 2: Proposed Site Plan



### POLICY CONTEXT

An overview of the relevant policy drivers for the assessment is provided in the following section.

### NATIONAL LEGISLATION

#### ***THE AIR QUALITY STRATEGY FOR ENGLAND, SCOTLAND, WALES AND NORTHERN IRELAND***

The Air Quality Strategy for England, Wales and Northern Ireland<sup>1</sup> was published in 2007 and sets out policy targets (objectives) for sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), benzene (C<sub>6</sub>H<sub>6</sub>), carbon monoxide (CO), lead (Pb), particulate matter (PM<sub>10</sub>, PM<sub>2.5</sub>), 1,3-butadiene (C<sub>4</sub>H<sub>6</sub>) and polyaromatic hydrocarbons (PAH). The Standards are concentrations measured over a specified time period that are considered acceptable in terms of the effect on health and the environment. The Objectives are the target date on which exceedance of a Standard must not exceed a specified number.

In January 2019, the UK government published a Clean Air Strategy<sup>2</sup>, which outlines measures to reduce emissions from a wide range of sources including transport, farming and industry. The Strategy proposes new local powers to implement Clean Air Zones in problem areas, backed up by clear enforcement mechanisms.

In the context of the proposed development, the primary pollutants of concern are nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>).

The assessment of potential air quality impacts associated with these pollutants has been evaluated with respect to the current air quality standards and objectives for the protection of human health, as set out in the Air Quality Regulations 2010<sup>3</sup> and The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020<sup>4</sup>.

It is widely accepted that there is no safe level for PM<sub>2.5</sub> and on this basis The Environment Act (2021) required the Air Quality Regulations to be updated to include a more stringent long-term air quality target by the 31<sup>st</sup> of October 2022. On 31<sup>st</sup> January 2023, the Government published an Environmental Improvement Plan<sup>5</sup>, which includes an Annual Mean Concentration Target (AMCT) of 10 µg/m<sup>3</sup>, to be achieved by the end of 2040. The Plan also includes an interim target of 12 µg/m<sup>3</sup>, to be achieved by the end of January 2028. The 10 µg/m<sup>3</sup> target for PM<sub>2.5</sub> has been adopted into UK law via the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023<sup>6</sup>.

The Air Quality Standards (AQS) and Objectives for NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> that are applicable in England, are presented in Table 1.

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<sup>1</sup> The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Department for Environment, Food and Rural Affairs in partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland, July 2007.

<sup>2</sup> Clean Air Strategy 2019, Defra, January 2019

<sup>3</sup> The Air Quality Standards Regulations 2010, Statutory Instrument 2010 No. 1001

<sup>4</sup> The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020, Statutory Instrument 2020 No. 000

<sup>5</sup> Environmental Improvement Plan 2023, Defra, January 2023

<sup>6</sup> Environmental Targets (Fine Particulate Matter) (England) Regulations 2023, Statutory Instrument 2023 No. 96



## AIR QUALITY ASSESSMENT

Table 1: National Air Quality Standards and Objectives

Pollutant	Averaging Period	Standard	Objective
NO <sub>2</sub>	1-hour	200 µg/m <sup>3</sup> , not to be exceeded more than 18 times per calendar year (a)	31 December 2005
	Annual	40 µg/m <sup>3</sup>	
PM <sub>10</sub>	24-hour	50 µg/m <sup>3</sup> , not to be exceeded more than 35 times per calendar year (b)	31 December 2004
	Annual	40 µg/m <sup>3</sup>	
PM <sub>2.5</sub>	Annual	20 µg/m <sup>3</sup>	2020
	Annual	12 µg/m <sup>3</sup> (interim target)	31 January 2028
	Annual	10 µg/m <sup>3</sup> (target)	31 December 2040
(a) Equivalent to the 99.8 <sup>th</sup> percentile of 1-hour means.			
(b) Equivalent to the 90.4 <sup>th</sup> percentile of 24-hour means.			

### LOCAL AIR QUALITY MANAGEMENT

The framework for Local Air Quality Management (LAQM) in the UK was introduced by the Environment Act 1995<sup>7</sup>. Local Authorities are required to regularly review and assess air quality to establish whether there are any locations where pollutant concentrations exceed the relevant air quality objectives or EU limit values. Where an exceedance is identified, the local authority is obliged to declare an Air Quality Management Area (AQMA) and prepare an Action Plan setting out measures to improve air quality and achieve compliance with the objective(s).

### THE NATIONAL PLANNING POLICY FRAMEWORK

The National Planning Policy Framework NPPF<sup>8</sup> sets out the Government's policies for planning and how these should be applied. With regard to air quality, the NPPF 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 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*".

<sup>7</sup> Part IV of the Environment Act 1995

<sup>8</sup> Department for Communities and Local Government, National Planning Policy Framework, July 2021

## REGIONAL POLICY

### ***THE LONDON PLAN***

Policy SI1 (Improving Air Quality) of the London Plan<sup>9</sup> sets out the Greater London Authority's (GLA) commitment to improving air quality and public health and states:

*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, which do not demonstrate that design measures have been used to minimise exposure should be refused.*

*C. Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating:*

*a) How proposals have considered ways to maximise benefits to local air quality, and 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.*

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<sup>9</sup> The London Plan 2021, The Spatial Development Strategy for Greater London, Greater London Authority, March 2021.

### **LONDON ENVIRONMENT STRATEGY (2018)**

Chapter 4 of the London Environment Strategy<sup>10</sup> outlines the Mayor's commitment to improving air quality in London. The strategy aims plan to significantly reduce NO<sub>2</sub> and particulate (PM<sub>10</sub>, PM<sub>2.5</sub> and black carbon) concentrations through a number of key objectives and policies:

*Objective 4.1 support and empower London and its communities, particularly the most disadvantaged and those in priority locations, to reduce their exposure to poor air quality.*

- Policy 4.1.1 Make sure that London and its communities, particularly the most disadvantaged and those in priority locations, are empowered to reduce their exposure to poor air quality.
- Policy 4.1.2 Improve the understanding of air quality health impacts to better target policies and action.

*Objective 4.2 achieve legal compliance with UK and EU limits as soon as possible, including by mobilising action from London boroughs, government and other partners.*

- Policy 4.2.1 Reduce emissions from London's road transport network by phasing out fossil fuelled vehicles, prioritising action on diesel, and enabling Londoners to switch to more sustainable forms of transport.
- Policy 4.2.2 Reduce emissions from non-road transport sources, including by phasing out fossil fuels.
- Policy 4.2.3 Reduce emissions from non-transport sources, including by phasing out fossil fuels.
- Policy 4.2.4 The Mayor will work with the government, the London boroughs and other partners to accelerate the achievement of legal limits in Greater London and improve air quality.
- Policy 4.2.5 The Mayor will work with other cities (here and internationally), global city and industry networks to share best practice, lead action and support evidence based steps to improve air quality.

*Objective 4.3 establish and achieve new, tighter air quality targets for a cleaner London by transitioning to a zero emission London by 2050, meeting World Health Organization health-based guidelines for air quality.*

- Policy 4.3.1 The Mayor will establish new targets for PM<sub>2.5</sub> and other pollutants where needed. The Mayor will seek to meet these targets as soon as possible, working with government and other partners.
- Policy 4.3.2 The Mayor will encourage the take up of ultra-low and zero emission technologies to make sure London's entire transport system is zero emission by 2050 to further reduce levels of pollution and achieve WHO air quality guidelines.
- Policy 4.3.3 Phase out the use of fossil fuels to heat, cool and maintain London's buildings, homes and urban spaces, and reduce the impact of building emissions on air quality.
- Policy 4.3.4 Work to reduce exposure to indoor air pollutants in the home, schools, workplace and other enclosed spaces.

With regard to Policy 4.3.1, the Mayor of London has set a target for compliance with the now superseded WHO guideline value<sup>11</sup> for PM<sub>2.5</sub> of 10 µg/m<sup>3</sup> by 2030. However, recent modelling<sup>12</sup> suggests that due to the transboundary nature of PM<sub>2.5</sub>, compliance in London is unlikely to be achieved without additional measures at national, European and international level.

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<sup>10</sup> London Environment Strategy, The Mayor of London, May 2018

<sup>11</sup> Air Quality Guidelines Global Update 2005, World Health Organisation

<sup>12</sup> PM<sub>2.5</sub> in London: Roadmap to meeting World Health Organization guidelines by 2030, GLA, October 2019

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## ***GREATER LONDON AUTHORITY AIR QUALITY FOCUS AREAS***

Air Quality Focus Areas have been identified by the Greater London Authority (GLA) where there is high human exposure in locations where the annual mean air quality objective for NO<sub>2</sub> is exceeded. The purpose of the Focus Areas is to allow local authorities to target actions to improve air quality where it is most needed and to inform the planning process with regard to the air quality impact of new developments.

The proposed development is not located within an AQFA.

## **LOCAL POLICY**

### ***HILLINGDON AIR QUALITY ACTION PLAN***

LBH's Air Quality Action Plan<sup>13</sup> outlines the Council's commitment to improving air quality in the Borough, including prioritising the following actions:

- Leading by example by reducing emissions from the Council's vehicle fleet and buildings.
- Reducing public exposure and improving air quality around schools.
- Implementation of improvement strategies in the AQ Focus Areas.
- Ensure the integration of the 'Health Streets' approach in relevant council work programmes.
- Ensure the planning system supports the achievement of air quality improvements in relation to new developments.
- Raise awareness via targeted campaigns.

### ***HILLINGDON LOCAL PLAN***

The Hillingdon Local Plan: Part 2<sup>14</sup> sets out strategic objectives and policies for development in the Borough. Policy DMEI 14 relates specifically to air quality and states that:

- 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 continued improvement of air quality, especially within the Air Quality Management Area.

In addition, policy DMEI 1 (Living Walls and Roofs and on-site Vegetation) states that: 'Major development in Air Quality Management Areas must provide onsite provision of living roofs and/or walls. A suitable offsite contribution may be required where onsite provision is not appropriate'.

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<sup>13</sup> Air Quality Action Plan 2019 - 2024, London Borough of Hillingdon, May 2019

<sup>14</sup> London Borough of Hillingdon Local Plan: Part 2 Development Management Policies – Adopted Version 2020

### METHODOLOGY

This section outlines the assessment methodology, taking into account all relevant national and local policies and technical guidance relating to air quality.

### CONSTRUCTION DUST

The potential impact of dust generated during site enabling, earthworks and construction works at the proposed development has been assessed in accordance with the Mayor of London's Supplementary Planning Guidance (SPG) for the control of dust and emissions during construction and demolition<sup>15</sup>, which is closely aligned with the Institute of Air Quality Management (IAQM) construction dust guidance<sup>16</sup>. A full description of the construction dust methodology is provided in Appendix A.

A detailed assessment of dust impacts is required where there are human receptors within:

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

For ecological impacts, a detailed assessment is required if there are dust sensitive habitat sites within

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

The IAQM/ SPG methodology allows the potential risk of dust soiling and human health effects to be determined, based primarily on the sensitivity of nearby receptors (human and ecological) and the anticipated magnitude of the dust emission due to:

- Demolition;
- Earthworks;
- Construction; and
- Track-out (re-suspended dust from vehicle movements).

The assessment of dust risk is also based on professional judgement taking into account factors such as the prevailing wind direction, the proposed construction phasing, the likely duration of dust raising activities, local topography and existing air quality.

A range of best practice mitigation measures are provided within the guidance, which are dependent on the level of dust risk attributed to the site. It is recommended that these measures are incorporated into a Dust Management Plan (DMP) of the Construction Environmental Management Plan (CEMP) for the proposed development.

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

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<sup>15</sup> The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance, Greater London Authority, July 2014

<sup>16</sup> Guidance on the assessment of dust from demolition and construction, IAQM, v1.1, June 2016

### CONSTRUCTION TRAFFIC

The Environmental Protection UK (EPUK)/ IAQM planning guidance<sup>17</sup>, states that for developments within or near an AQMA, a detailed assessment of traffic-related impacts is required where:

- There is a change in the annual average daily traffic (AADT) flow of light goods vehicles (LGV) of more than 100 vehicles; and/or
- There is a change in the AADT flow of heavy goods vehicles (HGV) of more than 25 vehicles; and/or
- There is a change in the road re-alignment by more than 5m; and/or
- A new junction is introduced, which will significantly alter vehicle speeds.

In the context of these screening criteria, LGV refers to vehicles below 3.5 tonnes and HGV refers to vehicles above 3.5 tonnes.

At the time of writing, the construction phase trip generation for the proposed development is not available. However, it is unlikely that the temporary increase in traffic will exceed the above thresholds. The impact of the construction traffic on local air quality is therefore expected to be negligible.

All non-road mobile machinery (NRMM) will comply with the emission standards specified in the Mayor of London's Control of Dust and Emissions during Construction and Demolition SPG.

The impact of vehicular emissions of NO<sub>2</sub> and PM<sub>10</sub> from construction traffic and on-site machinery on local air quality is anticipated to be negligible.

### OPERATIONAL TRAFFIC

The proposed development is expected to generate 39 vehicle movements per day (AADT) during the operational phase, well below the IAQM/EPUK screening criteria for a detailed assessment. However, the existing site (a 13 bed children's home) is likely to generate a similar number of traffic movements per day and therefore there will be no significant change in flow arising from the re-development of the site. The impact of the operational traffic on local air quality is therefore expected to be negligible.

### EXPOSURE ASSESSMENT

Detailed dispersion modelling of emissions from traffic on the local road network has been undertaken using the ADMS-Roads dispersion model, to predict pollutant concentrations at the proposed development and determine whether on-site mitigation will be required to protect future occupants from poor air quality.

A summary of the model input parameters is presented in Appendix A.

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<sup>17</sup> Land-use Planning and Development Control: Planning for Air Quality, Guidance from Environmental Protection UK and the Institute of Air Quality Management for the consideration of air quality within the land use planning and development control process, January 2017.

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## **TRAFFIC DATA**

Traffic data (AADT) used in the assessment has been obtained from the following sources:

- Department for Transport automatic traffic counts<sup>18</sup>; and
- The 2019 London Atmospheric Emissions Inventory (LAEI)<sup>19</sup>.

The flows have been projected to 2024 (the opening year) using TEMPro v7.2<sup>20</sup>. LAEI traffic speeds have been used to estimate the average speed on the modelled road links, taking into account slowing/queueing traffic on the approach to junctions/ traffic lights.

There are no street canyons in the modelled locations and therefore buildings effects have not been included in the model.

## **EMISSION FACTORS**

Concentrations of NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> have been predicted using vehicle emission factors from the latest version of the Emissions Factor Toolkit (11.0)<sup>21</sup>. The predicted NO<sub>x</sub> concentrations have been converted to NO<sub>2</sub> using version 8.1 of the NO<sub>x</sub> to NO<sub>2</sub> calculator, available from the Defra air quality website<sup>22</sup>.

## **METEOROLOGICAL DATA**

Hourly sequential meteorological data from London Heathrow Airport (approximately 7 km south-southwest of the proposed development) for 2018 has been used in the dispersion modelling.

## **SENSITIVE RECEPTORS**

Concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> have been predicted using a Cartesian grid of 5 m resolution over the full extent of the development site at an elevation of 1.5m above road-level (representing ground-floor level exposure).

## **VERIFICATION**

There is an inherent level of uncertainty associated with any assessment process; however, the methodology presented has been developed to minimise errors where possible. Potential errors in predicted concentrations due to uncertainties in the assessment source activity data (e.g., traffic flows and emission factors) and the estimated background concentration are minimised by the verification of modelled concentrations using local monitoring data.

The 2022 Local Air Quality Management Technical Guidance (TG22)<sup>23</sup> recommends that modelled concentrations should be within 25% of monitored concentrations, ideally within 10%. Where there is a large discrepancy between

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<sup>18</sup> <https://roadtraffic.dft.gov.uk/>

<sup>19</sup> <https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2019>

<sup>20</sup> <https://www.gov.uk/government/publications/tempo-downloads>

<sup>21</sup> <http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>

<sup>22</sup> <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc>

<sup>23</sup> Local Air Quality Management Technical Guidance (TG22), Defra, August 2022



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modelled and measured concentrations, it is considered necessary to adjust the model results to reflect local air quality more accurately.

The modelled concentrations have therefore been verified using 2018 data from the Hillingdon 1 South Ruislip automatic site (H11) and diffusion tubes on Uxbridge Road (HILL04) and Long Lane (HILL22). Full details of the model verification process are presented in Appendix B. The most recent pre-pandemic year (2019) was not used for verification purposes due to poor data capture at the diffusion tube sites.

### EXPOSURE CRITERIA

The London Councils Air Quality Planning Guidance<sup>24</sup> provides criteria for determining the significance of exposure to air pollution and level of mitigation required. The Air Pollution Exposure Criteria (APEC) are presented in Table 2. The applicable ranges assume a downward trend in pollutant concentrations has been established, which is anticipated due to the uptake of electric vehicles and the expansion of the Ultra-Low Emission Zone (ULEZ).

Table 2: Air Pollution Exposure Criteria

	Applicable Range NO <sub>2</sub> Annual Mean	Applicable Range PM <sub>10</sub>	Recommendation
<b>APEC - A</b>	> 5% below national objective	<b>Annual Mean:</b> > 5% below national objective <b>24 hr Mean:</b> > 1-day less than national objective	No air quality grounds for refusal; however, mitigation of any emissions should be considered.
<b>APEC - B</b>	Between 5% below or above national objective	<b>Annual Mean:</b> Between 5% above or below national objective <b>24 hr Mean:</b> Between 1-day above or below national objective.	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered e.g., Maximise distance from pollutant source, proven ventilation systems, parking considerations, winter gardens, internal layout considered, and internal pollutant emissions minimised.
<b>APEC - C</b>	> 5% above national objective	<b>Annual Mean:</b> > 5% above national objective <b>24 hr Mean:</b> > 1-day more than national objective.	Refusal on air quality grounds should be anticipated, unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures.

### BUILDING EMISSIONS

The energy strategy for the proposed development is Air Source Heat Pumps (ASHP) and photovoltaic technology (PV). There will be no combustion emissions associated with the site and therefore no impact on local air quality.

<sup>24</sup> London Councils Air Quality and Planning Guidance, January 2007

# BASELINE AIR QUALITY

## LOCAL AIR QUALITY MONITORING

There are currently twelve automatic air quality monitoring stations (AQMS) in the Borough, the majority of which are within 1-2km of Heathrow Airport. The nearest site to the proposed development is Hillingdon 1 South Ruislip, which is a roadside location on the A4180, approximately 2.5km to the northeast. LBH also undertake monitoring of NO<sub>2</sub> via an extensive network of passive diffusion tubes.

Details of the monitoring locations that are considered relevant to the assessment are shown in Table 3. The locations of the monitoring sites are presented in Figure 3.

Table 3: Monitoring Locations

Site ID	Location	Type	Pollutants Measured	Easting	Northing
<b>Automatic</b>					
HI1	Hillingdon 1 - South Ruislip	Roadside	NO <sub>2</sub> and PM <sub>10</sub>	510857	184917
<b>Diffusion Tube</b>					
HILL03	South Ruislip Monitoring Station West End Road	Roadside	NO <sub>2</sub>	510821	184923
HILL04	Hillingdon Primary School Uxbridge Road	Roadside	NO <sub>2</sub>	507617	182506
HILL22	340 Long Lane, Uxbridge Lamp Post (71)	Roadside	NO <sub>2</sub>	507649	184611
HD49	83 Hayes End Drive Hayes End Middlesex (on drainpipe)	Roadside	NO <sub>2</sub>	508651	182274
HD401	15 Victoria Avenue, Hillingdon Lamp Post (2)	Background	NO <sub>2</sub>	507730	184623

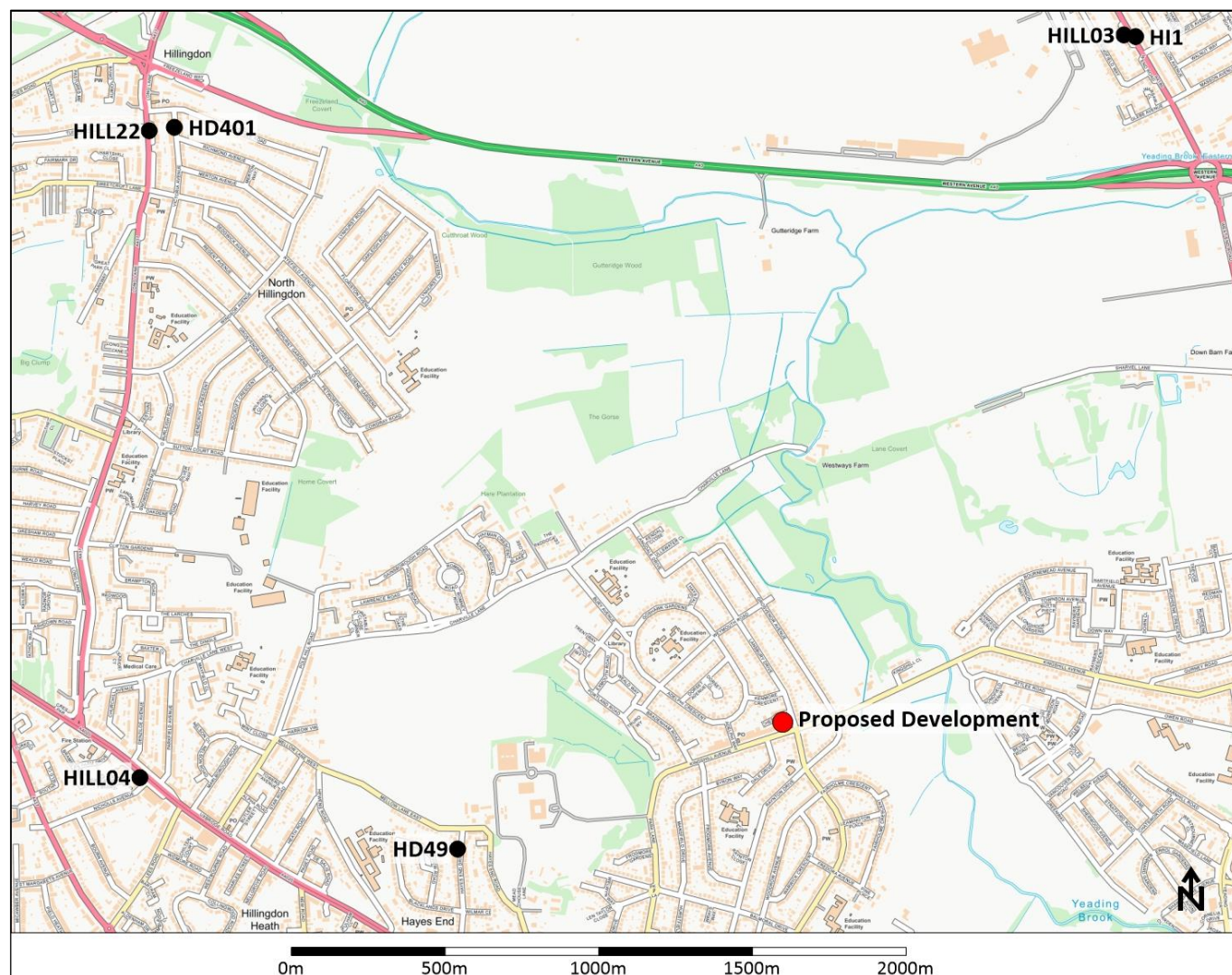


Figure 3: Location of Automatic and Diffusion Tube Monitoring Sites

A summary of annual mean concentrations and short-term exceedances between 2015 and 2019 is presented in Table 4. The data indicates ongoing exceedances of the long-term air quality objective for  $\text{NO}_2$  at HILL22 and HILL03. Concentrations at these locations were lower in 2019, but due to the poor data capture, it would be unwise to assume that there was a significant improvement in air quality.

Diffusion tube HD401 is adjacent to a minor road and is described as a background location. The measured concentrations are well within the air quality objective of  $40 \mu\text{g}/\text{m}^3$ , but in 2018 (the verification year) exceeded the concentrations measured at roadside sites HILL04 and HD49. This site is likely affected by its relatively close proximity to the A40/A437 junction and is therefore unlikely to be representative of background air quality at the proposed development. Tube HD49 is also on a minor road but is situated on a residential façade 7m from the kerbside. Concentrations measured at this location are likely to be similar to those at the proposed development.

Automatic site HI1 has recorded a maximum of 2 hourly means per year that exceed the air quality standard of  $200 \mu\text{g}/\text{m}^3$ , well below the objective of 18 exceedances. Diffusion tubes are not able to measure short-term concentrations,

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however measurements across the UK<sup>25</sup> have shown that the 1-hour mean AQO for NO<sub>2</sub> is unlikely to be exceeded where the annual mean concentration is below 60 µg/m<sup>3</sup>. The measured concentrations at all the diffusion tube monitoring sites are well below this threshold and therefore an exceedance of the short-term objective in the area is unlikely.

The NO<sub>2</sub> data shows significant inter-annual variability and there is no obvious trend that would suggest that there was a significant decline in NO<sub>2</sub> concentrations over the five-year period.

Roadside annual mean PM<sub>10</sub> concentrations measured at CM1 have been less than 50% of the objective since 2017. The number of 24-hour means above 50 µg/m<sup>3</sup> has also been well below the 35 allowable within the objective.

Table 4: Air Quality Monitoring Data

Site ID	Type	2015	2016	2017	2018	2019	Standard/ Objective
Annual Mean NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )							
HI1	Roadside	48.4	42.9	46	36 (a)	34 (a)	40
HILL03	Roadside	43.2	40.2	46.7	43.4	35.5 (b)	
HILL04	Roadside	28.9	26.8	28.2	28.5	27.8 (b)	
HILL22	Roadside	43.3	42.5	45.5	42.4	38.3 (b)	
HD49	Roadside	22.1	20.9	26.5	23.6	21.7 (b)	
HD401	Background	30	27.6	29.4	28.6	24.7 (b)	
Number of 1-Hour Mean NO <sub>2</sub> Concentrations > 200 µg/m <sup>3</sup>							
HI1	Roadside	0	2	2	0	0	18
Annual Mean PM <sub>10</sub> Concentration (µg/m <sup>3</sup> )							
HI1	Roadside	24	22	17	17	17	40
Number of 24-Hour Mean PM <sub>10</sub> Concentrations > 50 µg/m <sup>3</sup>							
HI1	Roadside	4	4	6	1	0	35
(a) Monitor moved slightly further from the carriageway. (b) Data capture < 90%							

## MAPPED AND ASSESSMENT BACKGROUND CONCENTRATIONS

In the absence of a representative urban background monitoring location in the vicinity of the proposed development, annual mean concentrations have been obtained from the Defra UK Background Air Pollution maps<sup>26</sup>. These 1km grid resolution maps are derived from a complex modelling exercise that takes into account emissions inventories and measurements of ambient air pollution from both automated and non-automated sites. The latest background maps were issued in August 2020 and are based on 2018 monitoring data, with projections for future years.

The 2018 background NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations at the proposed development and verification locations have been obtained from contour plots of the mapped data. These data have been used to predict concentrations at

<sup>25</sup> D Laxen and B Marner: Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites, July 2003.

<sup>26</sup> <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>

# AIR QUALITY ASSESSMENT

the proposed development in the opening year (2024). Since background air quality is expected to improve due to the expansion of the ULEZ and the increased uptake of low emission vehicles, this approach is considered to provide a conservative assessment of potential exposure at the proposed development.

Table 5: Mapped 2018 Annual Mean Background Pollutant Concentrations (µg/m³)

Pollutant	Proposed Development	HILL22	HILL04	HI1	Air Quality Standard
NOx	29.2	30.1	32.4	32.3	n/a
NO <sub>2</sub>	19.9	20.8	22.1	22.4	40
PM <sub>10</sub>	16.5	16.7	17.1	17.3	40
PM <sub>2.5</sub>	11.4	11.3	11.6	11.6	20 / 12/ 10

## CONSTRUCTION DUST RISK ASSESSMENT

### SENSITIVITY OF THE AREA TO DUST IMPACTS

The assessment of dust impacts is dependent on the proximity of the most sensitive receptors to the construction area and existing PM<sub>10</sub> concentrations (i.e., the potential for additional dust to result in an exceedance of the short or long-term air quality objectives). The mapped background concentrations indicate that even with the additional contribution from traffic on the local road network, PM<sub>10</sub> concentrations in the area are unlikely to exceed 24 µg/m<sup>3</sup>, the lowest threshold for the assessment of dust impacts on human health.

A summary of the receptor and area sensitivity to health and dust soiling impacts is presented in Table 6.

There are no dust sensitive habitat sites within 50m of the Site; therefore, impacts on ecology have not been considered in the assessment.

Table 6: Sensitivity of Receptors and the Local Area to Dust Impacts

Receptor	Distance from Site Boundary	Number of Receptors	Sensitivity to Health Impacts		Sensitivity to Dust Soiling Impacts	
			Receptor	Area	Receptor	Area
Residential Properties	<20m	10 - 100	High	Low	High	High
	<50m	10 - 100		Low		Medium
	<100m	>100		Low		Medium
Charville Primary School	Approx. 90m	>100	High	Low	High	Medium
Overall Sensitivity of the Area to Dust Impacts			Low		High	

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

A wind rose for London Heathrow Airport is presented in Figure 4, which shows that the prevailing wind is from the west and southwest. Receptors to the east and northeast of the site are, therefore, most likely to experience dust impacts during the construction phase.



## AIR QUALITY ASSESSMENT

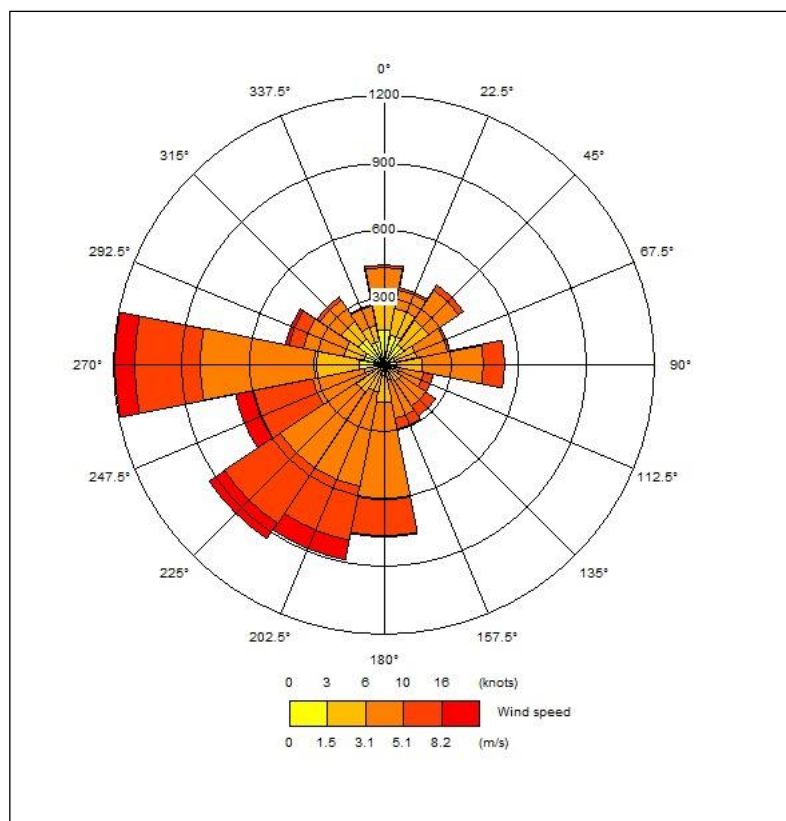


Figure 4: Wind Rose London Heathrow Airport

### DUST EMISSION MAGNITUDE

The magnitude of the potential dust emission from earthworks, construction and trackout, has been evaluated using the criteria in Table A5 of Appendix A and is presented in Table 7.

Table 7: Evaluation of Dust Emission Magnitude

Dust Source	IAQM Criteria	Proposed Development	Dust Emission Magnitude
Demolition	Total building volume (m <sup>3</sup> )	777	Small
	Potentially dusty material?	Brick	Small
	On-site crushing and screening?	Yes	Large
	Maximum height of demolition activities above ground-level (m)	<10 m	Small
Overall Dust Emission Magnitude from Demolition			Small
Whilst crushing and screening will be undertaken on Site, the scale of the works is minor and therefore the dust emission magnitude is expected to be 'small'.			
Earthworks	Site area (m <sup>2</sup> )	3,100	Medium
	Soil type?	Unknown, assumed moderately dusty	Medium
	Number of heavy earth moving vehicles active at any one time	<5	Small



## AIR QUALITY ASSESSMENT

Dust Source	IAQM Criteria	Proposed Development	Dust Emission Magnitude
	Maximum bund height (m)	Expected <4m	Small
	Total material moved (tonnes)	< 20,000	Small
	Earthworks during wetter months?	Cannot be guaranteed.	Medium
<b>Overall Dust Emission Magnitude from Earthworks</b>			<b>Small</b>
Whilst the soil type is potential dusty, the scale of the works is minor and therefore the dust emission magnitude is expected to be 'small'.			
<b>Construction</b>	Total building volume (m <sup>3</sup> )	4,790	Small
	Potentially dusty construction materials?	Brick, concrete	Medium
	On-site concrete batching?	No	-
	Sandblasting?	No	-
<b>Overall Dust Emission Magnitude from Construction</b>			<b>Small</b>
Whilst the construction materials are potentially dusty, the scale of the works is very minor and therefore the dust emission magnitude is expected to be 'small'.			
<b>Trackout</b>	Number of outward HGV movements in any one day	Unknown, expected < 5 based on proposed works.	Small
	Dusty surface material?	There are existing areas of hardstanding and therefore limited access over unmade ground.	Small
	Unpaved road length (m)	<50m	Small
<b>Overall Dust Emission Magnitude from Trackout</b>			<b>Small</b>

### ASSESSMENT OF DUST RISK PRIOR TO MITIGATION

The risk of dust impacts is determined from the sensitivity of the area and the dust emission magnitude, as shown in Tables A6, A7 and A8 of Appendix A. A summary of the potential risk of dust impacts from the development sites, based on a low and high sensitivity of the area to health and dust doing impacts, respectively, is presented in Table 8.

Overall, **there is a 'low to medium' risk of dust impacts, prior to mitigation.**

Table 8: Dust Risk (Pre-Mitigation)

Dust Source	Emission Magnitude	Human Health Risk	Dust Soiling Risk	Overall Risk
Demolition	Small	Negligible	Medium	<b>Medium</b>
Earthworks	Small	Negligible	Low	<b>Low</b>
Construction	Small	Negligible	Low	<b>Low</b>
Trackout	Small	Negligible	Low	<b>Low</b>

### EXPOSURE ASSESSMENT

The potential impact of local air quality on future occupants of the development are identified in this section.

#### NITROGEN DIOXIDE

Predicted ground-floor level annual mean NO<sub>2</sub> concentrations due to emissions from traffic on the local road network are presented a contour plot in Figure 5. The maximum concentration at the roadside façade of the proposed development is less than 50% of the air quality objective. **The proposed development therefore falls within exposure category APEC-A, with respect to NO<sub>2</sub>.**

The predicted concentrations at all locations on site are also less than 50% of the 60 µg/m<sup>3</sup> threshold for a potential exceedance of the 1-hour mean air quality objective and therefore the risk of non-compliance at the development, including the grounds, gardens and multi-activity area, is negligible.



Figure 5: Predicted 2024 Ground-Floor Level Annual Mean NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>)

## PARTICULATE MATTER

Predicted annual mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations at ground-floor level across the proposed development site are presented as contour plots in Figure 6 and Figure 7, respectively. The predicted concentrations are well within the current long-term air quality objectives for the protection of human health.

TG22 provides a relationship between predicted annual mean PM<sub>10</sub> concentrations and the likely number of exceedances of the short-term (24-hour mean) PM<sub>10</sub> objective of 50 µg/m<sup>3</sup>. The objective allows 35 exceedances per year, which is equivalent to an annual mean of 32 µg/m<sup>3</sup>. On this basis, the dispersion modelling indicates that compliance with the short-term PM<sub>10</sub> objective will be achieved at all locations on site. **The proposed development therefore falls within exposure category APEC-A for PM<sub>10</sub>.**

## AIR QUALITY ASSESSMENT

The background PM<sub>2.5</sub> concentration used in the assessment of 11.4 µg/m<sup>3</sup>, exceeds the Government's 2040 concentration target, but is below the 2028 interim target of 12 µg/m<sup>3</sup>. Following the implementation of increasingly stringent legislative measures aimed at reducing PM<sub>2.5</sub> emissions, concentrations at the proposed development in the future are anticipated to be lower than predicted.

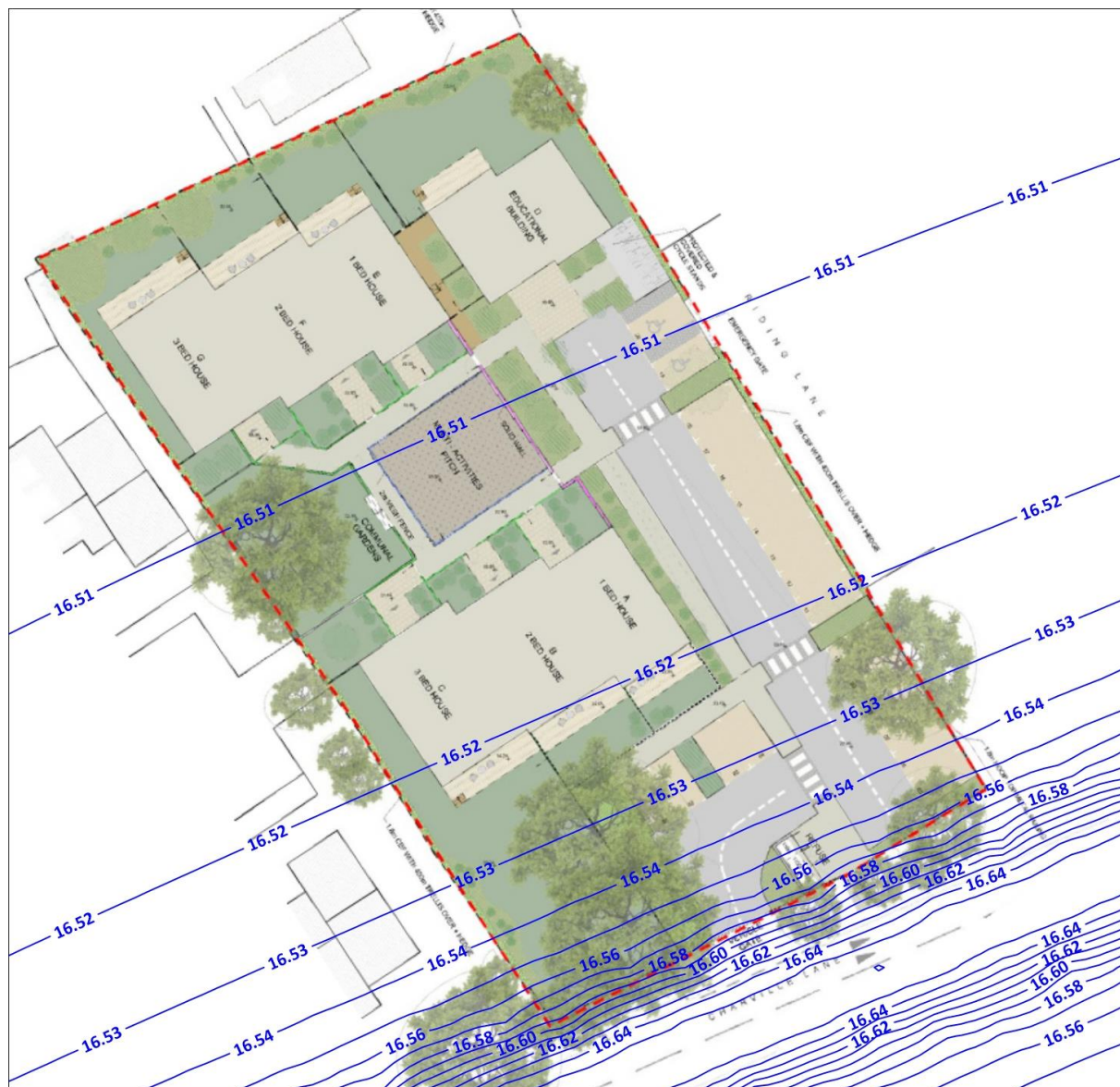


Figure 6: Predicted 2024 Ground-Floor Level Annual Mean PM<sub>10</sub> Concentration (µg/m<sup>3</sup>)





Figure 7: Predicted 2024 Ground-Floor Level Annual Mean PM<sub>2.5</sub> Concentration (µg/m<sup>3</sup>)

### AIR QUALITY NEUTRAL ASSESSMENT

To assess whether a development is air quality neutral, annual building and transport-related emissions are compared with 'air quality neutral' benchmarks provided within the London Plan Air Quality Neutral Guidance<sup>27</sup>. Where these benchmarks are exceeded, following appropriate mitigation measures, the developer is required to off-set the impacts off-site or make a financial contribution (e.g., through a section 106 agreement).

#### TRAFFIC EMISSIONS

The proposed development (which would provide accommodation for 12 young people) replaces an existing 13 bed Children's Home and is not expected to generate significant additional traffic. Nevertheless, at the request of the London Borough of Hillingdon, an air quality neutral assessment has been undertaken using Transport Emission Benchmarks (TEB) for 'care home/hospital' uses in Outer London, as shown in Table 9.

Table 9: Benchmarked Trip Rate

Land Use	GIA (m <sup>2</sup> )	TEB (trips/ m <sup>2</sup> /annum)	Benchmarked Trips (per annum)
Children's Home (C2)	999	19.5	19,500

The annual trip generation for the proposed development, based on 39 trips per day, is 14,235, which is well below the benchmarked trip rate. **The proposed development is therefore Air Quality Neutral with respect to transport related emissions.**

#### BUILDING EMISSIONS

The energy strategy for the proposed development is Air Source Heat Pumps (ASHP) and PV. There will be no combustion emissions associated with the site and therefore **the proposed development is Air Quality Neutral with respect to building-related emissions.**

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<sup>27</sup> London Plan Guidance Air Quality Neutral, GLA, February 2023

### MITIGATION

The following mitigation measures will be required during the construction and operational phases to minimise the air quality impacts arising from the development.

#### CONSTRUCTION PHASE

London Best Practice Guidance for dust control will be implemented, as appropriate, during the construction phase through the CEMP or DMP for the proposed development.

The risk of dust impacts from the site has been assessed as 'medium' during demolition, earthworks and construction. The risk of impacts from trackout have been assessed as 'low'.

In accordance with the GLA guidance, to minimise the risk of dust impacts at sensitive receptors close to the site, the 'highly recommended' measures detailed in Table 10 should be incorporated into the CEMP or DMP. The 'desirable' measures detailed in Table 11 should also be considered for inclusion.

**The significance of dust impacts on nearby receptors following the implementation of appropriate and best practice mitigation is expected to be negligible.**

Table 10: Highly Recommended Mitigation Measures

Description	Mitigation Measure
Site Management	<ul style="list-style-type: none"><li>- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.</li><li>- 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.</li><li>- Display the head or regional office contact information.</li><li>- Record and respond to all dust and air quality pollutant emissions complaints.</li><li>- Make the complaints log available to the local authority when asked.</li><li>- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.</li><li>- 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.</li><li>- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.</li></ul>



## AIR QUALITY ASSESSMENT

Description	Mitigation Measure
Preparing and maintaining the site	<ul style="list-style-type: none"> <li>- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.</li> <li>- Erect solid screens or barriers around dusty activities or at the site boundary that are at least as high as any stockpiles on site.</li> <li>- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.</li> <li>- Avoid site runoff of water or mud.</li> <li>- Keep site fencing, barriers and scaffolding clean using wet methods.</li> <li>- Remove materials from site as soon as possible.</li> <li>- Cover, seed or fence stockpiles to prevent wind whipping.</li> <li>- If relevant, put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly. Potentially agree monitoring locations with the Local Authority if required and where possible, commence baseline monitoring at least three months before phase begins.</li> </ul>
Operating vehicle/machinery and sustainable travel	<ul style="list-style-type: none"> <li>- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.</li> <li>- Ensure all vehicles switch off engines when stationary - no idling vehicles.</li> <li>- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.</li> <li>- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.</li> <li>- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).</li> </ul>
Operations	<ul style="list-style-type: none"> <li>- 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.</li> <li>- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.</li> <li>- Use enclosed chutes and conveyors and covered skips.</li> <li>- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.</li> <li>- Ensure equipment is readily available on site to clean any dry spillage and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>- Reuse and recycle waste to reduce dust from waste materials.</li> <li>- Avoid bonfires and burning of waste materials.</li> </ul>
Demolition	<ul style="list-style-type: none"> <li>- Ensure water suppression is used during demolition operations.</li> <li>- Avoid explosive blasting, using appropriate manual or mechanical alternatives.</li> <li>- Bag and remove any biological debris or damp down such material before demolition.</li> </ul>
Construction	<ul style="list-style-type: none"> <li>- Ensure sand and other aggregates are stored in banded 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.</li> </ul>

## AIR QUALITY ASSESSMENT

Table 11: Desirable Mitigation Measures

Description	Mitigation Measure
Preparing and maintaining the site	<ul style="list-style-type: none"> <li>- Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution.</li> <li>- Carry out regular dust soiling checks of buildings within 100m of site boundary and cleaning to be provided if necessary.</li> </ul>
Operating vehicle/machinery and sustainable travel	<ul style="list-style-type: none"> <li>- Impose and signpost a maximum-speed-limit of 10mph on surfaced haul routes 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).</li> </ul>
Demolition	<ul style="list-style-type: none"> <li>- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).</li> </ul>
Construction	<ul style="list-style-type: none"> <li>- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.</li> </ul>
Earthworks	<ul style="list-style-type: none"> <li>- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces.</li> <li>- Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil.</li> <li>- Only remove secure covers in small areas during work and not all at once.</li> </ul>
Construction	<ul style="list-style-type: none"> <li>- Avoid scabbling (roughening of concrete surfaces) if possible.</li> <li>- 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.</li> <li>- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.</li> </ul>
Trackout	<ul style="list-style-type: none"> <li>- Use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site.</li> <li>- Avoid dry sweeping of large areas.</li> <li>- Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport.</li> <li>- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).</li> </ul>

## OPERATIONAL PHASE

Detailed dispersion modelling of traffic on the local road network indicates that concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> will be well within the relevant long and short-term air quality standards at the proposed development (**APEC-A**).

The proposed development will include EVCPs and secure bike storage to encourage sustainable transport. The site will also be fully landscaped.

The proposed development is not air quality neutral with respect to transport emissions and therefore additional mitigation measures will be agreed with the LBH to offset the excess emissions.

### SUMMARY AND CONCLUSIONS

An assessment has been undertaken to assess the potential impact on local air quality associated with the construction and operation of the proposed development.

Releases of dust and PM<sub>10</sub> are likely to occur during site activities in the construction phase. However, through good site practice and the implementation best practice dust control, as outlined in the CEMP/ DMP for the proposed development, the impact of dust and PM<sub>10</sub> releases will be effectively mitigated, and the resultant impacts are considered to be negligible.

The operational trip generation above the existing site uses is expected to be minimal, therefore there will be no significant traffic-related impact on local air quality.

Detailed dispersion modelling of traffic on the local road network has been undertaken to predict concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> at proposed development to determine whether mitigation will be required to protect future occupants from poor air quality. The predicted concentrations are well below the relevant long and short-term air quality objectives (exposure category APEC-A).

The energy strategy for the proposed development is ASHP/ PV and therefore there will be no combustion emissions associated with the site and no impact on local air quality.

The proposed development is air quality neutral with respect to both building and transport-related emissions.

Based on the results of the assessment and with the implementation of the recommended construction-phase mitigation measures, it is considered that air quality would not pose a constraint to the redevelopment of the site as proposed.

## APPENDIX A – CONSTRUCTION DUST RISK ASSESSMENT METHODOLOGY

Factors defining the sensitivity of a receptor to dust impacts are presented in Table A1.

Table A1: Receptor Sensitivity

Receptor Sensitivity	Human Health	Dust Soiling	Ecological
High	<ul style="list-style-type: none"> <li>- Locations where members of the public are exposed over a time period relevant to the air quality objectives for PM<sub>10</sub> (a)</li> <li>- Examples include residential dwellings, hospitals, schools and residential care homes.</li> </ul>	<ul style="list-style-type: none"> <li>- Regular exposure</li> <li>- High level of amenity expected.</li> <li>- Appearance, aesthetics or value of the property would be affected by dust soiling.</li> <li>- Examples include residential dwellings, museums, medium and long-term car parks and car showrooms.</li> </ul>	<ul style="list-style-type: none"> <li>- Nationally or Internationally designated site with dust sensitive features (b)</li> <li>- Locations with vascular species (c)</li> </ul>
Medium	<ul style="list-style-type: none"> <li>- Locations where workers are exposed over a time period relevant to the air quality objectives for PM<sub>10</sub> (a)</li> <li>- Examples include office and shop workers (d)</li> </ul>	<ul style="list-style-type: none"> <li>- Short-term exposure</li> <li>- Moderate level of amenity expected.</li> <li>- Possible diminished appearance or aesthetics of property due to dust soiling</li> <li>- Examples include parks and places of work</li> </ul>	<ul style="list-style-type: none"> <li>- Nationally designated site with dust sensitive features (b)</li> <li>- Nationally designated site with a particularly important plant species where dust sensitivity is unknown</li> </ul>
Low	<ul style="list-style-type: none"> <li>- Transient human exposure</li> <li>- Examples include public footpaths, playing fields, parks and shopping streets</li> </ul>	<ul style="list-style-type: none"> <li>- Transient exposure</li> <li>- Enjoyment of amenity not expected.</li> <li>- Appearance and aesthetics of property unaffected</li> <li>- Examples include playing fields, farmland (e), footpaths, short-term car parks and roads</li> </ul>	<ul style="list-style-type: none"> <li>- Locally designated site with dust sensitive features (b)</li> </ul>
<p>a) In the case of the 24-hour objective, a relevant location would be one where individuals may be exposed for eight hours or more in a day.</p> <p>b) Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete).</p> <p>c) Cheffing C. M. &amp; Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.</p> <p>d) Does not include workers' exposure to PM<sub>10</sub> as protection is covered by Health and Safety at Work legislation.</p> <p>e) Except commercially sensitive horticulture.</p>			

## AIR QUALITY ASSESSMENT

The sensitivity of the area as a whole is dependent on the number of receptors within each sensitivity class and their distance from the source. Human health impacts are also dependent on the existing PM<sub>10</sub> concentrations in the area.

Table A2 and Table A3 summarise the criteria for determining the overall sensitivity of the area to dust soiling and health impacts, respectively. The sensitivity of the area to ecological impacts is presented in Table A4.

Table A2: Sensitivity of the Area to Dust Soiling Effects on People and Property

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

Table A3: Sensitivity of the Area to Health Impacts from Dust

Receptor Sensitivity	Annual Mean PM <sub>10</sub> Concentration (µg/m <sup>3</sup> )	Number of Receptors	Distance from the Source				
			<20m	<50m	<100m	<200m	<350m
High	>32	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low	Low

## AIR QUALITY ASSESSMENT

Table A4: Sensitivity of the Area to Ecological Impacts from Dust

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

The magnitude of the dust impacts for demolition, earthworks, construction and trackout is classified as small, medium or large depending on the scale of the proposed works as detailed in Table A5.

Table A5: Dust Emission Magnitude

Source	Large	Medium	Small
Demolition	<ul style="list-style-type: none"> <li>- Total building volume &gt;50,000m<sup>3</sup></li> <li>- Potentially dusty material (e.g., concrete)</li> <li>- Onsite crushing and screening</li> <li>- Demolition activities &gt;20m above ground level.</li> </ul>	<ul style="list-style-type: none"> <li>- Total building volume 20,000 - 50,000m<sup>3</sup></li> <li>- Potentially dusty material</li> <li>- Demolition activities 10 - 20m above ground level.</li> </ul>	<ul style="list-style-type: none"> <li>- Total building volume &lt;20,000m<sup>3</sup></li> <li>- Construction material with low potential for dust release</li> <li>- Demolition activities &lt;10m above ground level</li> <li>- Demolition during wetter months</li> </ul>
Earthworks	<ul style="list-style-type: none"> <li>- Total site area &gt;10,000m<sup>2</sup></li> <li>- Potentially dusty soil type (e.g., clay)</li> <li>- &gt;10 heavy earth moving vehicles active at any one time.</li> <li>- Formation of bunds &gt;8m in height</li> <li>- Total material moved &gt;100,000 tonnes</li> </ul>	<ul style="list-style-type: none"> <li>- Total site area 2,500 - 10,000m<sup>2</sup></li> <li>- Moderately dusty soil type (e.g., silt)</li> <li>- 10 heavy earth moving vehicles active at any one time.</li> <li>- Formation of bunds 4 - 8m in height</li> <li>- Total material moved 20,000 - 100,000 tonnes</li> </ul>	<ul style="list-style-type: none"> <li>- Total site area &lt;2,500m<sup>2</sup></li> <li>- Soil type with large grain size (e.g., sand)</li> <li>- &lt;5 heavy earth moving vehicles active at any one time.</li> <li>- Formation of bunds &lt;4m in height</li> <li>- Total material moved &lt;20,000 tonnes.</li> <li>- Earthworks during wetter months</li> </ul>
Construction	<ul style="list-style-type: none"> <li>- Total building volume &gt;100,000m<sup>3</sup></li> <li>- On site concrete batching</li> <li>- Sandblasting</li> </ul>	<ul style="list-style-type: none"> <li>- Total building volume 25,000 - 100,000m<sup>3</sup></li> <li>- Potentially dusty construction material (e.g., concrete)</li> <li>- On site concrete batching</li> </ul>	<ul style="list-style-type: none"> <li>- Total building volume &lt;25,000m<sup>3</sup></li> <li>- Material with low potential for dust release (e.g., metal cladding or timber)</li> </ul>
Trackout	<ul style="list-style-type: none"> <li>- &gt;50 HGV movements in any one day (a)</li> <li>- Potentially dusty surface material (e.g., high clay content)</li> <li>- Unpaved road length &gt;100m</li> </ul>	<ul style="list-style-type: none"> <li>- 10 - 50 HGV movements in any one day (a)</li> <li>- Moderately dusty surface material (e.g., silt)</li> <li>- Unpaved road length 50 - 100m</li> </ul>	<ul style="list-style-type: none"> <li>- &lt;10 HGV movements in any one day (a)</li> <li>- Surface material with low potential for dust release</li> </ul>

## AIR QUALITY ASSESSMENT

			- Unpaved road length <50m
a) HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes			

For each dust emission source, the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts prior to mitigation as illustrated in Tables A6, A7 and A8.

Table A6: Risk of Dust Impacts from Demolition

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

Table A7: Risk of Dust Impacts from Earthworks and Construction

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

Table A8: Risk of Dust Impacts from Trackout

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



## APPENDIX B – ADMS-ROADS INPUT PARAMETERS

Table B1: Summary of ADMS-Roads Input Parameters

Parameter	2018 Verification	2024 Exposure
ADMS-Roads Model Version	5.1	5.1
Vehicle Emission Factors	EFT v11 for 2018	EFT v11 for 2024
Meteorological Data	Hourly sequential data from London Heathrow Airport (2018)	Hourly sequential data from London Heathrow Airport (2018)
Surface Roughness	1.0m	1.0m
Monin-Obukhov Length	75m	75m

Table B2: Summary of 2018 Traffic Data for Model Verification

Road Link	2019 AADT	HGV (%)	Average Speed (kph) (d)
A437 Long Lane	14,144 (a)	2.9%	16
A4180 West End Road	16,972 (b)	2.5%	24
A4020 Uxbridge Road	29,303 (c)	4.1%	48
(a) DfT ATC 8090 for 2018 (b) DfT ATC 17636 for 2018 (c) DfT ATC 27861 for 2018			

Table B3: Summary of Traffic Data for the Prediction of 2024 Pollutant Concentrations at the Proposed Development

Road Link	2024 AADT	HGV (%)	Average Speed (kph) (b)
Charville Lane	1,906 (a)	0.33%	32
(a) DfT ATC 56742 for 2019 with TEMPro v7.2 growth factor for Hillingdon applied to project flow to 2024.			

## APPENDIX C – MODEL VERIFICATION

### NITROGEN DIOXIDE

Most nitrogen dioxide (NO<sub>2</sub>) is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions. Verification of concentrations predicted by the ADMS-Roads model has followed the methodology presented in LAQM.TG22.

Modelled annual mean concentrations of NO<sub>2</sub> have been compared with the concentrations measured at the following monitoring locations in 2018:

- South Ruislip Automatic Monitoring Site (H11)
- Hillingdon Primary School, Uxbridge Road (HILL04)
- 340 Long Lane (HILL22)

For the diffusion tubes sites (HILL04 and HILL22), the Defra NO<sub>x</sub>toNO<sub>2</sub> calculator has been used to determine the Road-NO<sub>x</sub> (i.e., the component of total NO<sub>x</sub> coming from road traffic) concentration using the mapped background NO<sub>2</sub> concentration at each site (see Table 5). At the automatic site, the Road-NO<sub>x</sub> concentration has been calculated by subtracting the mapped background NO<sub>x</sub> concentration from the measured NO<sub>x</sub> concentration (77 µg/m<sup>3</sup>).

The measured Road-NO<sub>x</sub> concentrations are compared with the modelled Road-NO<sub>x</sub> concentrations in Figure C1.

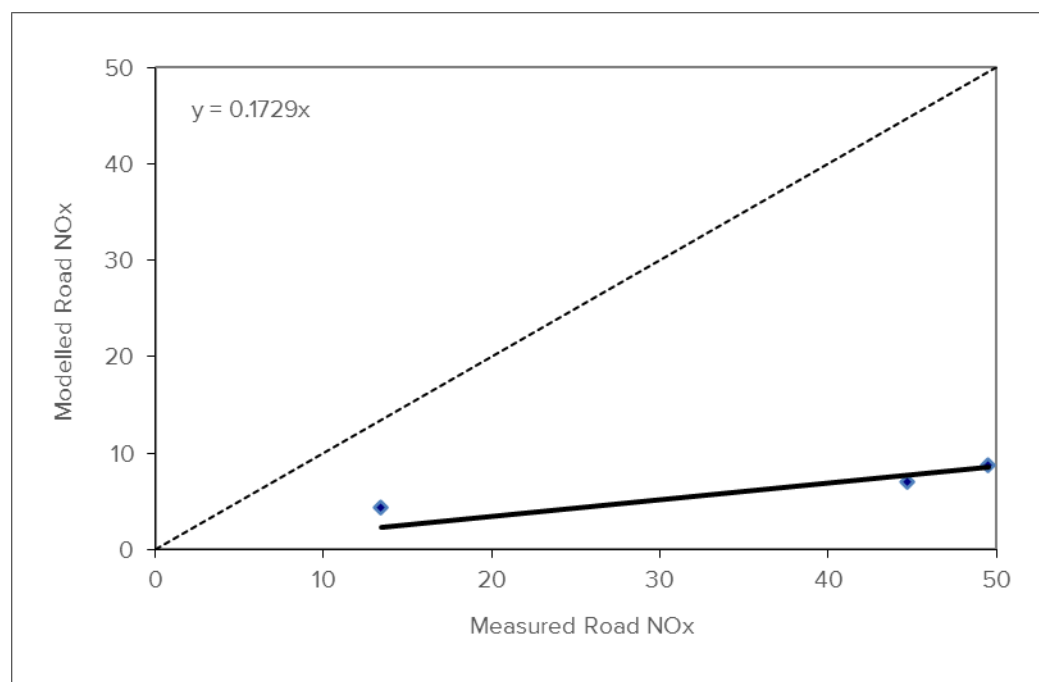


Figure C1: Comparison of Measured Road-NO<sub>x</sub> Concentrations with Modelled Road-NO<sub>x</sub> Concentrations.

A primary adjustment factor is determined as the ratio between the measured road-NO<sub>x</sub> contribution and the modelled Road-NO<sub>x</sub> contribution, forced through zero ( $1/0.1729 = 5.784$ ). This factor was then applied to the modelled Road-NO<sub>x</sub> concentration for each monitoring location to provide an adjusted modelled Road-NO<sub>x</sub> concentration. The equivalent Road-NO<sub>2</sub> concentration is then determined using the Defra NO<sub>x</sub> from NO<sub>2</sub> calculator and added to the background NO<sub>2</sub> concentration, for comparison with the measured NO<sub>2</sub> concentration (see Figure C2).

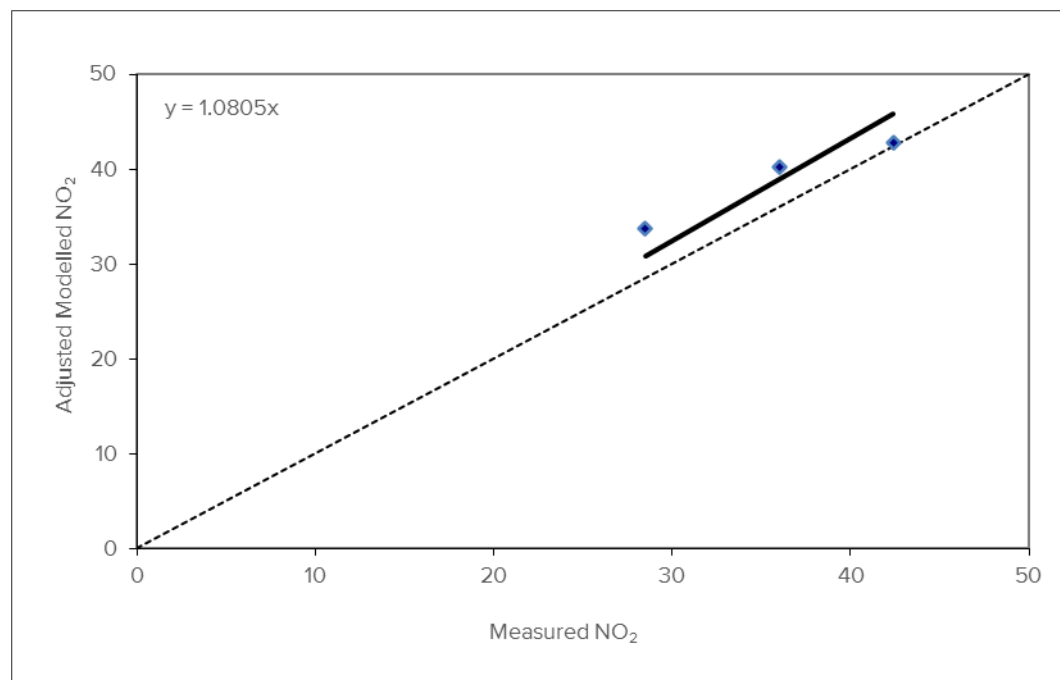


Figure C2: Comparison of Measured NO<sub>2</sub> Concentrations with the Adjusted Modelled NO<sub>2</sub> Concentrations.

The average performance of the model can be expressed as the Root Mean Square Error (RMSE), which in accordance with LAQM.TG22 should ideally be less than 10% and not more than 25% of the relevant air quality standard (in this case, the annual mean NO<sub>2</sub> objective of 40 µg/m<sup>3</sup>). The RMSE for the comparison of the adjusted modelled and measured NO<sub>2</sub> concentrations is 3.84 µg/m<sup>3</sup>, only just below 10% of the air quality objective, therefore a secondary adjustment factor is determined as the ratio between the measured NO<sub>2</sub> concentration and the adjusted modelled NO<sub>2</sub> concentration, forced through zero ( $1/1.0805 = 0.925$ ). The RMSE following secondary adjustment is 2.37 µg/m<sup>3</sup> (5.9% of the air quality objective). Since the RMSE is well below 10% of the objective, further adjustment is not considered necessary.

### ***PARTICULATE MATTER***

The measured PM<sub>10</sub> concentration at HI1 (17 µg/m<sup>3</sup>) is lower than the mapped background (17.3 µg/m<sup>3</sup>), therefore no adjustment has therefore been applied to the modelled PM<sub>10</sub> or PM<sub>2.5</sub> concentrations.

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