# AIR QUALITY ASSESSMENT

Yiewsley Housing and Library Scheme

Produced by XCO2 for London Borough of Hillingdon

July 2023

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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 at Falling Lane and Otterfield Road, 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 $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations at Otterfield Road will be well within the relevant long and short-term air quality standards and therefore site is suitable for commercial and residential development, as proposed.  At Falling Lane, the annual mean $NO_2$ concentrations are close to the objective at the ground-floor roadside façade and therefore mechanical ventilation with NOx filtration is recommended.

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 development in Yiewsley, in the London Borough of Hillingdon (LBH). The development encompasses two sites; Falling Lane and Otterfield Road. The site locations are presented in


Figure 1.

The scheme comprises the erection of two new residential and mixed-use buildings, including 95 number 1-, 2-, and 3-bedroom residential units, a public library with community space, associated car parking and landscaping. The proposed site plans are presented in

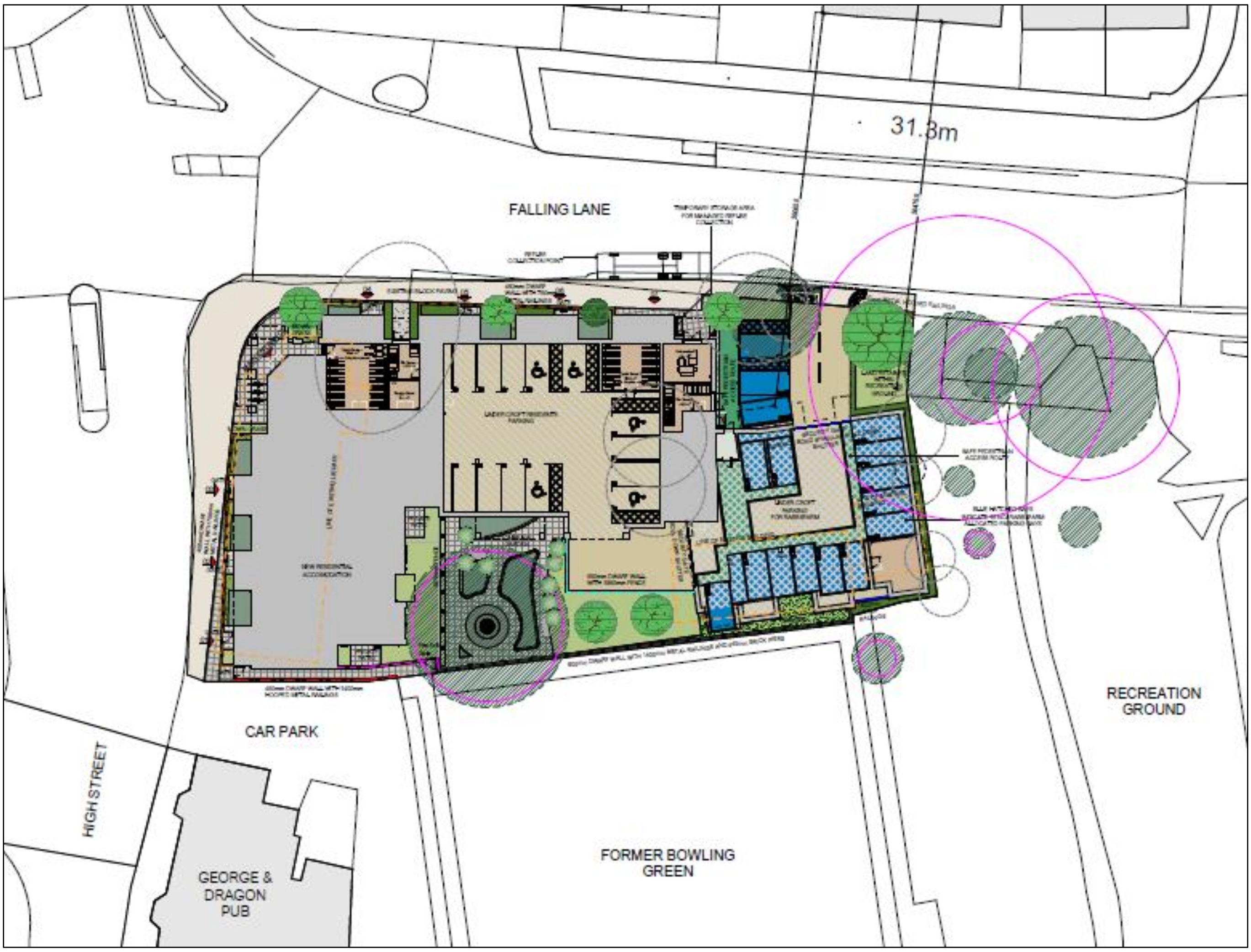


Figure 2 and Figure 3.

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 ($NO_2$). The primary source of $NO_2$ 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

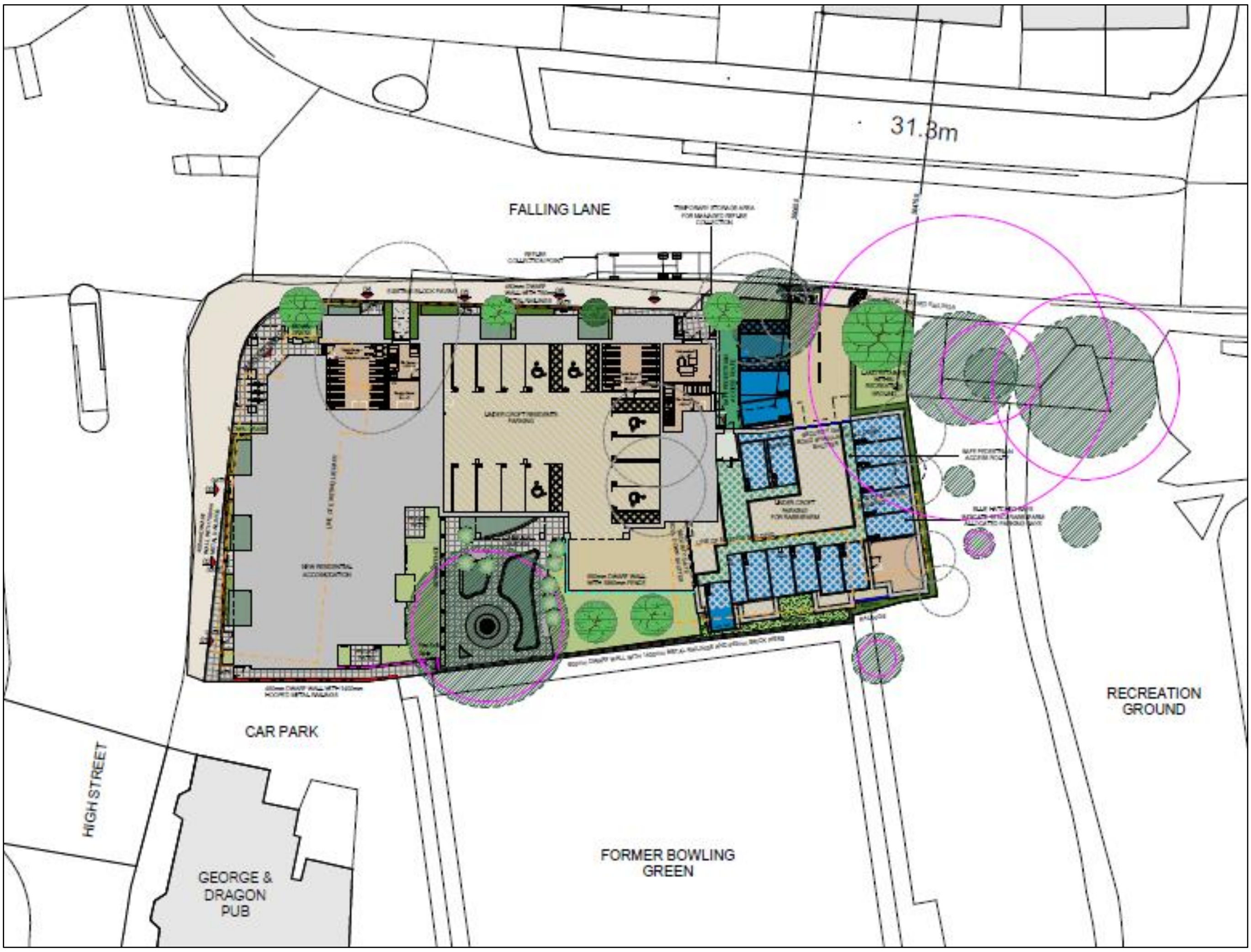


Figure 2: Proposed Site Plan (Falling Lane)


Figure 3: Proposed Site Plan (Otterfield Road)

# 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[1] was published in 2007 and sets out policy targets (objectives) for sulphur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), benzene ($C_6H_6$), carbon monoxide (CO), lead (Pb), particulate matter ($PM_{10}$, $PM_{2.5}$), 1,3-butadiene ($C_4H_6$) 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[2], 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 ($NO_2$) and particulate matter ($PM_{10}$ and $PM_{2.5}$).

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[3] and The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[4].

It is widely accepted that there is no safe level for $PM_{2.5}$ 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 31st of October 2022. On 31st January 2023, the Government published an Environmental Improvement Plan[5], which includes an Annual Mean Concentration Target (AMCT) of 10 µg/m$^3$, to be achieved by the end of 2040. The Plan also includes an interim target of 12 µg/m$^3$, to be achieved by the end of January 2028. The 10 µg/m$^3$ target for $PM_{2.5}$ has been adopted into UK law via the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023[6].

The Air Quality Standards and Objectives for $NO_2$, $PM_{10}$ and $PM_{2.5}$ that are applicable in England, are presented in Table 1.

[1] 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.
[2] Clean Air Strategy 2019, Defra, January 2019
[3] The Air Quality Standards Regulations 2010, Statutory Instrument 2010 No. 1001
[4] The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020, Statutory Instrument 2020 No. 000
[5] Environmental Improvement Plan 2023, Defra, January 2023
[6] Environmental Targets (Fine Particulate Matter) (England) Regulations 2023, Statutory Instrument 2023 No. 96

Table 1: National Air Quality Standards and Objectives

| Pollutant | Averaging Period | Standard | Objective |
|---|---|---|---|
| $NO_2$ | 1-hour | 200 $\mu g/m^3$, not to be exceeded more than 18 times per calendar year (a) | 31 December 2005 |
| | Annual | 40 $\mu g/m^3$ | |
| $PM_{10}$ | 24-hour | 50 $\mu g/m^3$, not to be exceeded more than 35 times per calendar year (b) | 31 December 2004 |
| | Annual | 40 $\mu g/m^3$ | |
| $PM_{2.5}$ | Annual | 20 $\mu g/m^3$ | 2020 |
| | Annual | 12 $\mu g/m^3$ (interim target) | 31 January 2028 |
| | Annual | 10 $\mu g/m^3$ (target) | 31 December 2040 |
| (a) Equivalent to the 99.8th percentile of 1-hour means.<br>(b) Equivalent to the 90.4th 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[7]. 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[8] 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*".

[7] Part IV of the Environment Act 1995

[8] 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[9] 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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[9] 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[10] outlines the Mayor's commitment to improving air quality in London. The strategy aims plan to significantly reduce $NO_2$ and particulate ($PM_{10}$, $PM_{2.5}$ 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 $PM_{2.5}$ 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[11] for $PM_{2.5}$ of 10 µg/m$^3$ by 2030. However, recent modelling[12] suggests that due to the transboundary nature of $PM_{2.5}$, compliance in London is unlikely to be achieved without additional measures at national, European and international level.

[10] London Environment Strategy, The Mayor of London, May 2018
[11] Air Quality Guidelines Global Update 2005, World Health Organisation
[12] $PM_{2.5}$ in London: Roadmap to meeting World Health Organization guidelines by 2030, GLA, October 2019

### 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 $NO_2$ 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 located within the West Drayton/ Yiewsley AQFA.

## LOCAL POLICY

### HILLINGDON AIR QUALITY ACTION PLAN

LBH's Air Quality Action Plan[13] 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; and
- Raise awareness via targeted campaigns.

### HILLINGDON LOCAL PLAN

The Hillingdon Local Plan: Part 2[14] 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'.

[13] Air Quality Action Plan 2019 - 2024, London Borough of Hillingdon, May 2019
[14] 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[15], which is closely aligned with the Institute of Air Quality Management (IAQM) construction dust guidance[16] . 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.

[15] The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance, Greater London Authority, July 2014
[16] 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[17] , 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 $NO_2$ and $PM_{10}$ from construction traffic and on-site machinery on local air quality is anticipated to be negligible.

## OPERATIONAL TRAFFIC

The Falling Lane and Otterfield Road sites will include 28 and 25 parking spaces, respectively.

The Falling Lane site will reduce traffic on the local road network compared with the existing car park uses. The Otterfield Road site (which is currently vacant) is expected to generate 107, predominantly LGV, trips on the local road network per day. The transport consultants for the proposed development have advised that the trips will be distributed 89% (95 AADT) north and 11% (12 AADT) south of the site access on Otterfield Road. No road link will experience an increase of over 100 AADT and therefore in accordance with the IAQM/ EPUK guidance, the impact of the operational traffic on local air quality is 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.

[17] 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.

## TRAFFIC DATA

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

- Department for Transport automatic traffic counts[18];
- The 2019 London Atmospheric Emissions Inventory (LAEI)[19]; and
- Department for Transport 2019 Road Traffic Statistics (Table TRA0302[20]).

The flows have been projected to 2025 (the opening year) using TEMPro v7.2[21]. 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.

The proposed development will not create a street canyon on Falling Road and pollutant concentrations at the Otterfield Road site will not be significantly affected by the buildings on either side of Otterfield Road. Detailed street canyon effects have therefore not been included in the model.

## EMISSION FACTORS

Concentrations of NOx, $PM_{10}$ and $PM_{2.5}$ have been predicted using vehicle emission factors from the latest version of the Emissions Factor Toolkit (11.0) [22]. The predicted NOx concentrations have been converted to $NO_2$ using version 8.1 of the NOx to $NO_2$ calculator, available from the Defra air quality website[23].

## METEOROLOGICAL DATA

Hourly sequential meteorological data from London Heathrow Airport (approximately 5 km south of the proposed development) for 2018 has been used in the dispersion modelling.

## SENSITIVE RECEPTORS

Concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ have been predicted using a Cartesian grid of 5 m resolution over the full extent of the development sites 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.

[18] https://roadtraffic.dft.gov.uk/
[19] https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2019
[20] www.gov.uk/government/organisations/department-for-transport/series/road-traffic-statistics
[21] https://www.gov.uk/government/publications/tempro-downloads
[22] http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html
[23] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

The 2022 Local Air Quality Management Technical Guidance (TG22)[24] recommends that modelled concentrations should be within 25% of monitored concentrations, ideally within 10%. Where there is a large discrepancy between modelled and measured concentrations, it is considered necessary to adjust the model results to reflect local air quality more accurately.

The modelled concentrations have therefore been verified using 2018 data from diffusion tubes on Fairfield Road and Horton Road. 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.

## *EXPOSURE CRITERIA*

The London Councils Air Quality Planning Guidance[25] 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 $NO_2$ Annual Mean | Applicable Range $PM_{10}$ | Recommendation |
|---|---|---|---|
| **APEC - A** | > 5% below national objective | **Annual Mean:** > 5% below national objective **24 hr Mean:** > 1-day less than national objective | No air quality grounds for refusal; however, mitigation of any emissions should be considered. |
| **APEC - B** | Between 5% below or above national objective | **Annual Mean:** Between 5% above or below national objective **24 hr Mean:** 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. |
| **APEC - C** | > 5% above national objective | **Annual Mean:** > 5% above national objective **24 hr Mean:** > 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. |

[24] Local Air Quality Management Technical Guidance (TG22), Defra, August 2022
[25] London Councils Air Quality and Planning Guidance, January 2007

## 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.

# 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 London Hillingdon, which is approximately 2.3km to the south. London Hillingdon is described as an urban background location; however, the monitor is approximately 30m from the M40, which is a significant source of $NO_2$. Pollutant concentrations measured at this location are not considered representative of urban background concentrations at the proposed development.

LBH also undertake monitoring of $NO_2$ via an extensive network of passive diffusion tubes. Details of the tubes nearest the proposed development are shown in Table 3. The locations of the monitoring sites are presented in Figure 4.

Table 3: Diffusion Tube Monitoring Locations

| Site ID | Location | Type | Distance from kerb (m) | Easting | Northing |
|---|---|---|---|---|---|
| HD51 | Top of Colham Avenue, Yiewsley | Roadside | 7 | 506335 | 180263 |
| HILL13 | 31 Tavistock Road | Roadside | 1 | 505731 | 180288 |
| HILL19 | Side of 104 Yiewsley High Street | Urban Background | 2 (Fairfield Road)<br>37 (Yiewsley High Street) | 506108 | 180493 |

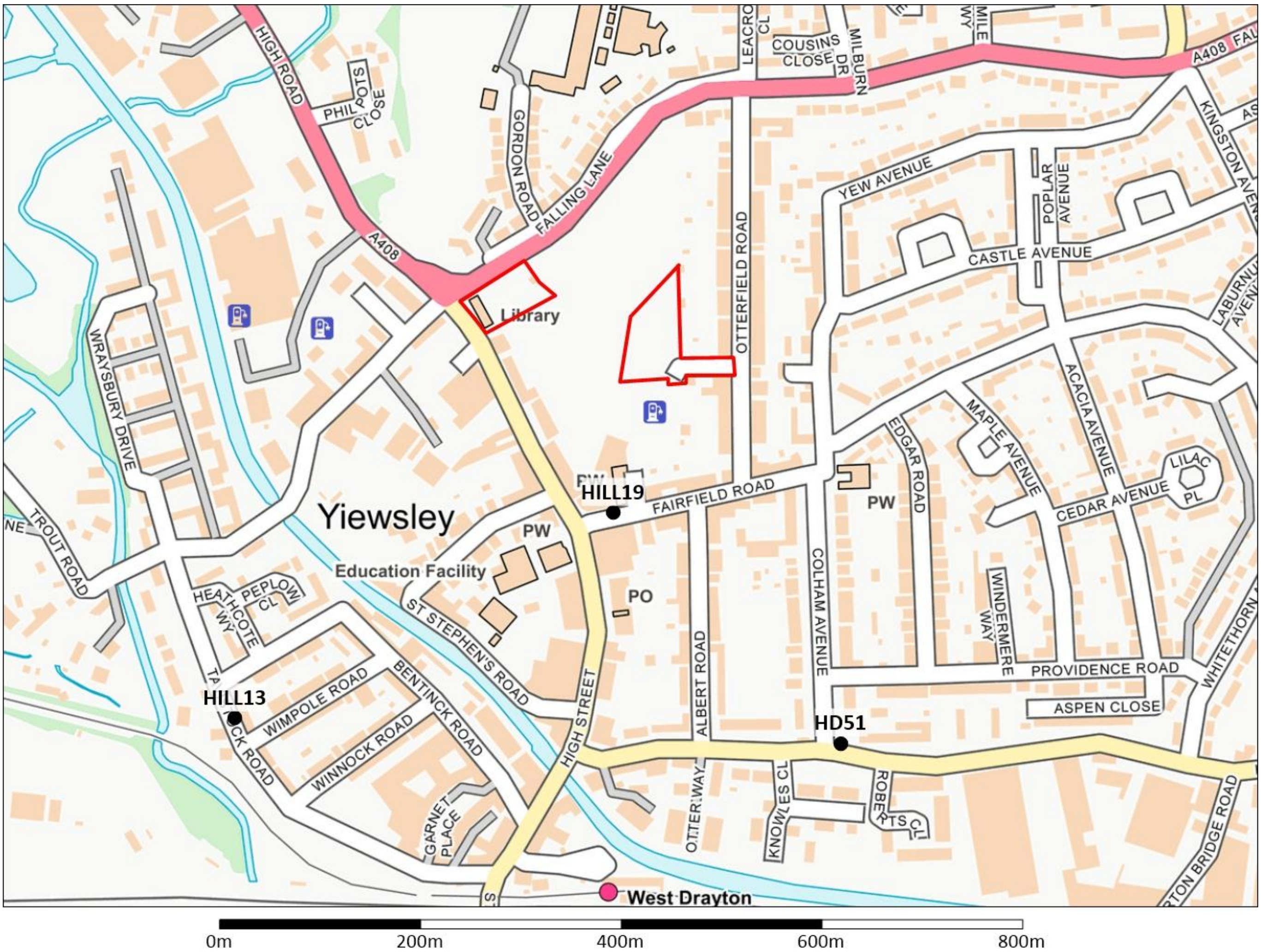


Figure 4: Location of Automatic and Diffusion Tube Monitoring Sites

A summary of annual mean $NO_2$ concentrations measured by diffusion tube between 2015 and 2019 is presented in Table 4. Since 2016 the measured concentrations have been below the air quality objective of 40 µg/m$^3$ at all three locations. There is no obvious trend in the data that would suggest that there was a significant decline in $NO_2$ concentrations over the five-year period.

Tube HILL19 is described as an urban background site, however it is located just 2m from Fairfield Road and the measured concentrations exceed those measured at HD51 and HILL13, which are described as roadside sites. On this basis, the concentrations measured at HILL19 are unlikely to be representative of the background concentration at the proposed development.

Measurements across the UK[26] have shown that the 1-hour mean AQO for $NO_2$ is unlikely to be exceeded where the annual mean concentration is below 60 µg/m$^3$. The measured concentrations are well below this threshold and therefore an exceedance of the short-term objective in the area is unlikely.

Table 4: Annual Mean $NO_2$ Concentrations Measured by Diffusion Tube

| Site ID | Location | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|
| HD51 | Top of Colham Avenue, Yiewsley | 33.3 | 29.3 | 32.9 | 30.6 | 26.4 |
| HILL13 | 31 Tavistock Road | 28.7 | 25.8 | 26.9 | 29.5 | 27.9 |
| HILL19 | Side of 104 Yiewsley High Street | 40.9 | 32.0 | 37.0 | 35.0 | 34.6 |

## 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[27]. 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 $NO_2$, $PM_{10}$ and $PM_{2.5}$ 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 the proposed development in the opening year (2025). 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/m$^3$)

| Pollutant | Mapped | Air Quality Standard |
|---|---|---|
| $NO_2$ | 25.4 | 40 |
| $PM_{10}$ | 17.2 | 40 |
| $PM_{2.5}$ | 11.6 | 20 / 12/ 10 |

[26] 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.
[27] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

# 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 $PM_{10}$ 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, $PM_{10}$ concentrations in the area are unlikely to exceed 24 µg/m$^3$, 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 |
| **Falling Lane** | | | | | | |
| Residential Properties | <20m | 1 | High | Low | High | Medium |
| | <50m | 1 - 10 | | Low | | Low |
| | <100m | 10 - 100 | | Low | | Low |
| George and Dragon Pub | <20m | 10 - 100 | Medium | Low | Medium | Medium |
| Bowling Green and Park | <20m | 10 - 100 | Low | Low | Medium | Low |
| **Otterfield Road** | | | | | | |
| Residential Properties | <20m | < 25 (gardens) | Medium | Low | Medium | Medium |
| | <50m | < 50 | High | Low | High | Medium |
| | <100m | >100 | High | Low | High | Medium |
| Medical Centre | <50m | 10 - 100 | High | Low | Medium | Low |
| Park | <20m | 10 – 100 | Low | Low | Medium | Low |
| **Overall Sensitivity of the Area** | | | **Low** | | **Medium** | |

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 5, 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.

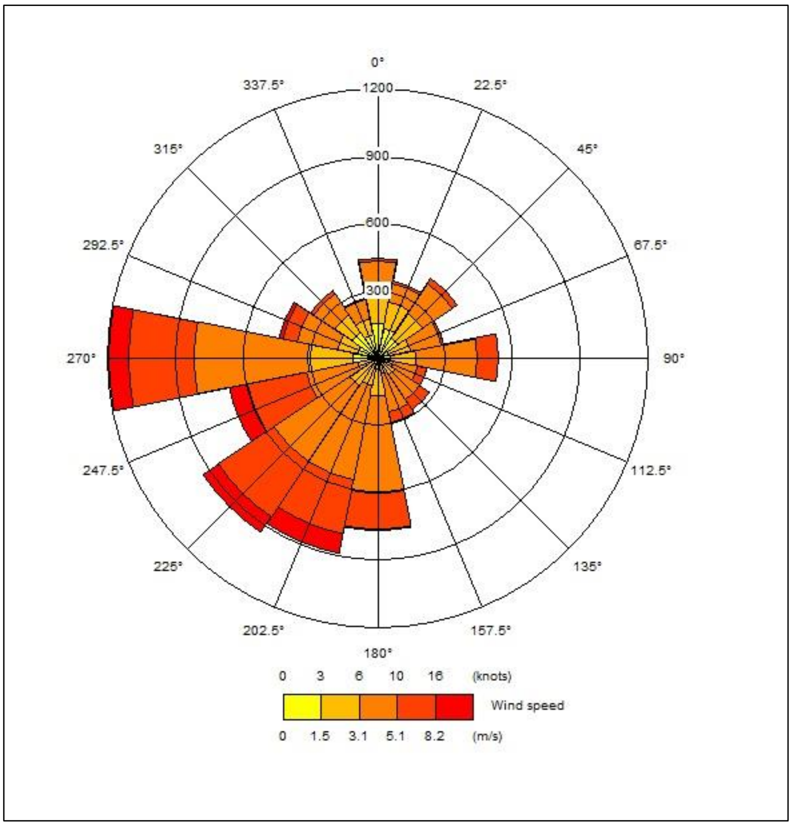


Figure 5: Wind Rose London Heathrow Airport

### *DUST EMISSION MAGNITUDE*

The magnitude of the likely dust emission from demolition, earthworks, construction and trackout, has been evaluated for each site using the criteria in Table A5 of Appendix A and are presented in Table 7 to Table 10.

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Table 7: Dust Emission Magnitude from Demolition (Pre-Mitigation)

| Criteria | Falling Lane | Otterfield Road |
|---|---|---|
| **Total building volume ($m^3$)** | **2,156** | **0** |
| Dust emission magnitude | Small | - |
| **Potentially dusty material?** | **Brick** | **-** |
| Dust emission magnitude | Medium | - |
| **On-site crushing and screening?** | **Unknown, assume yes** | **-** |
| Dust emission magnitude | Large | - |
| **Maximum height of demolition activities above ground-level (m)** | **7.36 m** | **-** |
| Dust emission magnitude | Small | - |
| **Demolition during wetter months?** | **Unknown, assume no** | **-** |
| Dust emission magnitude | Medium | - |
| **Overall dust emission magnitude** | **MEDIUM** | **-** |

| Criteria | Falling Lane | Otterfield Road |
|---|---|---|
| Justification | Whilst it is possible that on-site crushing and screening may be undertaken to enable the re-use of material, the scale of the proposed works are minor. | No demolition required. |

Table 8: Dust Emission Magnitude from Earthworks (Pre-Mitigation)

| Criteria | Falling Lane | Otterfield Road |
|---|---|---|
| **Total site area ($m^2$)** | **2,371** | **4,228** |
| Dust emission magnitude | Small | Medium |
| **Soil Type** | **Unknown, assumed moderately dusty** | |
| Dust emission magnitude | Medium | |
| **Number of heavy earth-moving vehicles active at any one time** | **Unknown, assumed <5 based on proposed works** | |
| Dust emission magnitude | Small | |
| **Maximum bund height (m)** | **Unknown, assumed 4m based on site area** | **Unknown, assumed 4 - 8m based on site area** |
| Dust emission magnitude | Small | Medium |
| **Total material moved (tonnes)** | **Unknown, assumed <20,000 based on proposed works** | |
| Dust emission magnitude | Small | |
| **Earthworks during wetter months?** | **Unknown, assumed no** | |
| Dust emission magnitude | Medium | |
| **Overall dust emission magnitude** | **SMALL** | **MEDIUM** |
| Justification | Site is small and scale of works is minor. | - |

Table 9: Dust Emission Magnitude from Construction (Pre-Mitigation)

| Criteria | Falling Lane | Otterfield Road |
|---|---|---|
| **Total building volume ($m^3$)** | **15,361** | **16,134** |
| Dust emission magnitude | Small | Small |
| **Potentially dusty construction material?** | **Concrete and brick** | |
| Dust emission magnitude | Medium | |
| **Piling?** | **Yes** | |
| Dust emission magnitude | Large | |
| **On-site concrete batching?** | **No** | |
| Dust emission magnitude | Small | |

| Criteria | Falling Lane | Otterfield Road |
|---|---|---|
| **Sandblasting?** | **No** | |
| Dust emission magnitude | Small | |
| **Overall dust emission magnitude** | **MEDIUM** | **MEDIUM** |
| Justification | Whilst piling will be undertaken the scale of the proposed construction works is minor. | Whilst piling will be undertaken the scale of the proposed construction works is minor. |

Table 10: Dust Emission Magnitude from Trackout (Pre-Mitigation)

| Criteria | Falling Lane | Otterfield Road |
|---|---|---|
| **Number of outward HGV movements per day** | **<10** | |
| Dust emission magnitude | Small | |
| **Potentially dusty surface material?** | **Unknown, assumed moderately dusty** | |
| Dust emission magnitude | Medium | |
| **Unpaved road length (m)** | - | **Unknown, assumed up to 50m** |
| Dust emission magnitude | - | Small |
| **Overall dust emission magnitude** | **NEGLIGIBLE** | **MEDIUM** |
| Justification | Site is currently a tarmacked car park and road vehicles are unlikely to travel over unmade ground. | Construction traffic will access the site via Otterfield Road where there are sensitive receptors within 2-3m of the carriageway. |

### *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 medium sensitivity of the area to health and dust doing impacts, respectively. is presented in Table 11.

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

Table 11: Dust Risk (Pre-Mitigation)

| Dust Source | Emission Magnitude | Human Health Risk | Dust Soiling Risk | Overall Risk |
|---|---|---|---|---|
| **Falling Lane** | | | | |
| Demolition | Medium | Low | Medium | **Medium** |
| Earthworks | Small | Negligible | Low | **Low** |
| Construction | Medium | Low | Medium | **Medium** |
| Trackout | Negligible | Negligible | Negligible | **Negligible** |
| **Otterfield Road** | | | | |

| | | | | |
|---|---|---|---|---|
| Demolition | - | - | - | **-** |
| Earthworks | Medium | Low | Medium | **Medium** |
| Construction | Medium | Low | Medium | **Medium** |
| Trackout | Medium | Low | Low | **Low** |

# EXPOSURE ASSESSMENT

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

## FALLING LANE

### *NITROGEN DIOXIDE*

Predicted ground-floor level annual mean $NO_2$ concentrations due to emissions from traffic on the local road network are presented a contour plot in Figure 6. The maximum concentration at the roadside façade of the proposed development is just below 39 µg/m$^3$. **The Falling Lane site therefore falls within exposure category APEC-B, with respect to $NO_2$**. It should be noted that the assessment is conservative and assumes no improvement in background air quality between the baseline and opening years. The expansion of the LEZ is expected to significantly improve air quality in the area and therefore, the concentrations in 2025 are likely to be somewhat lower than predicted. Nevertheless, mitigation should be considered to ensure that occupants of the ground-floor units on the roadside façades are not exposed to poor air quality. At first-floor level (see Figure 7) the annual mean $NO_2$ concentrations are well within the objective and mitigation is not required.

The predicted concentrations at all locations on site are less than 70% of the 60 µg/m$^3$ 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 roadside gardens, is negligible.


Figure 6: Falling Lane - Predicted 2025 Ground-Floor Level Annual Mean $NO_2$ Concentrations (µg/m$^3$)

Figure 7: Falling Lane - Predicted 2025 First-Floor Level Annual Mean $NO_2$ Concentrations (µg/m$^3$)

### *PARTICULATE MATTER*

Predicted annual mean $PM_{10}$ and $PM_{2.5}$ concentrations at ground-floor level across the proposed development site are presented as contour plots in Figure 8 and Figure 9, 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 $PM_{10}$ concentrations and the likely number of exceedances of the short-term (24-hour mean) $PM_{10}$ objective of 50 µg/m$^3$. The objective allows 35 exceedances per year, which is equivalent to an annual mean of 32 µg/m$^3$. On this basis, the dispersion modelling indicates that compliance with the short-term $PM_{10}$ objective will be achieved at all locations on site. **The Falling Lane site therefore falls within exposure category APEC-A for $PM_{10}$.**

The background $PM_{2.5}$ concentration used in the assessment of 11.6 µg/m$^3$, exceeds the Government's 2040 concentration target, but is below the 2028 interim target of 12 µg/m$^3$. The highest predicted concentration at the façade of the proposed development is approximately 13.5 µg/m$^3$ which is above the interim target. Following the implementation of increasingly stringent legislative measures aimed at reducing $PM_{2.5}$ emissions, concentrations at the proposed development in the future are anticipated to be lower than predicted.


Figure 8: Falling Lane - Predicted 2025 Ground-Floor Level Annual Mean $PM_{10}$ Concentration (µg/m³)


Figure 9: Falling Lane - Predicted 2025 Ground-Floor Level Annual Mean $PM_{2.5}$ Concentration (µg/m³)

## OTTERFIELD ROAD

### *NITROGEN DIOXIDE*

Predicted ground-floor level annual mean $NO_2$ concentrations due to emissions from traffic on the local road network are presented a contour plot in Figure 10. The maximum concentration at the roadside façade of the proposed development is 27 µg/m³, well below the air quality objective of 40 µg/m³. **The Otterfield Road site therefore falls within exposure category APEC-A, with respect to $NO_2$.**

The predicted concentrations at all locations on site are less than 50% of the 60 µg/m³ threshold for a potential exceedance of the 1-hour mean air quality objective and therefore the risk of non-compliance at the development is negligible.


Figure 10: Otterfield Road - Predicted 2025 Ground-Floor Level Annual Mean $NO_2$ Concentrations (µg/m$^3$)

## *PARTICULATE MATTER*

Predicted annual mean $PM_{10}$ and $PM_{2.5}$ concentrations at ground-floor level across the proposed development site are presented as contour plots in Figure 11 and Figure 12, respectively. The predicted concentrations are well within the current long-term air quality objectives for the protection of human health.

The annual mean $PM_{10}$ concentrations are well below 32 µg/m$^3$ and therefore compliance with the short-term $PM_{10}$ objective is expected at all locations on site. **The proposed development therefore falls within exposure category APEC-A for $PM_{10}$.**

The predicted $PM_{2.5}$ concentration at the façade of the proposed development is approximately 11.9 µg/m$^3$ which is well below the 2028 interim target.


Figure 11: Otterfield Road - Predicted 2025 Ground-Floor Level Annual Mean $PM_{10}$ Concentration (µg/m$^3$)


Figure 12: Otterfield Road - Predicted 2025 Ground-Floor Level Annual Mean $PM_{2.5}$ Concentration (µg/m$^3$)

# 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[28]. 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 air quality neutral assessment for transport-related emissions compares the annual vehicle trips generated by the site with benchmarked trip rates, based on the proposed land-use.

The TEBs for in Outer London and benchmarked annual trips are presented in Table 12.

Table 12: Benchmarked Trip Rate

| Land Use | Number of dwellings or GIA | TEB (trips/dwelling or $m^2$/annum) | Benchmarked Trips (per annum) |
|---|---|---|---|
| Residential | 95 dwellings | 447 | 42,465 |
| Library | 391 $m^2$ | 44.4 | 17,360 |
| **Total Benchmarked Trips** | | | **59,825** |

The Falling Lane site will reduce trips on the local road network compared with the existing site uses, whereas the Otterfield Road site is expected to generate 107 trips per day. Assuming as a worst-case that the overall daily trip generation associated with the proposed development is 107 (i.e., not taking into account the reduction associated with the Falling Lane site), the annual trip generation for the site is 39,055, well below the benchmarked trips. **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.**

[28] 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 13 should be incorporated into the CEMP or DMP. The 'desirable' measures detailed in Table 14 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 13: Highly Recommended Mitigation Measures

| Description | Mitigation Measure |
|---|---|
| Site Management | - Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.<br>- 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.<br>- Display the head or regional office contact information.<br>- Record and respond to all dust and air quality pollutant emissions complaints.<br>- Make the complaints log available to the local authority when asked.<br>- 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.<br>- 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.<br>- 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. |

| Description | Mitigation Measure |
|---|---|
| Preparing and maintaining the site | - Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.<br>- Erect solid screens or barriers around dusty activities or at the site boundary that are at least as high as any stockpiles on site.<br>- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.<br>- Avoid site runoff of water or mud.<br>- Keep site fencing, barriers and scaffolding clean using wet methods.<br>- Remove materials from site as soon as possible.<br>- Cover, seed or fence stockpiles to prevent wind whipping.<br>- 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. |
| Operating vehicle/machinery and sustainable travel | - Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.<br>- Ensure all vehicles switch off engines when stationary - no idling vehicles.<br>- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.<br>- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.<br>- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing). |
| 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.<br>- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.<br>- Use enclosed chutes and conveyors and covered skips.<br>- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.<br>- 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. |
| Waste management | - Reuse and recycle waste to reduce dust from waste materials.<br>- Avoid bonfires and burning of waste materials. |
| Demolition | - Ensure water suppression is used during demolition operations.<br>- Avoid explosive blasting, using appropriate manual or mechanical alternatives.<br>- Bag and remove any biological debris or damp down such material before demolition. |
| Construction | - 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. |

Table 14: Desirable Mitigation Measures

| Description | Mitigation Measure |
|---|---|
| Preparing and maintaining the site | - Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution.<br>- Carry out regular dust soiling checks of buildings within 100m of site boundary and cleaning to be provided if necessary. |
| Operating vehicle/machinery and sustainable travel | - 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). |
| Demolition | - Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). |
| Construction | - For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust. |
| Earthworks | - Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces.<br>- Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil.<br>- Only remove secure covers in small areas during work and not all at once. |
| Construction | - Avoid scabbling (roughening of concrete surfaces) if possible.<br>- 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.<br>- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust. |
| Trackout | - Use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site.<br>- Avoid dry sweeping of large areas.<br>- Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport.<br>- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). |

## OPERATIONAL PHASE

Detailed dispersion modelling of traffic on the local road network indicates that concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ will be well within the relevant long and short-term air quality standards at the Otterfield Road site (**APEC-A**). However, at the Falling Lane site, the predicted annual mean $NO_2$ concentrations at the ground-floor roadside façade is 39 µg/m$^3$ (**APEC-B**) and therefore mechanical ventilation with NOx filtration is recommended for the affected units to minimise exposure to poor air quality.

The proposed development will include EVCPs and secure bike storage. The site will be landscaped, and green roofs will be provided. Improvements to pedestrian and cycling infrastructure will encourage sustainable transport.

# 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 $PM_{10}$ 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 $PM_{10}$ releases will be effectively mitigated, and the resultant impacts are considered to be negligible.

Detailed dispersion modelling of traffic on the local road network has been undertaken to predict concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ at the Falling Lane and Otterfield Road sites to determine whether mitigation will be required to protect future occupants from poor air quality. At Otterfield Road, the predicted concentrations are well below the relevant long and short-term air quality objectives (exposure category APEC-A). At Falling Lane, the annual mean $NO_2$ concentrations at the ground-floor roadside façade are close to the objective (39 µg/m$^3$) and therefore mechanical ventilation with NOx filtration is recommended for the affected residential units.

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

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

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

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

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

e) Except commercially sensitive horticulture.

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 $PM_{10}$ 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 $PM_{10}$ Concentration ($\mu g/m^3$) | 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 |

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 | - Total building volume >50,000$m^3$<br>- Potentially dusty material (e.g., concrete)<br>- Onsite crushing and screening<br>- Demolition activities >20m above ground level. | - Total building volume 20,000 - 50,000$m^3$<br>- Potentially dusty material<br>- Demolition activities 10 - 20m above ground level. | - Total building volume <20,000$m^3$<br>- Construction material with low potential for dust release<br>- Demolition activities <10m above ground level<br>- Demolition during wetter months |
| Earthworks | - Total site area >10,000$m^2$<br>- Potentially dusty soil type (e.g., clay)<br>- >10 heavy earth moving vehicles active at any one time.<br>- Formation of bunds >8m in height<br>- Total material moved >100,000 tonnes | - Total site area 2,500 - 10,000$m^2$<br>- Moderately dusty soil type (e.g., silt)<br>- 10 heavy earth moving vehicles active at any one time.<br>- Formation of bunds 4 - 8m in height<br>- Total material moved 20,000 - 100,000 tonnes | - Total site area <2,500$m^2$<br>- Soil type with large grain size (e.g., sand)<br>- <5 heavy earth moving vehicles active at any one time.<br>- Formation of bunds <4m in height<br>- Total material moved <20,000 tonnes.<br>- Earthworks during wetter months |
| Construction | - Total building volume >100,000$m^3$<br>- On site concrete batching<br>- Sandblasting | - Total building volume 25,000 - 100,000$m^3$<br>- Potentially dusty construction material (e.g., concrete)<br>- On site concrete batching | - Total building volume <25,000$m^3$<br>- Material with low potential for dust release (e.g., metal cladding or timber |
| Trackout | - >50 HGV movements in any one day (a)<br>- Potentially dusty surface material (e.g., high clay content)<br>- Unpaved road length >100m | - 10 - 50 HGV movements in any one day (a)<br>- Moderately dusty surface material (e.g., silt)<br>- Unpaved road length 50 - 100m | - <10 HGV movements in any one day (a)<br>- Surface material with low potential for dust release |

| | | | |
|---|---|---|---|
| | | | - 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 | 2025Exposure |
|---|---|---|
| ADMS-Roads Model Version | 5.1 | 5.1 |
| Vehicle Emission Factors | EFT v11 for 2018 | EFT v11 for 2025 |
| 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) |
|---|---|---|---|
| High St | 19,552 (a) | 6.5% | 13 |
| Fairfield Road | 2,232 (b) | 4.0% | 22 |
| Horton Lane | 5,316 (a) | 3.9% | 22 |

(a) AADT obtained from the 2019 LAEI
(b) DfT ATC 990328 for 2009 with TEMPro v7.2 growth factor for Hillingdon applied to project flow to 2018.
(c) Average speeds based on LAEI data

Table B3: Summary of Traffic Data for the Prediction of 2025 Pollutant Concentrations at the Proposed Development

| Road Link | 2025 AADT | HGV (%) | Average Speed (kph) (b) |
|---|---|---|---|
| A408 High Rd | 26,056 (a) | 5.1% | 8 - 34 |
| High St | 20,629 (a) | 6.2% | 8 - 13 |
| A408 Falling Lane | 19,242 (b) | 2.9% | 8 - 35 |
| Trout Road | 3,693 (c) | 5.0% | 8 - 16 |
| Otterfield Road N of Site Access | 8,590 (d) | 0.0% | 22 |
| Otterfield Road S of Site Access | 6,382 (d) | 0.0% | 22 |
| Fairfield Road | 2,385 | 4.0% | 22 |

(a) AADT obtained from the 2019 LAEI with TEMPro v7.2 growth factor for Hillingdon applied to project flow to 2025.
(b) DfT ATC 56742 for 2019 with TEMPro v7.2 growth factor for Hillingdon applied to project flow to 2025.
(c) DfT 2019 average flow on a minor in London with TEMPro v7.2 growth factor for Hillingdon applied to project flow to 2025.
(d) 2019 flow provided by transport consultant with TEMPro v7.2 growth factor for Hillingdon applied to project flow to 2025.
(e) DfT ATC 990328 for 2009 with TEMPro v7.2 growth factor for Hillingdon applied to project flow to 2018.
(f) Average speeds based on LAEI data, taking into account slowing traffic at junctions

# APPENDIX C – MODEL VERIFICATION

## *NITROGEN DIOXIDE*

Most nitrogen dioxide ($NO_2$) is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions. Verification of concentrations predicted by the ADMS-Roads model has followed the methodology presented in LAQM.TG22.

Modelled annual mean concentrations of $NO_2$ have been compared with the concentrations measured at the following diffusion tube monitoring locations in 2018:

- Top of Colham Avenue, Yiewsley (HD51)
- Side of 104 Yiewsley High Street (HILL19)

The Defra NOxtoNO2 calculator has been used to determine the Road-NOx (i.e., the component of total NOx coming from road traffic) concentration using the mapped background $NO_2$ concentration of 25.4 µg/m$^3$. The measured Road-NOx concentrations are compared with the modelled Road-NOx concentrations in Figure C1.

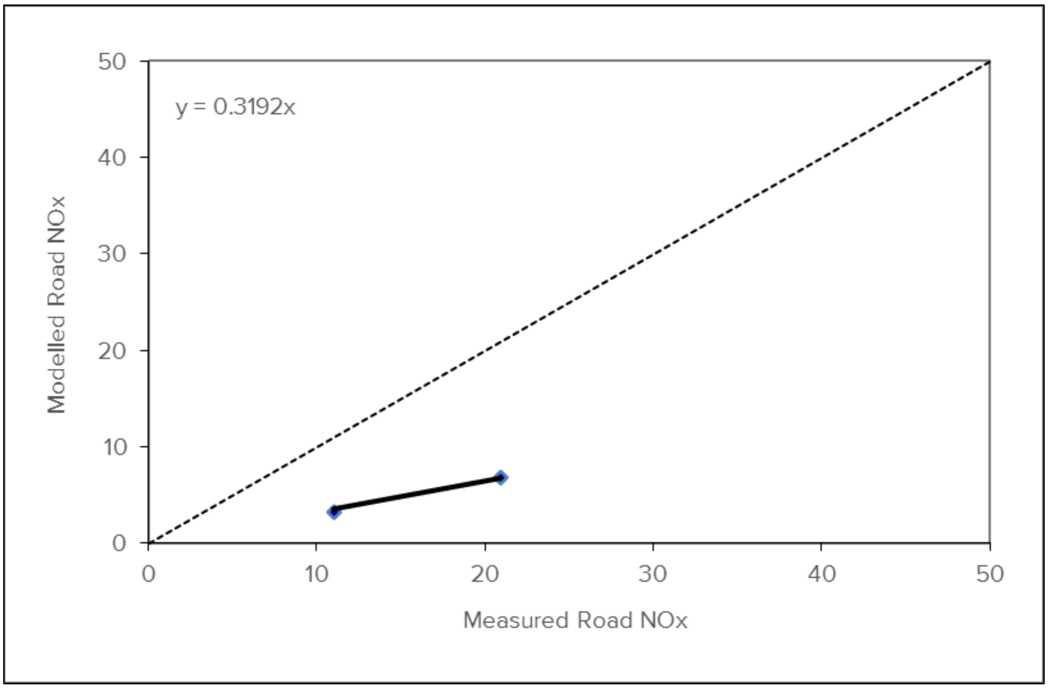


Figure C1: Comparison of Measured Road-NOx Concentrations with Modelled Road-NOx Concentrations.

A primary adjustment factor is determined as the ratio between the measured road-$NO_x$ contribution and the modelled Road-NOx contribution, forced through zero (1/0.3192 = 2.85). This factor was then applied to the modelled Road-NOx concentration for each monitoring location to provide an adjusted modelled Road-NOx concentration. The equivalent Road-$NO_2$ concentration is then determined using the Defra NOx from $NO_2$ calculator and added to the background $NO_2$ concentration, for comparison with the measured $NO_2$ concentration (see Figure C2).

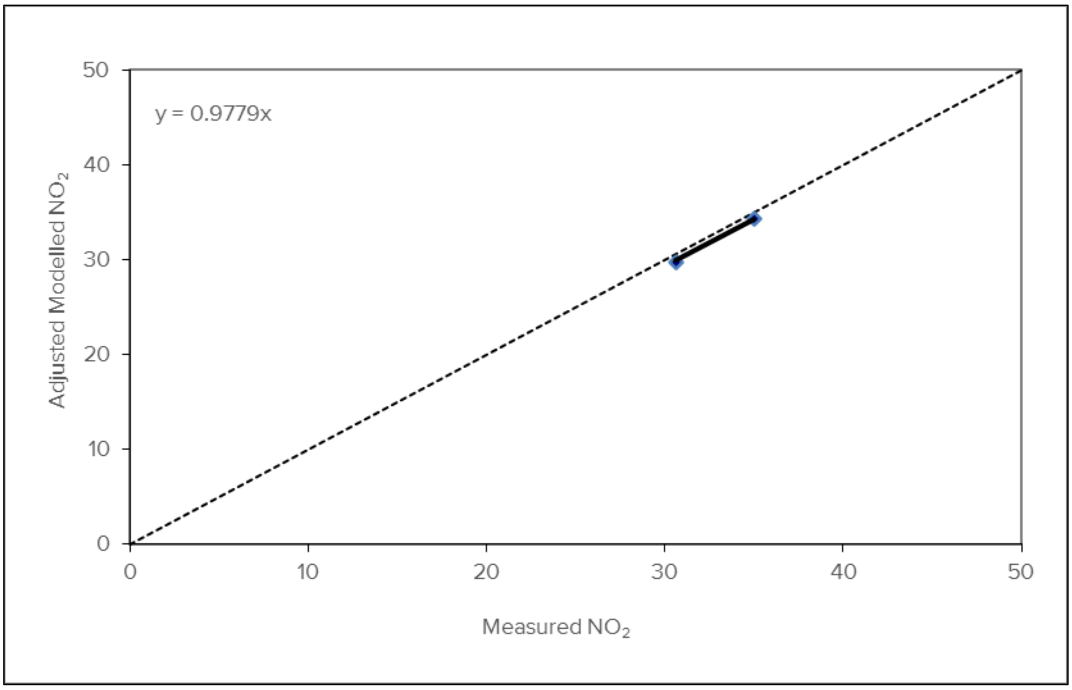


Figure C2: Comparison of Measured $NO_2$ Concentrations with the Adjusted Modelled $NO_2$ Concentrations.

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 $NO_2$ objective of 40 µg/m$^3$). The RMSE for the comparison of the adjusted modelled and measured $NO_2$ concentrations is 0.74 µg/m$^3$, 1.9% of the air quality objective. Since the RMSE is below 10% of the objective, further adjustment is not required.

In the absence of a local monitoring site for the verification of the modelled particulate concentrations, the NOx adjustment factor has been applied to the modelled Road-$PM_{10}$ and Road-$PM_{2.5}$ concentrations, in accordance with the guidance.

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