AIR QUALITY ASSESSMENT

Northwood Hills Library

Produced by XCO2 for Hillingdon First Ltd

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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 Northwood Hills Library, 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 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 building-related emissions, but not transport 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 the proposed re-development of Northwood Hills Library, in the London Borough of Hillingdon (LBH). The site location is presented in Figure 1.

The proposed development comprises the demolition of existing library and construction of a new mixed-use building comprising a replacement library and 9 x residential dwellings with car parking, cycle parking, waste storage and associated infrastructure. The proposed ground-floor plan is presented in Figure 2.

The site is not within an AQMA but is less than 500m from the London Borough of Harrow Air Quality Management Area (AQMA), a borough-wide designation declared in 2022 due to measured exceedances of the annual mean air quality objective for nitrogen dioxide (NO_2) and 24-hour mean objective for particulate matter, as PM_{10}. The primary source of NO_2 and PM_{10} in both Hillingdon and Harrow 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 Ground-Floor 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[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 (AQS) 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 µg/m^3, not to be exceeded more than 18 times per calendar year (a)	31 December 2005
	Annual	40 µg/m^3	
PM_{10}	24-hour	50 µg/m^3, not to be exceeded more than 35 times per calendar year (b)	31 December 2004
	Annual	40 µg/m^3	
$PM_{2.5}$	Annual	20 µg/m^3	2020
	Annual	12 µg/m^3 (interim target)	31 January 2028
	Annual	10 µg/m^3 (target)	31 December 2040
(a) Equivalent to the 99.8th percentile of 1-hour means. (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.

[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 not located within an 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.
- 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.

During the construction phase, the proposed development is expected to generate 15 – 20 HGV movements per day (AADT). Based on the above screening criteria, the impact of the temporary increase traffic 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 on-site machinery on local air quality is therefore anticipated to be negligible.

OPERATIONAL TRAFFIC

Nine parking spaces are proposed for the site; four for the residential element and five for the library. No additional trips will be associated with the new library, compared with the existing building, however the new dwellings are expected to generate 20 movements per day (AADT), including deliveries and servicing. The impact of the operational traffic on local air quality is therefore expected to be negligible, however an air quality neutral assessment has been undertaken for the new residential trips, in accordance with the London Plan.

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.

TRAFFIC DATA

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

[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.

- Department for Transport automatic traffic counts[18]; and
- The 2019 London Atmospheric Emissions Inventory (LAEI)[19].

The flows have been projected to 2025 (the opening year) using TEMPro v7.2[20]. 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 study area, therefore buildings effects have 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) [21]. 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[22].

METEOROLOGICAL DATA

Hourly sequential meteorological data from Heathrow Airport (approximately 14 km south of the proposed development) for 2019 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 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)[23] 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 2019 data from the diffusion tube HILL34 on Pinner Road. Diffusion tube site HILL33 is a kerbside site, which, in accordance with TG22, is not recommended for verification

[18] https://roadtraffic.dft.gov.uk/
[19] https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2019
[20] https://www.gov.uk/government/publications/tempro-downloads
[21] http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html
[22] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc
[23] Local Air Quality Management Technical Guidance (TG22), Defra, August 2022

purposes unless there is relevant kerbside exposure. Full details of the model verification process are presented in Appendix B.

EXPOSURE CRITERIA

The London Councils Air Quality Planning Guidance[24] 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.

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.

[24] 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. None of the monitoring sites are sufficiently close to the proposed development to be of relevance to the assessment.

LBH also undertake monitoring of NO_2 via an extensive network of passive diffusion tubes. Details of the monitoring locations that are nearest the proposed development 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
HILL33	Kerbside lamppost outside Roundabout House, 34 Pinner Road. HA6 1BZ	Kerbside	NO_2	510284	190524
HILL34	Roadside lamp-post, pavement outside 177/179 Pinner Road. HA6 1DB.	Roadside	NO_2	509900	190648
A	Hard 8 Bar & Kitchen, 1 Eastbury Road, Northwood HA6 3BG	Roadside	NO_2	509236	191478
B	Steve's Hairdressers, 60 Green Lane, Northwood HA6 2XW	Roadside	NO_2	509280	191450

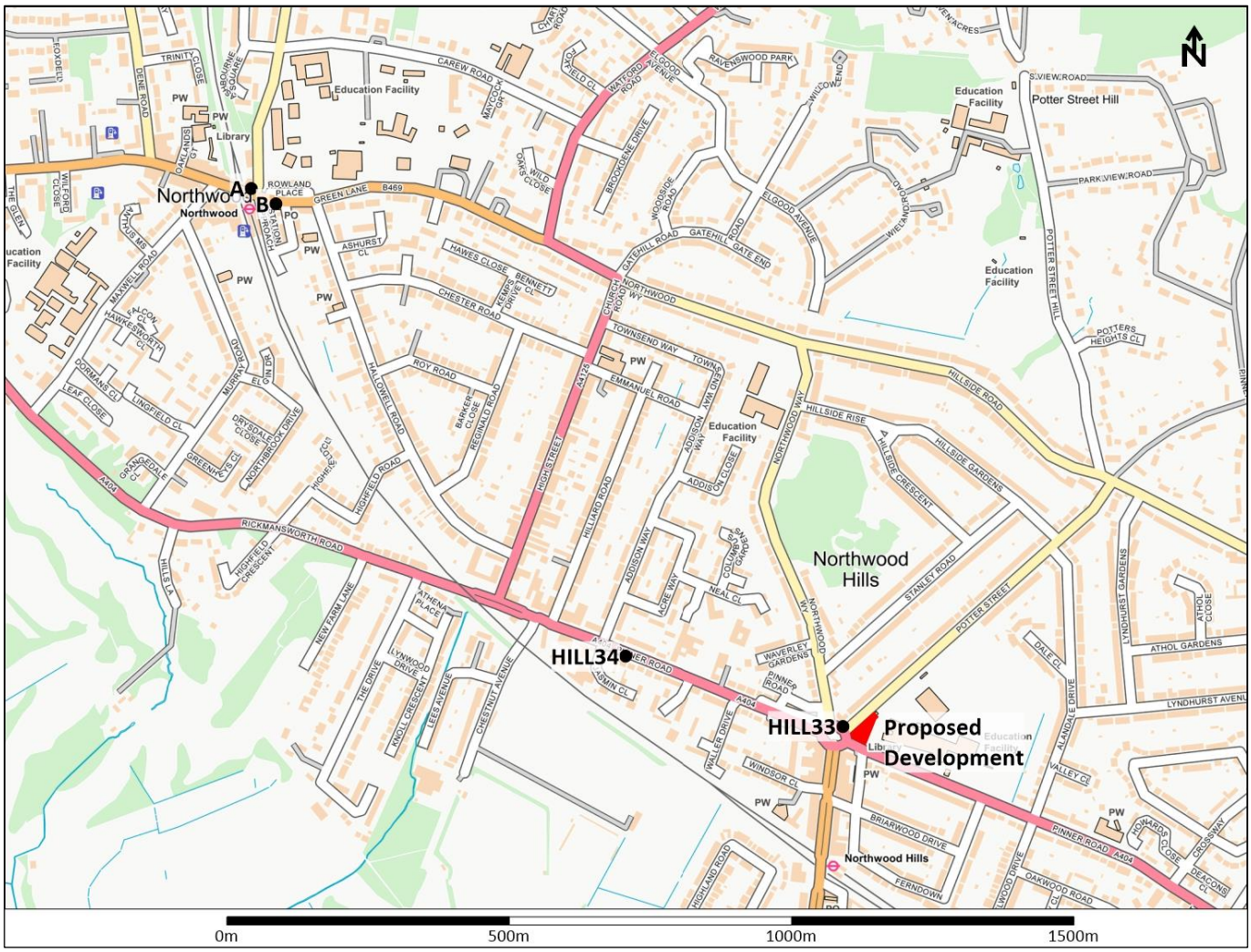

Figure 3: Location of Diffusion Tube Monitoring Sites

A summary of annual mean concentrations and short-term exceedances between 2015 and 2019 is presented in Table 4. Due to the impact of the Covid-19 pandemic restrictions on traffic levels, data from 2020 and 2021 has not been considered in the assessment. At the time of writing, LBH has not published their 2022 diffusion tube monitoring data, however both roadside and urban background automatic monitoring sites in the borough have recorded significantly lower annual mean NO_2 concentrations in 2022, than 2019 (see Table 5). Unfortunately, it is not possible to ascertain at this stage whether this will be an ongoing trend related to changes in behaviour as a consequence of the pandemic. On this basis, the most recent pre-pandemic data (2019) is considered to provide a more conservative estimate of existing air quality for assessment purposes.

Table 4: Annual Mean NO_2 Concentrations Measured by Diffusion Tube

Site ID	Type	2016	2017	2018	2019	Standard/ Objective
HILL33	Roadside	-	-	-	39.5	40
HILL34	Roadside	-	-	-	35.9	
A	Roadside	40.6	37.1	41.8	34.4	
B	Roadside	35.7	31.6	35.4	31.5	
(a) Tubes only in place for 6 months, but data has been annualised, in accordance with Defra technical guidance.						

Tubes HILL33 and HILL34 were new monitoring sites in 2019 and NO_2 concentrations were only measured from July to December, however the concentrations presented have been annualised by LBH in accordance with the Defra technical guidance.

Tube HILL33 is in very close proximity to the proposed development and is therefore likely to be representative of existing air quality at the site (although the tube is closer to the carriageway than the proposed building façade). The annual mean concentration at HILL33 was just 0.5 µg/m^3 below the objective in 2019. The concentrations measured at the other three diffusion tube sites were well within the objective in 2019.

Diffusion tubes are not able to measure short-term concentrations, however measurements across the UK[25] 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 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.

Table 5: Hillingdon Automatically Measured Annual Mean NO_2 Concentrations in 2019 and 2022

Site ID	Type	2019 (µg/m^3)	2022 (µg/m^3)	Change (%)
HI1	Roadside	34	28	-17.6%
HIL	Urban Background	45	28	-37.8%
HI3	Roadside	33	29	-12.1%
SIPS	Urban Background	30	24	-20.0%
HIL1	Urban Background	24	19	-20.8%
HIL5	Roadside	41	34	-17.1%

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[26]. 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.

[25] 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.
[26] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

The 2019 background NO_2, PM_{10} and $PM_{2.5}$ concentrations at the proposed development and verification site have been obtained from contour plots of the mapped data and are presented in Table 6. The mapped concentrations are well within the current UK air quality standards, however the $PM_{2.5}$ exceeds the 2040 concentration target of 10 µg/m^3.

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 6: Mapped 2019 Annual Mean Background Pollutant Concentrations (µg/m^3)

Pollutant	Proposed Development and Verification Site	Air Quality Standard
NO_2	17.2	40
PM_{10}	15.5	40
$PM_{2.5}$	10.6	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_{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 at the facades of sensitive receptors in the area are unlikely to exceed 24 $\mu g/m^3$, 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 7.

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

Table 7: 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
Northwood School	Adjacent	>100	High	Medium	High	High
Overall Sensitivity of the Area to Dust Impacts			**Medium**		**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.

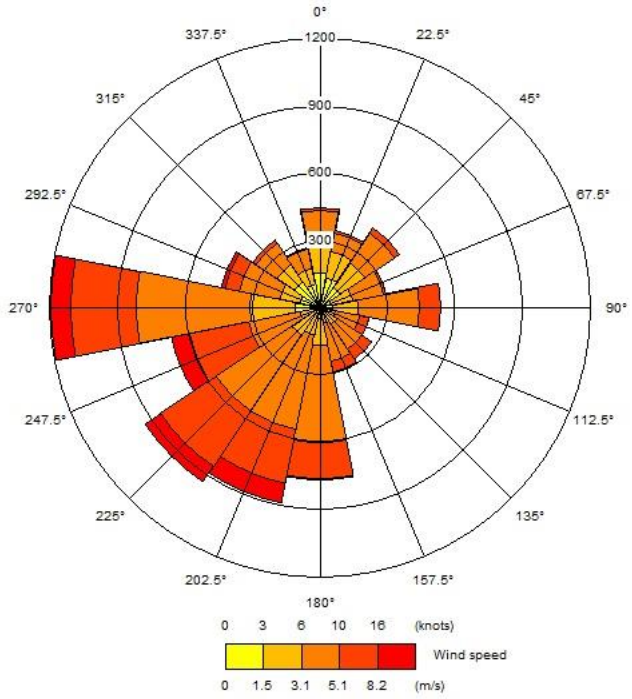

Figure 4: Wind Rose London Heathrow Airport

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 8.

Table 8: Evaluation of Dust Emission Magnitude

Dust Source	IAQM Criteria	Proposed Development	Dust Emission Magnitude
Demolition	Total building volume (m^3)	< 3,000	Small
	Potentially dusty material?	Brick	Medium
	On-site crushing and screening?	Possibly, if demolition material is to be reused.	Large
	Maximum height of demolition activities above ground-level (m)	6.5	Small
Overall Dust Emission Magnitude from Demolition			**Small**
Whilst crushing and screening may 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^2)	1,226	Small
	Soil type?	Clay below 500m made ground	Medium

Dust Source	IAQM Criteria	Proposed Development	Dust Emission Magnitude
	Number of heavy earth moving vehicles active at any one time	<5	Small
	Maximum bund height (m)	Expected <4m	Small
	Total material moved (tonnes)	< 20,000	Small
	Earthworks during wetter months?	Cannot be guaranteed.	Medium
Overall Dust Emission Magnitude from Earthworks			**Small**
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'.			
Construction	Total building volume (m^3)	<10,000	Small
	Potentially dusty construction materials?	Brick, concrete	Medium
	Piling?	Yes	Large
	On-site concrete batching?	No	-
	Sandblasting?	No	-
Overall Dust Emission Magnitude from Construction			**Small**
Whilst the construction materials are potentially dusty, the scale of the works is minor and therefore the dust emission magnitude is expected to be 'small'.			
Trackout	Number of outward HGV movements in any one day	<10	Small
	Dusty surface material?	There are existing areas of hardstanding and therefore there will be limited access by road vehicles over unmade ground.	Small
	Unpaved road length (m)	<50m	Small
Overall Dust Emission Magnitude from Trackout			**Small**

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 the 'medium' and 'high' sensitivity of the area to health and dust doing impacts, respectively, is presented in Table 9.

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

Table 9: Dust Risk (Pre-Mitigation)

Dust Source	Emission Magnitude	Human Health Risk	Dust Soiling Risk	Overall Risk
Demolition	Small	Low	Medium	**Medium**
Earthworks	Small	Low	Low	**Low**
Construction	Small	Low	Low	**Low**
Trackout	Small	Negligible	Low	**Low**

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_2 concentrations due to emissions from traffic on the local road network are presented a contour plot in Figure 5. The maximum concentration at the façade of the proposed development is less than 75% of the air quality objective. **The proposed development 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/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 library garden and picnic area, is negligible.

Figure 5: 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 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_{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 proposed development therefore falls within exposure category APEC-A for PM_{10}.**

The background $PM_{2.5}$ concentration used in the assessment of 10.6 µg/m^3, exceeds the Government's 2040 concentration target, but is below the 2028 interim target of 12 µg/m^3. 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 6: Predicted 2025 Ground-Floor Level Annual Mean PM_{10} Concentration ($\mu g/m^3$)

Figure 7: 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[27]. 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 residential dwellings are expected to generate 18 private vehicle trips on the local road network per day. An air quality neutral assessment has been undertaken using Transport Emission Benchmarks (TEB) for residential uses in Outer London, as shown in Table 10.

Table 10: Benchmarked Trip Rate

Land Use	No. of Dwellings	TEB (trips/ m^2/annum)	Benchmarked Trips (per annum)
Residential	9	447	**4,023**

The annual trip generation for the proposed development is 6,570, which is above the benchmarked trip rate. **The proposed development is therefore not Air Quality Neutral with respect to transport related emissions.** Additional mitigation measures will be required and agreed with LBH to offset the excess transport emissions. Alternatively, the guidance provides a methodology for calculating an off-setting payment, by calculating the damage cost associated with the excess NOx and $PM_{2.5}$ emissions (above the benchmark). The benchmarked and development emissions are presented in Table 11. The average distance travelled for office uses has been used for the educational uses.

Table 11: Benchmarked and Development Emissions

Land Use	Trip Rate (per annum)	Average Distance Per Trip	Emissions (g/veh-km)		Total Emissions (kg)	
			NOx	$PM_{2.5}$	NOx	$PM_{2.5}$
Benchmarked						
Residential	4,023	11.4	0.35	0.028	16.1	1.3
Development						
Residential	6,570	11.4	0.35	0.028	26.2	2.1

The offsetting amount has been calculated using the 2023 damage costs (2022 prices)[28], as shown in Table 12. In accordance with the guidance, the total offsetting amount is calculated over 30 years with a 2% annual uplift.

[27] London Plan Guidance Air Quality Neutral, GLA, February 2023
[28] www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance#annex-a

Table 12: Calculation of Offsetting Payment

Pollutant	Benchmark Emissions (t/annum)	Development Emissions (t/annum)	Excess Emissions (t/annum)	Damage Cost (£/t)	Offsetting Amount (£)
NOx	0.038	0.051	0.013	33,064	336.01
$PM_{2.5}$	0.0030	0.0045	0.0015	246,942	200.76
Total Annual Offsetting Amount					**536.78**
Total Offsetting Amount					**21,776.07**

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.**

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 and 'low' from earthworks and construction and trackout.

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. - 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. - Display the head or regional office contact information. - Record and respond to all dust and air quality pollutant emissions complaints. - Make the complaints log available to the local authority when asked. - 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. - 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. - 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. - Erect solid screens or barriers around dusty activities or at the site boundary that are at least as high as any stockpiles on site. - Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period. - Avoid site runoff of water or mud. - Keep site fencing, barriers and scaffolding clean using wet methods. - Remove materials from site as soon as possible. - Cover, seed or fence stockpiles to prevent wind whipping. - 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. - Ensure all vehicles switch off engines when stationary - no idling vehicles. - Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable. - Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials. - 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. - Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. - Use enclosed chutes and conveyors and covered skips. - Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. - 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. - Avoid bonfires and burning of waste materials.
Demolition	- Ensure water suppression is used during demolition operations. - Avoid explosive blasting, using appropriate manual or mechanical alternatives. - Bag and remove any biological debris or damp down such material before demolition.

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. - Carry out regular dust soiling checks of buildings within 100m of site boundary and cleaning to be provided if necessary.
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.
Construction	- Avoid scabbling (roughening of concrete surfaces) if possible. - 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.
Trackout	- Use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site. - Avoid dry sweeping of large areas. - Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport. - 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 proposed development (**APEC-A**).

All of the proposed parking spaces will have EVCP infrastructure. Five of the spaces will be active from opening with the remining four spaces passive until additional provision is required. The proposed development will include 16 bike spaces 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_{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.

The operational trip generation above the existing site uses will be minimal (20 AADT), 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_2, PM_{10} and $PM_{2.5}$ 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 emissions but not transport emissions. and transport-related emissions. Additional mitigation measures or a financial contribution will be agreed with the LBH to offset the excess 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) - Examples include residential dwellings, hospitals, schools and residential care homes.	- Regular exposure - High level of amenity expected. - Appearance, aesthetics or value of the property would be affected by dust soiling. - Examples include residential dwellings, museums, medium and long-term car parks and car showrooms.	- Nationally or Internationally designated site with dust sensitive features (b) - 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) - Examples include office and shop workers (d)	- Short-term exposure - Moderate level of amenity expected. - Possible diminished appearance or aesthetics of property due to dust soiling - Examples include parks and places of work	- Nationally designated site with dust sensitive features (b) - Nationally designated site with a particularly important plant species where dust sensitivity is unknown
Low	- Transient human exposure - Examples include public footpaths, playing fields, parks and shopping streets	- Transient exposure - Enjoyment of amenity not expected. - Appearance and aesthetics of property unaffected - 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 >50,000m^3 - Potentially dusty material (e.g., concrete) - Onsite crushing and screening - Demolition activities >20m above ground level.	- Total building volume 20,000 - 50,000m^3 - Potentially dusty material - Demolition activities 10 - 20m above ground level.	- Total building volume <20,000m^3 - Construction material with low potential for dust release - Demolition activities <10m above ground level - Demolition during wetter months
Earthworks	- Total site area >10,000m^2 - Potentially dusty soil type (e.g., clay) - >10 heavy earth moving vehicles active at any one time. - Formation of bunds >8m in height - Total material moved >100,000 tonnes	- Total site area 2,500 - 10,000m^2 - Moderately dusty soil type (e.g., silt) - 10 heavy earth moving vehicles active at any one time. - Formation of bunds 4 - 8m in height - Total material moved 20,000 - 100,000 tonnes	- Total site area <2,500m^2 - Soil type with large grain size (e.g., sand) - <5 heavy earth moving vehicles active at any one time. - Formation of bunds <4m in height - Total material moved <20,000 tonnes. - Earthworks during wetter months
Construction	- Total building volume >100,000m^3 - On site concrete batching - Sandblasting	- Total building volume 25,000 - 100,000m^3 - Potentially dusty construction material (e.g., concrete) - On site concrete batching	- Total building volume <25,000m^3 - Material with low potential for dust release (e.g., metal cladding or timber
Trackout	- >50 HGV movements in any one day (a) - Potentially dusty surface material (e.g., high clay content) - Unpaved road length >100m	- 10 - 50 HGV movements in any one day (a) - Moderately dusty surface material (e.g., silt) - Unpaved road length 50 - 100m	- <10 HGV movements in any one day (a) - 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	2019 Verification	2025 Exposure
ADMS-Roads Model Version	5.1	5.1
Vehicle Emission Factors	EFT v11 for 2019	EFT v11 for 2025
Meteorological Data	Hourly sequential data from London Heathrow Airport (2019)	Hourly sequential data from London Heathrow Airport (2019)
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)
Pinner Road west of Northwood Hills Circus	29,587 (a)	2.1%	32
(a) DfT ATC 37107 for 2019			

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

Road Link	2024 AADT	HGV (%)	Average Speed (kph) (b)
Potter St	845 (a)	3.1%	16
Northwood Way	936 (a)	16.5%	16
Pinner Road west of Northwood Hills Circus	31217 (b)	2.1%	24
Pinner Road east of Northwood Hills Circus	17463 (c)	2.1%	24
Joel Street	19352 (a)	5.8%	24
Roundabout	34906 (d)	3.3%	16
(a) LAEI 2019 with TEMPro v7.2 2019 – 2025 growth factor for Hillingdon applied. (b) DfT ATC 37107 for 2019 with TEMPro v7.2 2019 – 2025 growth factor for Hillingdon applied. (c) DfT ATC 58181 for 2019 with TEMPro v7.2 2019 – 2025 growth factor for Hillingdon applied (d) Roundabout flow assumed to be half the sum of the traffic on all adjoining links.			

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 monitoring location in 2018:

- HILL34 on Pinner Road

The Defra NOxtoNO_2 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 (see Table 6). The ratio of the measured and modelled Road-NOx concentrations provides an adjustment factor for the modelled concentrations at the proposed development. An equivalent Road-NO_2 concentration is then determined using the Defra NOx from NO_2 calculator and added to the background NO_2 concentration to predict the total concentrations at the site for comparison with the air quality objectives.

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

Table C1: Verification Calculation (NO_2)

Parameter	
Measured NO_2 Concentration	35.9 µg/m^3
Background NO_2 Concentration	17.2 µg/m^3
Measured Road-NOx Concentration	40.9 µg/m^3
Modelled Road-NOx Concentration	13.6 µg/m^3
Adjustment Factor	**3.0**

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