Air Quality Assessment Update:

St Andrew's Park, Hillingdon

June 2024

Experts in air quality management & assessment

Document Control

Client	Anchor Hanover Group	**Principal Contact**	Elizabeth Bloomfield (Pegasus Group)

Job Number	J10/15582A/10

Report Prepared By:	Wale Abiye & Jack Buckley

Document Status and Review Schedule

Report No.	Date	Status	Reviewed by
J10/15582A/10/1/F2	4 June 2024	Final	Dr Jessica Muirhead (Associate Director)

Air Quality Consultants Ltd
23 Coldharbour Road, Bristol BS6 7JT Tel: 0117 974 1086
24 Greville Street, Farringdon, London, EC1N 8SS Tel: 020 3873 4780
aqc@aqconsultants.co.uk

Registered Office: 23 Coldharbour Road, Bristol BS6 7JT
Companies House Registration No: 2814570

1 Introduction

1.1 This report describes the potential air quality impacts associated with the proposed change of use of the development at St Andrew's Park in the London Borough of Hillingdon (LBH), from C2 (accommodation with care) to C3 (residential accommodation). The development was granted planning permission (ref: 585/APP/2019/829) by LBH in February 2020 for use class C2 and has since completed construction. The current proposal seeks to secure planning approval to occupy the completed development as an accommodation for older people (use class C3). This report therefore provides an update to the previous assessment (document ref: J3605A/1/F1) carried out by Air Quality Consultants (AQC) in March 2019 (AQC, 2019).

1.2 No changes are proposed to the layout of the site, the proposed means of vehicular and pedestrian access will remain as per the consented scheme and there is no proposed alteration to the level of car and cycle parking provided. The energy strategy will also remain all-electric, so there will be no new point sources of emissions. The Transport Consultants (Bellamy Roberts) have provided an updated Transport Statement, which has been used in the updated assessment.

1.3 The Greater London Authority's (GLA's) London Plan (GLA, 2021) requires new developments to be air quality neutral. Given the proposed change of use, and the publication of new London Plan Guidance (Air Quality Neutral) (GLA, 2023) since the previous assessment was undertaken, an updated assessment is set out in this report.

1.4 The GLA has also released Supplementary Planning Guidance on the Control of Dust and Emissions from Construction and Demolition (GLA, 2014), however the current proposal only involves the change of use of the completed building; thus, a construction dust risk assessment is not required and will not be considered further in this assessment.

1.5 This report has been prepared taking into account all relevant local and national guidance and regulations.

2 Policy Context

2.1 All European legislation referred to in this report is written into UK law and remains in place. The following Policy, Legislation and Guidance has been followed when preparing this document. For details of each, please see Appendix A2.

- Air Quality Strategy 2007
- Air Quality Strategy 2023
- Clean Air Strategy 2019
- Environment Act 2021
- Environmental Improvement Plan 2023
- Planning Policy
- London-Specific Policies
    - The London Plan
    - London Environment Strategy
    - Mayor's Transport Strategy
    - GLA LPG: Air Quality Neutral
    - Air Quality Focus Areas
- Local Policies
- Air Quality Action Plans
    - National Air Quality Plan
    - Local Air Quality Action Plan

3 Pollutants of Concern

3.1 The main air pollutants of concern are NO_2, PM_{10} and $PM_{2.5}$.

3.2 Since the previous assessment was carried out, Defra has set two new targets, and two new interim targets, for $PM_{2.5}$ concentrations in England. One set of targets focuses on absolute concentrations. The long-term target is to achieve an annual mean $PM_{2.5}$ concentration of 10 µg/m^3 by the end of 2040, with the interim target being a value of 12 µg/m^3 by the start of 2028[1]. The second set of targets relate to reducing overall population exposure to $PM_{2.5}$. By the end of 2040, overall population exposure to $PM_{2.5}$ should be reduced by 35% compared with 2018 levels, with the interim target being a reduction of 22% by the start of 2028.

3.3 Defra has provided advice (Defra, 2023) which explains that there is no current requirement to consider the new $PM_{2.5}$ targets in planning decisions and that guidance to local planning authorities will be forthcoming before this position changes. In the future, when planning decisions do need to consider the new targets, the expectation is that this will focus on reducing emissions from new development rather than there being a direct requirement for planning-related air quality assessments to predict $PM_{2.5}$ concentrations.

3.4 For the time being, therefore, no assessment is required, and indeed no robust assessment is possible, in relation to the new $PM_{2.5}$ targets and they are not considered further.

3.5 As explained in Paragraph A2.21 of Appendix A2, the GLA has also set a target to achieve an annual mean $PM_{2.5}$ concentration of 10 µg/m^3 by 2030. This target was derived from an air quality guideline set by WHO in 2005. In 2021, WHO updated its guidelines, but the London Environment Strategy (GLA, 2018) considers the 2005 guideline of 10 µg/m^3. While there is no explicit requirement to assess against the GLA target of 10 µg/m^3, it has nevertheless been included within this assessment.

3.6 There have been no other changes to the assessment criteria since the previous assessment was carried out. The relevant air quality criteria for this assessment therefore remain as provided in Table 1.

[1] Meaning that it will be assessed using measurements from 2027. The 2040 target will be assessed using measurements from 2040. National targets are assessed against concentrations expressed to the nearest whole number, for example a concentration of 10.4 µg/m^3 would not exceed the 10 µg/m^3 target.

Table 1: Air Quality Criteria for NO_2, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Value
NO_2	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
PM_{10}	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3
$PM_{2.5}$	Annual Mean	20 µg/m^3 [a]
	Annual Mean	10 µg/m^3 by 2030

[a] There is no numerical $PM_{2.5}$ objective for local authorities (see Paragraph 3.2). Convention is to assess against the UK limit value which is currently 20 µg/m^3.

4 Baseline Conditions

Relevant Features

4.1 Relevant features in the vicinity of the proposed development are the same as those in the previous assessment. The location of the proposed development is highlighted in Figure 1**Error! Reference source not found.**.

Industrial Sources

4.2 As previously assessed, no significant industrial or waste management sources have been identified that are likely to affect the proposed development, in terms of air quality.

Local Air Quality Monitoring

4.3 The LBH operates 12 automatic monitoring stations within its area, but none are located close to the proposed development. The LBH also operates a number of nitrogen dioxide (NO_2) monitoring sites using diffusion tubes prepared and analysed by Gradko International (using the 50% TEA in acetone method). These include two monitors (HILL02 and HILL24) located within 350 m of the proposed development.

4.4 Available annual mean results for the years 2017 and 2022 are summarised in Table 2**Error! Reference source not found.**. The monitoring locations are shown in Figure 1. The monitoring data have been taken from LBH's 2022 Annual Status Report (LBH, 2023).

Table 2: Summary of Annual Mean NO2 Monitoring (2017 - 2022) (µg/m^3)

Site No.	Site Type	Location	2017	2018	2019	2020	2021	2022
HILL02	Roadside	Uxbridge Day Nursery Park Road Uxbridge (on wire Fence)	**40.1**	**40.7**	36.9	28.9	30.9	32.8
HILL24	Roadside	59 Hillingdon Road, Uxbridge Lamp Post (56)	**40.0**	36.9	34.7	27.6	32.0	31.1
Objective			**40**					

[a] Exceedances of the objectives are shown in bold.

4.5 Measured annual mean NO_2 concentrations have been below the annual mean objective at the two monitors since 2019. There has been an overall reduction in annual mean concentrations of NO_2 since 2017.

4.6 While the 2020 and 2021 result have been presented in this Section for completeness, it is not relied upon in any way as it will not be representative of 'typical' air quality conditions due to the considerable impact of the Covid-19 pandemic on traffic volumes and thus pollutant concentrations.

4.7 Since the annual mean NO_2 concentrations have remained below 60 µg/m^3, it is unlikely that the 1-hour mean objective has been exceeded at any of the two monitors in recent years.

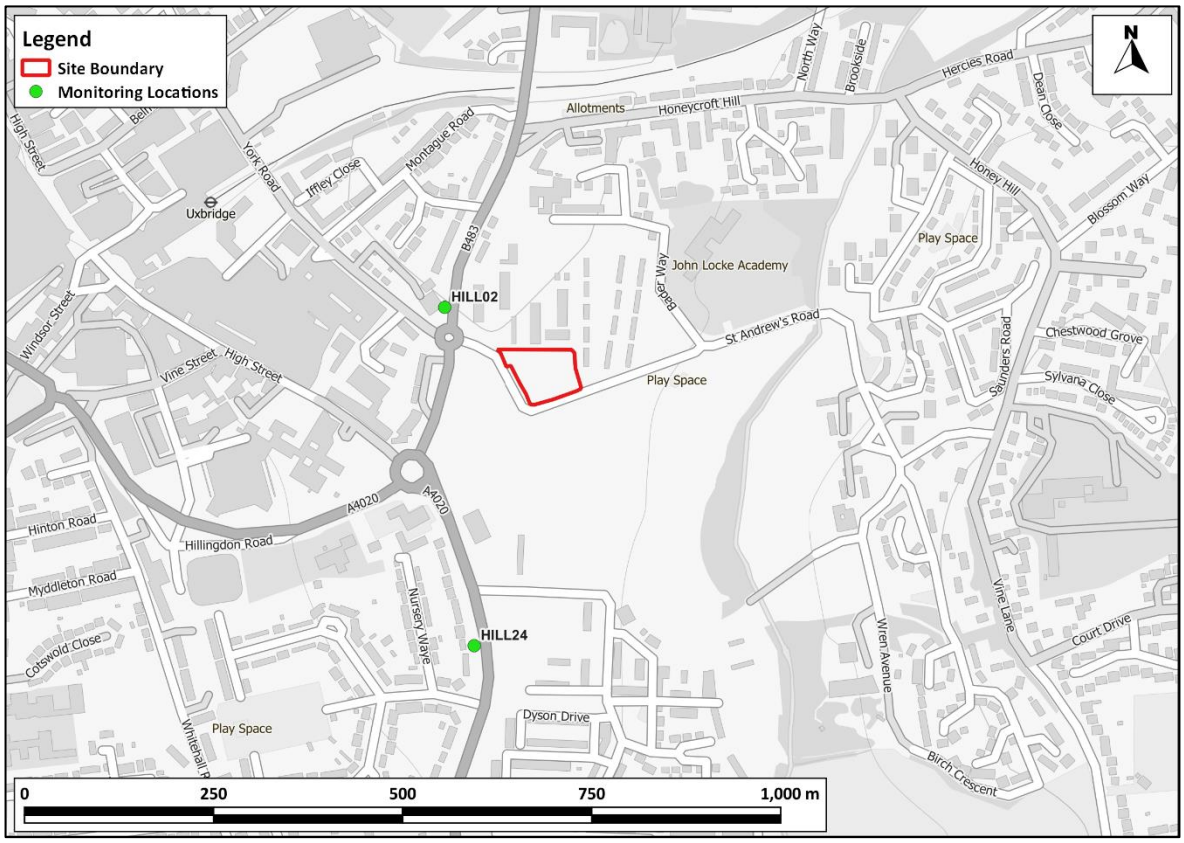

Figure 1: Monitoring Locations

4.8 There have not been any exceedances of the PM_{10} and $PM_{2.5}$ objectives at any of the automatic monitors operated by LBH since 2016 (LBH, 2023).

LAEI Predicted Concentrations

4.9 The maximum LAEI modelled concentrations of NO_2, PM_{10}, and $PM_{2.5}$ at the proposed development are shown in Table 3 for all the available years. In each year, maximum pollutant concentrations are well below their respective objectives. The annual mean $PM_{2.5}$ concentration is also below the GLA target by 2025.

Table 3: Maximum Modelled LAEI Concentrations at the Proposed Development (µg/m^3)

Year	NO_2	PM_{10}	$PM_{2.5}$
2019	25.6	15.4	10.1
2025	18.6	14.1	9.0
2030	14.5	12.9	8.2
Objective / GLA target	**40**	**40**	**20/10** [a]

[a] The 20 µg/m^3 $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it. 10 µg/m^3 is the GLA target for annual mean $PM_{2.5}$; again, there is no requirement for local authorities to meet this.

5 Impact Assessment

Operational Impacts - Approach to Assessment

5.1 The traffic consultant for the proposed development (Bellamy Roberts) has predicted that the proposed development will generate a total of 108 two-way daily traffic, compared with 226 two-way daily traffic by the consented and completed scheme. This change will lead to a net reduction of 118 two-way daily traffic flows (or 52%) compared to the consented and completed scheme.

5.2 Road traffic impacts from the proposed development on the surrounding area have thus been screened out, taking account of the net change in traffic generation by the proposed development in comparison with the consented and completed scheme, and the industry screening criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

5.3 The impacts of NO_2, PM_{10} and $PM_{2.5}$ concentrations from the existing road network on new residents of the development have been assessed qualitatively, taking account of the conclusions of the previous assessment, recent local air quality monitoring data, the GLA's LAEI predicted concentrations, and measures to improve vehicle emissions across the United Kingdom.

Impacts at Existing Receptors

5.4 As stated above, there is a reduction in daily traffic of 118 movements compared to the consented scheme. As such, it is judged that the relevant screening thresholds of an increase in HDVs of 25 AADT and an increase in LDVs of 100 AADT will not be exceeded (Moorcroft and Barrowcliffe et al, 2017) and there is no requirement for a detailed assessment of road traffic impacts at existing receptors.

5.5 Therefore, it can be concluded that the proposed development will not have a significant impact on local roadside air quality.

Site Suitability

5.6 The previous air quality assessment of the consented and completed scheme included a worst-case sensitivity test, which assumes higher NO_2 emissions from some diesel vehicles than have been predicted by Defra, using AQC's Calculator Using Realistic Emissions for Diesels (CURED (AQC, 2017). Based on the worst-case scenario, the conclusion was that residents will experience acceptable air quality conditions with NO_2 concentrations below objective.

5.7 Furthermore, maximum LAEI predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ across the site in 2019 and 2025 are well below the objectives, and the $PM_{2.5}$ concentration is below the GLA's $PM_{2.5}$ target in 2025.

5.8 Additionally, measures (as described Appendix A2, Paragraphs A2.15 to A2.26) to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of

more stringent emissions standards, largely via European legislation (which is written into UK law). Consequently, concentrations are likely to have improved further since the previous assessment was carried out.

5.9 It can be therefore considered that future users of the proposed development will experience acceptable air quality, and there is no need for more detailed assessment.

6 'Air Quality Neutral'

6.1 The purpose of the London Plan's requirement that development proposals be 'air quality neutral' is to prevent the gradual deterioration of air quality throughout Greater London. The 'air quality neutrality' of a proposed development, as assessed in this section, does not directly indicate the potential of the proposed development to have significant impacts on human health (this has been assessed separately in the previous section). The air quality neutral assessment has been undertaken using the latest GLA's London Plan Guidance (Air Quality Neutral) (GLA, 2023).

6.2 The GLA's London Plan Guidance (Air Quality Neutral) (GLA, 2023) sets out guidance on how an 'air quality neutral' assessment should be undertaken. It also provides a methodology for calculating an offsetting payment if a development is not 'air quality neutral' and it is not possible to identify or agree appropriate and adequate mitigation.

6.3 Appendix A3 sets out the emissions benchmarks from the guidance. The approach has been to calculate the emissions from the development and to compare them with these benchmarks.

Building Emissions

6.4 The proposed development does not include any combustion plant for the routine provision of electricity, heating, or hot water. Paragraph 2.2.1 of the guidance states that developments which *"do not include new combustion plant such as gas-fired boilers" are "assumed to be Air Quality Neutral"*.

6.5 Therefore, taking account of the above, the proposed development is air quality neutral in terms of building emissions.

Road Transport Emissions

6.6 The transport consultant, Bellamy Roberts, has advised that the proposed development is expected to generate 108 trips per day, which amounts to a total of 39,420 trips per year. These values are set out in Table 4. Appendix A3 provides the Benchmark Trip Rates for each land use category based on the number of dwellings and the benchmark calculations are also shown in Table 4. For context, the consented development is estimated to generate 283 daily traffic (103,295 trips per year) based on the same number of dwellings.

Table 4: Calculation of Transport Benchmarks for the Proposed Development [a]

Use Class	dwellings	Benchmark		Annual Trips from Development
		trips/dwelling /yr	Trips/yr	
Residential [b]	**72**	**447**	**32,184**	39,420
Total Trip Rate			**32,184**	**39,420**

[a] Each trip is 1-way (i.e., a return journey would be two trips). Considers car trips only.

6.7 The total development trip rate, as presented in Table 4, is greater than the TEB. The proposed development is therefore not air quality neutral in terms of transport emissions.

Summary

6.8 While the proposed development will be better than air quality in terms of building emissions, its car trip generation exceeds the air quality neutral benchmark derived for an average development in outer London. Mitigation will be required to account for the excess transport emissions above the air quality neutral benchmark; this is discussed in the next Section.

Offsetting Payments

6.9 An offsetting payment calculation has been undertaken using the methodology detailed within section 5.2 of the guidance (GLA, 2023).

6.10 The calculations of the excess annual emissions from transport emissions of the proposed development can be seen in Table 5, with the offsetting amounts presented in Table 6. The total offsetting payment for the proposed development is **£61,865.57.**

Table 5: Excess Emissions from Road Transport

Description	NOx		$PM_{2.5}$	
	Development	Benchmark	Development	Benchmark
Total Car Trips per Year [a]	39,420	32,184	39,420	32,184
Average Distance per Trip (km)	11.4		11.4	
Emissions per Vehicle-km (g)	0.35		0.028	
Total Transport Emissions (kg/annum)	157.3	128.4	12.6	10.3
Excess Emissions (tonnes/annum)	0.02887		0.00231	

[a] Each trip is 1-way (i.e., a return journey would be two trips). Considers car trips only.

Table 6: Offsetting Payment Calculation

Description	Excess Emissions (tonnes)	Central Damage Cost (£/tonne)	Annual Offsetting Amount (£)
Building Emissions NOx	----	----	----
Transport Emissions NOx	0.02887	£33,064 [b]	954.61
Transport Emissions $PM_{2.5}$	0.00231	£246,942 [b]	570.37
Annual Total	-	-	**1,524.98**
30-yr Total [c]	-	-	**61,865.57**

[a] Central cost for domestic NOx emissions from Defra's guidance on 'air quality appraisal: damage cost guidance'[2]

[b] Central cost for Outer London road transport NOx/$PM_{2.5}$ emissions from Defra's guidance on 'air quality appraisal: damage cost guidance'[2]

[c] This is required in the GLA guidance (GLA, 2023), which specifies the calculation: $\{(Annual\ Total\ Offsetting\ Amount)x[(1+2\%\ uplift)^{30\ years}-1]\}/2\%\ uplift$

It is understood that an offsetting payment of £75,386 has already been made based on the calculated excess emissions of the consented scheme. This amount previously paid is greater than the updated offsetting payment (£61,865.57) and therefore no further payment is required.

[2] https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance

7 Mitigation

Good Design and Best Practice

7.1 The EPUK/IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required.

7.2 The EPUK/IAQM guidance predates the recent publication by Defra of long-term air quality targets for $PM_{2.5}$. While it is not appropriate to determine individual planning applications based on whether future $PM_{2.5}$ concentrations in an area will be above or below the concentration target, it is nevertheless appropriate that new development contributes to meeting the national targets by ensuring that air quality is taken into account in development design.

7.3 The proposed development incorporates the following good design and best practice measures, which have been accounted for in the assessment as far as is possible:

- use of an all-electric energy strategy for heating to avoid the need for on-site combustion; and
- provision of cycle parking spaces.

Recommended Mitigation

Road Traffic Impacts

7.4 The assessment has demonstrated that the overall air quality effect of the proposed development will be 'not significant'; it will not introduce any new exposure into areas of unacceptable air quality, nor will the development-generated traffic emissions have a significant impact on local air quality. It is, therefore, not considered appropriate to propose further mitigation measures for this development.

Air Quality Neutral

7.5 An offsetting amount of £61,865.57 has been calculated following GLA guidance, which is less than the already paid offsetting payment. Therefore no further mitigation is required.

8 Conclusions

8.1 The assessment has considered the impacts of the proposed development on local air quality in terms of emissions from road traffic generated by the completed and occupied development. It has also identified the air quality conditions that future residents will experience.

Operational Impacts

8.2 Air quality conditions for future residents of the proposed development have been shown to be acceptable, with concentrations well below the air quality objectives throughout the site. $PM_{2.5}$ concentrations will also be below the GLA target.

8.3 The traffic generated by the proposed development will be below industry screening thresholds and it will not introduce any combustion sources. Thus, the proposed development will have a negligible impact on air quality conditions at all existing receptors.

8.4 The overall operational air quality effects of the proposed development are judged to be 'not significant'.

Air Quality Neutral

8.5 The trip generation of the proposed development exceeds the air quality neutral benchmark derived for an average development in outer London, and an offsetting payment calculated. This sum is less than what has already been paid for the site and as such no further payment is required.

Policy Implications

8.6 Taking into account these conclusions, it is judged that the proposed development is consistent with Paragraph 191 of the NPPF, being appropriate for its location both in terms of its effects on the local air quality environment and the air quality conditions for future residents. It is also consistent with Paragraph 192, as it will not affect compliance with relevant limit values or national objectives.

8.7 The proposed development is compliant with Policy SI 1 of the London Plan in the following ways:

- it will not lead to further deterioration of existing poor air quality;
- it will not cause and exceedances of legal air quality limits; and
- it will not create new exposure to poor air quality.

8.8 The proposed development is also consistent with Policy DM14 of LBH's Local Plan as it is compliant with national air quality objectives for pollutants. The proposed development is also consistent with Policy DMT 1 as it will not have any significant adverse transport or associated air quality impacts on the local and wider environment, particularly on the strategic road network. It is also consistent with Policy DMT 2 as it will not contribute to the deterioration of air quality.

9 References

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Glossary

AADT	Annual Average Daily Traffic
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
BEB	Building Emissions Benchmark
CAZ	Central Activities Zone
Defra	Department for Environment, Food and Rural Affairs
EPUK	Environmental Protection UK
EU	European Union
EV	Electric Vehicle
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
Focus Area	Location that not only exceeds the annual mean limit value for NO_2 but also has a high level of human exposure
GLA	Greater London Authority
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LBH	London Borough of Haringey
LDV	Light Duty Vehicles (<3.5 tonnes)
LEZ	Low Emission Zone
$\mu g/m^3$	Microgrammes per cubic metre
NO_2	Nitrogen dioxide
NPPF	National Planning Policy Framework
OEP	Office for Environmental Protection
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the

	standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TEA	Triethanolamine – used to absorb nitrogen dioxide
TEB	Transport Emissions Benchmark
ULEZ	Ultra Low Emission Zone

10 Appendices

A1 EPUK & IAQM Planning for Air Quality Guidance

A1.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

"Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- the positive benefits provided through other material considerations".

Recommended Best Practice

A1.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

"The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions".

A1.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m^2 of commercial floorspace;
- are carried out on land of 1 ha or more.

A1.4 The good practice principles are that:

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new "street canyon", as this inhibits pollution dispersion;

- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;
- The provision of at least 1 Electric Vehicle (EV) "rapid charge" point per 10 residential dwellings and/or 1000 m^2 of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
- All gas-fired boilers to meet a minimum standard of <40 mgNOx/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:

  Spark ignition engine: 250 mgNOx/Nm^3;

  Compression ignition engine: 400 mgNOx/Nm^3;

  Gas turbine: 50 mgNOx/Nm^3.

- A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNOx/Nm^3 and 25 mgPM/Nm^3.

A1.5 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

"It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the "damage cost approach" used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential".

A1.6 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

- Support and promotion of car clubs;
- Contributions to low emission vehicle refuelling infrastructure;
- Provision of incentives for the uptake of low emission vehicles;
- Financial support to low emission public transport options; and
- Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

"There may be a requirement to carry out an air quality assessment for the impacts of the local area's emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

- *the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- *the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- *the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular nitrogen dioxide), that would cause unacceptably high exposure for users of the new development; and*
- *the presence of a source of odour and/or dust that may affect amenity for future occupants of the development".*

Impacts of the Development on the Local Area

A1.7 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m^2 of floor space for all other uses or a site area greater than 1 ha.

A1.8 Coupled with any of the following:

- the development has more than 10 parking spaces; and/or
- the development will have a centralised energy facility or other centralised combustion process.

A1.9 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;
- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor.

A1.10 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

A1.11 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

"Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NOx gas boiler or a 30kW CHP unit operating at <95mg/Nm^3.

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable".

A1.12 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

"The criteria provided are precautionary and should be treated as indicative. They are intended to function as a sensitive 'trigger' for initiating an assessment in cases where there is a possibility of significant effects arising on local air quality. This possibility will, self-evidently, not be realised in many cases. The criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement, bearing in mind that the objective is to identify situations where there is a possibility of a significant effect on local air quality".

A1.13 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

"The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. Similarly, it may be possible to conduct a quantitative assessment that does not require the use of a dispersion model run on a computer".

A1.14 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

A1.15 There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:

- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
- a judgement on the overall significance of the effects of any impacts.

A1.16 The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either 'significant' or 'not significant'. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as '*slight*' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a '*moderate*' or '*substantial*' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

A1.17 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.

A1.18 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A4.

A2 Policy

Air Quality Strategy 2007

A2.1 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives.

Air Quality Strategy 2023

A2.2 The Air Quality Strategy: Framework for Local Authority Delivery 2023 (Defra, 2023a) sets out the strategic air quality framework for local authorities and other Air Quality Partners in England. It sets out their powers and responsibilities, and actions the government expects them to take. It does not replace other air quality guidance documents relevant to local authorities.

Clean Air Strategy 2019

A2.3 The Clean Air Strategy (Defra, 2019a) sets out a wide range of actions by which the UK Government, in partnership with the Governments of Scotland, Wales and Northern Ireland, will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

Environment Act 2021

A2.4 The UK's new legal framework for protection of the natural environment, the Environment Act (2021) passed into UK law in November 2021. The Act gives the Government the power to set long-term, legally binding environmental targets. It also establishes an Office for Environmental Protection (OEP), responsible for holding the government to account and ensuring compliance with these targets.

A2.5 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (SI 2023 No. 96) sets two new targets for future concentrations of $PM_{2.5}$. These targets are described in Paragraph 3.6.

Environmental Improvement Plan 2023

A2.6 Defra published its 25 Year Environment Plan in 2018 (Defra, 2018a). The Environment Act (2021) requires Defra to review this Plan at least every five years. The Environmental Improvement Plan

2023 (Defra, 2023b) is the first revision. This outlines the progress made since 2018 and adds detail to the goals defined in the 2018 Plan, including that of achieving clean air.

A2.7 The Environmental Improvement Plan 2023 sets out the new air quality targets which have been set for concentrations of $PM_{2.5}$. These targets, which are described in more detail in Paragraph 3.6, include the long-term targets in the Statutory Instrument described in Paragraph 2.16, and interim targets to be achieved by 2028.

A2.8 The 2023 Plan outlines the role of local authorities in helping it meet both its targets and existing commitments. It also outlines the respective roles of industry, agricultural sectors, and the Department for Transport in providing the coordinated action required to meet both its new, and pre-existing targets and commitments.

Planning Policy

National Policies

A2.9 The National Planning Policy Framework (NPPF) (2023) sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which (Paragraph 8c) is an environmental objective:

"to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy".

A2.10 To prevent unacceptable risks from air pollution, Paragraph 180 of the NPPF states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by…preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air quality".

A2.11 Paragraph 191 states:

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

A2.12 More specifically on air quality, Paragraph 192 makes clear 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.".

A2.13 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019), which includes guiding principles on how planning can take account of the impacts of new development on air quality.

A2.14 The PPG sets out the information that may be required in an air quality assessment, making clear that:

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

London-Specific Policies

The London Plan

A2.15 The London Plan (GLA, 2021) sets out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. The key policy relating to air quality is Policy SI 1 on Improving air quality, Part B1 of which sets out three key requirements for developments:

"Development proposals should not:

- *lead to further deterioration of existing poor air quality*
- *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*
- *create unacceptable risk of high levels of exposure to poor air quality".*

A2.16 The Policy then details how developments should meet these requirements, stating:

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

- *development proposals must be at least Air Quality Neutral*
- *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*
- *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*

- *development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure".*

A2.17 Part C of the Policy introduces the concept of Air Quality Positive for large-scale development, stating:

"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:

- *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."*

A2.18 The proposed development is not large-scale development, thus an Air Quality Positive statement is not required.

A2.19 Regarding construction and demolition impacts, Part D of Policy SI 1 of the London Plan states:

"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".

A2.20 Part E of Policy SI 1 states the following regarding mitigation and offsetting of emissions:

"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".

London Environment Strategy

A2.21 The London Environment Strategy was published in May 2018 (GLA, 2018a). The strategy considers air quality in Chapter 4; the Mayor's main objective is to create a "zero emission London by 2050". Policy 4.2.1 aims to "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". The strategy sets a target to achieve, by 2030, the guideline value for $PM_{2.5}$ which was set by the World Health Organisation (WHO) in 2005. An implementation plan for the

strategy has also been published which sets out what the Mayor will do between 2018 and 2023 to help achieve the ambitions in the strategy.

Low Emission Zone (LEZ)

A2.22 The LEZ was implemented as a key measure to improve air quality in Greater London. It entails charges for vehicles entering Greater London not meeting certain emissions criteria, and affects diesel-engined lorries, buses, coaches, large vans, minibuses and other specialist vehicles derived from lorries and vans. Since 1 March 2021, a standard of Euro VI has applied for HGVs, buses and coaches, while a standard of Euro 3 has applied for large vans, minibuses and other specialist diesel vehicles since 2012.

Ultra Low Emission Zone (ULEZ)

A2.23 London's Ultra-Low Emission Zone (ULEZ), originally covering the congestion charge zone, came into force in April 2019, and was expanded outward to the North and South Circular Roads in October 2021. The ULEZ was expanded again to cover all London Boroughs (excluding the M25) at the end of August 2023. The ULEZ currently operates 24 hours a day, 7 days a week. All cars, motorcycles, vans and minibuses are required to meet exhaust emission standards (ULEZ standards) or pay an additional daily charge to travel within the zone. The ULEZ standards are Euro 3 for motorcycles, Euro 4 for petrol cars, vans and minibuses and Euro 6 for diesel cars, vans and minibuses. The ULEZ does not include any requirements relating to heavy vehicle (HGV, coach and bus) emissions, as these are addressed by the amendments to the LEZ described in Paragraph A2.22.

Other Measures

A2.24 Since 2018, all taxis presented for licencing for the first time had to be zero emission capable (ZEC). This means they must be able to travel a certain distance in a mode which produces no air pollutants, and all private hire vehicles (PHVs) presented for licensing for the first time had to meet Euro 6 emissions standards. Since January 2020, all newly manufactured PHVs presented for licensing for the first time had to be ZEC (with a minimum zero emission range of 10 miles). The Mayor's aim is that the entire taxi and PHV fleet will be made up of ZEC vehicles by 2033.

A2.25 The Mayor has also proposed to make sure that TfL leads by example by cleaning up its bus fleet, implementing the following measures:

- TfL will procure only hybrid or zero emission double-decker buses from 2018;
- a commitment to providing 3,100 double decker hybrid buses by 2019 and 300 zero emission single-deck buses in central London by 2020;
- introducing 12 Low Emission Bus Zones by 2020;
- investing £50m in Bus Priority Schemes across London to reduce engine idling; and

- retrofitting older buses to reduce emissions (selective catalytic reduction (SCR) technology has already been fitted to 1,800 buses, cutting their NOx emissions by around 88%).

Mayor's Transport Strategy

A2.26 The Mayor's Transport Strategy (GLA, 2018b) sets out the Mayor's policies and proposals to reshape transport in London over the next two decades. The Strategy focuses on reducing car dependency and increasing active sustainable travel, with the aim of improving air quality and creating healthier streets. It notes that development proposals should "be designed so that walking and cycling are the most appealing choices for getting around locally".

GLA LPG: Air Quality Neutral

A2.27 The GLA's Air Quality Neutral LPG outlines the assessment approach for determining whether a development is Air Quality Neutral (GLA, 2023a). The guidance sets out benchmarks for the maximum allowable emissions of NOx and particulate matter based on the size and use class of the proposed development. To determine whether the development is Air Quality Neutral, the building and transport emissions from the proposed development are compared to these benchmarks.

Air Quality Focus Areas

A2.28 The GLA has identified 160 air quality Focus Areas in London. These are locations that not only exceed the annual mean limit value for NO_2, but also have high levels of human exposure. They do not represent an exhaustive list of London's air quality hotspot locations, but locations where the GLA believes the problem to be most acute. They are also areas where the GLA considers there to be the most potential for air quality improvements and are, therefore, where the GLA and Transport for London (TfL) will focus actions to improve air quality. The proposed development is not located close to any the GLA air quality Focus Areas.

Local Policies

A2.29 The Local Plan Part 1: Strategic Policies (LBH, 2012) was adopted by LB of Hillingdon in November 2012 and provides a framework for development in the Borough up to 2026. The Plan includes the two Strategic Objectives (SOs) related to air quality:

- *SO10: "Improve and protect air… quality…"; and*
- *SO11: "…minimise emissions of… local air quality pollutants from new development and transport".*

A2.30 The main Policy of relevance to air quality is Policy EM8 'Land, Water, Air and Noise', which states that:

"All development should not cause deterioration in the local air quality levels and should ensure the protection of both existing and new sensitive receptors.

All major development within the Air Quality Management Area (AQMA) should demonstrate air quality neutrality (no worsening of impacts) where appropriate; actively contribute to the promotion of sustainable transport measures such as vehicle charging points and the increased provision for vehicles with cleaner transport fuels; deliver increased planting through soft landscaping and living walls and roofs; and provide a management plan for ensuring air quality impacts can be kept to a minimum.

The Council seeks to reduce the levels of pollutants referred to in the Government's National Air Quality Strategy and will have regard to the Mayor's Air Quality Strategy. London Boroughs should also take account of the findings of the Air Quality Review and Assessments and Action plans, in particular where Air Quality Management Areas have been designated.

The Council has a network of Air Quality Monitoring stations but recognises that this can be widened to improve understanding of air quality impacts. The Council may therefore require new major development in an AQMA to fund additional air quality monitoring stations to assist in managing air quality improvements".

A2.31 LB of Hillingdon adopted the Local Plan Part 2: Development Management Policies (LBH, 2020) in January 2020, which delivers the detail of the strategic policies set out in the Local Plan Part 1: Strategic Policies. Together the documents form a comprehensive development strategy for the Borough up to 2026. The Local Plan Part 2 includes the following policies that relate to air quality and the proposed development:

- *Policy DMEI 14 'Air Quality' 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 improvement of air quality, especially within the Air Quality Management Area".

- *Policy DMT 1 'Managing Transport Impacts' states that "…In order for developments to be acceptable they are required to… have no significant adverse transport or associated air*

quality… impacts on the local and wider environment, particularly on the strategic road network…"; and

- *Policy DMT 2 'Highways Impacts' states that "Development proposals must ensure that… they do not contribute to the deterioration of air quality…".*

A2.32 The LBH has also adopted a Supplementary Planning Document (SPD) on Planning Obligations (LBH, 2014), which states that:

"Obligations may be sought to ensure no detrimental impacts on air quality and/or to ensure compliance with the objective of the AQMA. The following circumstances may establish a requirement for planning obligations:

- *As a recommendation of an air quality assessment;*
- *To mitigate the impacts from emissions from new development where these cannot be resolved through other means such as planning conditions, travel plans or statutory licenses;*
- *To mitigate impacts on new development where floor space is to be occupied for significant*
- *parts of the day, such as residential, where located in an area of poor air quality; and*
- *To mitigate air quality impacts during the construction phase where these cannot be controlled through conditions or other statutory licenses."*

Air Quality Action Plans

National Air Quality Plan

A2.33 Defra has produced an Air Quality Plan to tackle roadside NO_2 concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018b) was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified. This assessment has principally been carried out in relation to the air quality objectives, rather than the limit values that are the focus of the Air Quality Plan.

Local Air Quality Action Plan

A2.34 The LBH has declared an AQMA for NO_2 covering the south of the borough, defined by the A40 corridor from the western borough boundary, east to the intersection with the Yeading Brook and north until its intersection with the Chiltern-Marylebone railway line. The proposed development is located within this AQMA. The Council has developed an Air Quality Action Plan (LBH, 2019). This plan identifies the Council's objectives to:

"a) improve the areas of poorer air quality as soon as possible;

b) to continue to improve air quality across the borough and reduce public exposure to air pollution, especially for vulnerable groups within our communities such as the young, the old and those already suffering with associated respiratory illnesses".

A2.35 With these objectives in mind, LB of Hillingdon will prioritise the following actions:

- *"Lead by example;*
- *Prioritise reducing public exposure and improving air quality around schools;*
- *Prioritise the implementation of improvement strategies in the AQ Focus Areas;*
- *Ensure the integration of the Healthy 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;*
- *Promote the use of greener walking and cycling routes to help the delivery of the Council's transport objective of an increased mode share for walking and cycling; and Work with external stakeholders."*

A3 'Air Quality Neutral'

A3.1 The GLA's London Plan Guidance; Air Quality Neutral (GLA, 2023) provides an approach to assessing whether a development is air quality neutral. The approach is to compare the expected emissions from the building's energy use and vehicle trips against defined benchmarks for buildings and transport in London.

A3.2 The benchmarks for heating and energy plant (termed 'Building Emissions Benchmarks' or 'BEBs') are set out in Table A3.1 while the 'Transport Emissions Benchmarks' ('TEBs') are set out in **Table A3.2**.

A3.3 The average trip length and average emission per vehicle are required if there is a need to calculate offset payments. The values given by GLA are set out in **Table A3.3** and **Table A3.4**, respectively.

Table A3.1: Building Emissions Benchmark NO_x Emission Rates ($gNO_x/m^2/annum$) [a]

Land Use [b]	Individual Gas Boilers	Gas Boiler Network	CHP + Gas Boiler Network	Heat Pumps + Gas Boiler Network
Residential (including student accommodation and large-scale purpose-built shared living development)	3.5	5.7	7.8	5.7
Retail	0.53	0.97	4.31	0.97
Restaurants and bars	1.76	3.23	14.34	3.23
Offices	1.43	2.62	11.68	2.62
Industrial	1.07	1.95	8.73	1.95
Storage and distribution	0.55	1.01	4.5	1.01
Hotel	9.47	15.42	38.16	15.42
Care homes and hospitals	9.15	14.90	36.86	14.90
Schools, nurseries, doctors' surgeries, other non-residential institutions	0.90	1.66	7.39	1.66
Assembly and leisure	2.62	4.84	21.53	4.84

[a] Solid and liquid biomass appliances also emit fine particulate matter in addition to NO_x. The benchmark emission rate for particulate matter is zero.

[b] Separate use classes for commercial uses, including retail and offices, have now been replaced by use class E. If these separate uses are specified in the development proposal, they should be used for this assessment. Where the intended use is not specified, or where use class E has been specified, the benchmark for retail should be used.

Table A3.2: Benchmark Trip Rates

Land Use	Annual trips per	Benchmark Trip Rates		
		Central Activities Zone (CAZ)	Inner London (excluding CAZ)	Outer London
Residential (including student accommodation and large-scale purpose-built shared living development)	dwelling	68	114	447
Office / Light Industrial	m^2 (GIA)	2	1	16
Retail (Superstore)	m^2 (GIA)	39	73	216
Retail (Convenience)	m^2 (GIA)	18	139	274
Restaurant / Café	m^2 (GIA)	64	137	170
Drinking establishments	m^2 (GIA)	0.8	8	N/A
Hot food takeaway	m^2 (GIA)	N/A	32.4	590
Industrial	m^2 (GIA)	N/A	5.6	6.5
Storage and distribution	m^2 (GIA)	N/A	5.5	6.5
Hotels	m^2 (GIA)	1	1.4	6.9
Care homes and hospitals	m^2 (GIA)	N/A	1.1	19.5
Schools, nurseries, doctors' surgeries, other non-residential institutions	m^2 (GIA)	0.1	30.3	44.4
Assembly and leisure	m^2 (GIA)	3.6	10.5	47.2

Table A3.3: Emission factors per vehicle-km

Pollutant	Emission factors (g/veh-km)		
	Central Activities Zone (CAZ)	Inner London [a] (excluding CAZ)	Outer London [a]
NOx	0.48	0.39	0.35
$PM_{2.5}$	0.036	0.032	0.028

[a] Inner London and Outer London as defined in the London Plan (GLA, 2021).

Table A3.4: Average Distance Travelled by Car per Trip

Land use	Distance (km)		
	Central Activity Zone	Inner	Outer
Residential	4.2	3.4	11.4
Office	3.0	7.2	10.8
Retail	9.2	5.5	5.4

A4 Professional Experience

Jessica Muirhead, BSc (Hons), MSc, PhD, CSci MIEnvSc MIAQM

Dr Muirhead is an Associate Director with AQC and has over 18 years' experience in air quality, responsible for delivering numerous air quality assessments for planning applications including Environmental Impact Assessments (EIAs) across the UK. She has fulfilled the role of air quality expert on a range of schemes, including providing (oral and written) evidence at planning and at planning appeal hearings. She engages in a confident and open manner with technical officers representing key stakeholders and has successfully represented her clients in discussions to agree common ground on proportionate air pollution mitigation.

She has experience of working for a Local Authority and has been a technical advisor for the Greater London Authority (GLA) Air Quality team, and is able to apply her knowledge of the expectations and requirements of the GLA to developments in London. She also has extensive experience providing technical peer reviews for a number of Planning Authorities in the UK, and for The Royal Commission for Al Ula in Saudi Arabia. She has delivered training to the London Boroughs on Air Quality Neutral and Air Quality Positive assessments.

Jack Buckley, BSc (Hons) MSc MIEnvSc MIAQM

Mr Buckley is a Principal Consultant with AQC. He has seven years' experience in the field of air quality, carrying out technical work for a range of projects, including road and rail infrastructure schemes, residential and mixed-use developments and industrial facilities. Jack has produced air quality, greenhouse gas and climate change assessments for numerous EIA schemes, using qualitative and quantitative methods, and has air quality monitoring experience. He also has a strong understanding of relevant local, regional and national policies, having been seconded to the Greater London Authority to undertake technical reviews of planning applications, and has assisted in the development of new Air Quality Neutral and Air Quality Positive guidance. Jack completed a BSc (Hons) in Chemistry and an MSc in Environmental Science and Management, with both dissertations investigating the performance of low-cost air quality sensors. He is a Member of both the Institute of Air Quality Management and the Institution of Environmental Sciences.

Wale Abiye, MIEnvSc MIAQM

Dr Abiye is an Assistant Consultant with AQC and joined the company in 2022. Prior to joining the company, he worked as a Research Fellow in Nigeria. He obtained his masters and PhD degrees from Obafemi Awolowo University, Ile-Ife, Nigeria. He is experienced in monitoring urban air pollution and analysing its chemical constituents, as well as using dispersion modelling to assess air quality. He is nominated to the United Nations Framework Convention on Climate Change's Roster of Experts.