Air Quality Assessment

19-37 Highgate Road
Kentish Town
London
NW5 1JY

10th March 2022

Prepared for:

GM London

Contents

Appendices

1.0 Executive Summary

An assessment of potential air quality impacts arising from the construction and operation of the proposed residential development at 19-37 Highgate Road, in the London Borough of Camden has been undertaken to ascertain the impact of the proposed development on the local environment and of the existing local environment upon occupants of the proposed development

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.

Traffic generated by the proposed development is not expected to significantly affect local air quality as traffic movements generated are expected to absolutely minimal.

However, detailed dispersion modelling of traffic on the local network confirms that, at the time of project delivery, the project will not be subject any issues associated with poor air quality and the design team are able to utilise a natural ventilation strategy if desired.

As a “car free” development, the site has been assessed as air quality neutral with respect to transport-related emissions.

Heat and hot water will be supplied to the development through electrically driven heat pump systems, emitting zero local emissions.

The building-related emissions have also been assessed as air quality neutral by default.

2.0 Introduction

This report presents an assessment of the potential impact on local air quality of the construction and operation of a proposed residential development scheme at 19-37 Highgate Road in Camden.

The site is bounded by industrial and commercial uses westerly, Highgate road to the north east and the commercial centre of Kentish Town to the south east.

The proposal is for a new 7 storey development with 47 new flats, a small commercial unit, amenity space, bin and bike storage and a new basement level plant space.

The location of the proposed development site is presented in Figure 1.

The site falls within the London Borough of Camden (Camden); Camden's Clean Air Action Plan 2019-2022 confirms that:-

Air pollution does not respect borough boundaries and many factors contributing to poor air quality are often beyond the control of the local authority. Improving air quality is therefore a shared challenge. Unlike previous Camden Clean Air Action Plans, this latest plan has been developed with the help of a new Camden Clean Air Partnership, chaired by University College London and comprised of representatives from the key pollution sectors in Camden, as well as schools, residents, campaign groups and businesses.

.Air pollution is associated with a number of adverse health impacts and is understood to be a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. The annual health costs to society of air pollution in the UK is estimated to be £15 billion1. Camden is committed to reducing the exposure of people in the borough to poor air quality in order to improve health.

The Clean Air Action Plan is organised around seven broad themes:

- Building emissions
- Construction emissions
- Transport emissions
- Communities and schools
- Delivery, servicing & freight:
- Public health and awareness raising:
- Lobbying:

Accordingly, the project must also consider the potential impacts on the local environment; during the construction phase the proposed development has potential to introduce the following air quality impacts:

- Suspended and re-suspended fugitive dust emissions from demolition / construction activities; and Emissions from construction traffic, including re suspended dust from HGV movements.

- Emissions from operational traffic.

An assessment of the potential risk of dust impacts has been undertaken and recommendations made for mitigation where appropriate. Report delivered under separate cover.

Fig 1. Site Location Plan

3.0 Policy Context

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

3.1 European Legislation

Within the European Union, ambient air quality is currently regulated through the Ambient Air Quality Directive 2008/50/EC and the Fourth Daughter Directive 2004/107/EC. These directives set limit values and target values for ambient pollutant concentrations. The limit values are legally binding and must not be exceeded, whereas the target values are to be attained where it is cost effective to do so.

The Ambient Air Quality Directive provides limit values for sulphur dioxide (SO2), nitrogen dioxide (NO_2), benzene (C_6H_6), carbon monoxide (CO), lead (Pb) and particulate matter (PM_{10} and $PM_{2.5}$). The Fourth Daughter Directive provides target values for arsenic (As), cadmium (Cd), nickel (Ni), benzo(a)pyrene (B(a)P), mercury (Hg) and polycyclic aromatic hydrocarbons (PAH).

The EU limit values have been adopted into UK law via the Air Quality Standards Regulations 2010.

In the context of the proposed development, the primary pollutants of concern are NO_2, PM_{10} and $PM_{2.5}$ from traffic on roads close to the site. A summary of the European limit values for the protection of human health for these pollutants is presented in Table 1.

Table 1: European Limit Values for the Protection of Human Heath

Pollutant	Averaging Period	Limit Value ($\mu g/m^3$)	Comments
NO_2	1 Hour	200	Not to be exceeded more than 18 times per calendar year (equivalent to the 99.8th percentile of 1-hour means)
	Calendar Year	40	
PM_{10}	24 Hour	50	Not to be exceeded more than 35 times per year (equivalent to the 90.4th percentile of 24-hour means)
	Calendar Year	40	
$PM_{2.5}$	Calendar Year	25	Stage 1 LV (to be met by 01/01/15)
	Calendar Year	20	Stage 2 LV (to be met by 01/01/20)

It should be noted that the ground floor commercial uses are not required to comply with the annual mean air quality objectives (see extract from the LAQM.TG(16)) below.

Box 1.4: Examples of where the air quality objectives should/should not apply		
Averaging Period	**Objectives should apply at:**	**Objectives should generally not apply at:**
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24-hour mean and 8-hour mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties[7].	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-min mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

Fig 2 – LAQM Box 1.4

3.2 National Legislation

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

The Air Quality Strategy for England, Wales and Northern Ireland was published in 2007 and sets out policy targets (objectives) for SO2, NO2, C6H6, CO, Pb, PM10, PM2.5, 1,3-butadiene (C4H6) and PAH. These objectives are generally in line with those set by the European Directives, although more stringent particulate and benzene objectives apply in Scotland (and in Northern Ireland for benzene).

The Air Quality Objectives (AQO) for NO2, PM10 and PM2.5 in England do not differ from those presented in Table 1.

Local Air Quality Management

The framework for Local Air Quality Management (LAQM) in the UK was introduced by the Environment Act 1995. 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 2021) sets out the Government's policies for planning and how these should be applied. With regard to air quality, the NPPF states that:-

para. 186.

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.

3.3 Regional Policy

The London Plan (March 2021)

Chapter 9 deals with Sustainable Infrastructure:-

Policy SI1 Improving air quality

London's air quality should be significantly improved and exposure to poor air quality, especially for vulnerable people, should be reduced:

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) reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality
d) create unacceptable risk of high levels of exposure to poor air quality.

5) Air Quality Assessments (AQAs) should be submitted with all major developments, unless they can demonstrate that transport and building emissions will be less than the previous or existing use.

The Mayor of London's Air Quality Strategy (2010)

The Mayor of London's Air Quality Strategy outlines the Mayor's commitment to improving air quality in London. The objective of the plan is to significantly reduce NO2 and PM10 concentrations through a number of measures including:

- Ensuring all buses meet Euro IV emission standards;

- Introducing age limits for taxis and Private Hire Vehicles to remove older, more polluting vehicles from the roads;

- Including large vans and minibuses in the Low Emission Zone (LEZ); Introducing a new NOx standard in the LEZ; and

- Working with Borough to implement traffic management strategies to reduce congestion.

The Mayor of London's Sustainable Design and Construction SPG was published in April 2014 and sets out the requirements for undertaking impact assessments in accordance with the policies set out in the London Plan and the Mayor of London's Air Quality Strategy.

An additional planning support document was issued in April 2014, which provides guidance on the implementation of the 'air quality neutral' policy for 'major developments' (over 10 residential dwellings or 1,000 m^2 floor area).

3.4 Local Plan Policy

Camden's Local Plan was adopted in 2017, and has specific policy in regard to air quality

Policy CC4 Air quality

The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough.

The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of the development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan.

Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution. Where the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact.

Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan.

4.0 Methodology

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

4.1 Construction Dust

This matter has been dealt with via a bespoke report under separate cover:

Phlorum - Dust Management Plan - 19 – 37 Highgate Road - November 2021

4.3 Construction Traffic

Construction traffic will contribute to existing traffic levels on the surrounding road network. However, the temporary increase in traffic is considered unlikely to be significant in terms of total flow or construction duration.

All non-road mobile machinery (NRMM) should use fuel equivalent to ultra-low sulphur diesel (ULSD), especially where a bunkered fuel supply is available.

The impact of vehicular emissions of NO_2 and PM10 from construction traffic and on-site machinery on local air quality is considered to be negligible, as a low volume temporary source of local pollution.

Construction traffic is not included within the screening requirements of Table 4.1 – Screening Assessment of Road Traffic Sources within the Technical Guidance 2016 (LLAQM.TG (16)).

Potential dust emission associated with construction traffic are considered further, in line with the IAQM guidance and section 6.0 below.

4.4 Operational Traffic

The Environmental Protection UK (EPUK)/ IAQM planning guidance 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.

The project at Highgate Road project does not trigger any of the above requirements;

Campbell Reith LLP have developed a Transport Assessment for the project, which confirms that the site is well located in respect to its accessibility to both public transport and local services; shopping, education and employment. The site has a PTAL level of 6a to 5, which is termed excellent to very good.

The area has a well-developed pedestrian network, and the proposals themselves generate no additional parking and result in minimal traffic movements, as a result, the proposals would result in a reduction in traffic generation on the surrounding road network in the weekday peak hour and over a typical weekday.

However, dispersion modelling of baseline traffic on the surrounding major road network has been undertaken to predict pollutant concentrations at the proposed development site to determine whether the site is suitable for the residential uses, as proposed.

The input parameters for the modelling are detailed in **Appendix A** – ADMS-Roads Input Parameters.

4.5 Emission Factors

Concentrations of NOx, PM_{10} and $PM_{2.5}$ have been predicted using vehicle emission factors from version 10.1 of the Emissions Factor Toolkit. The emission factors predict a gradual decline in pollution levels over time due to improvements in emissions abatement technologies and the gradual renewal of the vehicle fleet.

However, monitoring carried out in urban areas throughout the UK have found that NO_2 concentrations are not declining as rapidly as predicted and in some locations, roadside concentrations have increased.

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.
It should be noted that version 8.1 should only be used with the 2018 reference year background maps and the Emissions Factors Toolkit v10.1 onwards.

It should be noted that the Emission Factors Toolkit V11.0 was released in November 2021, but the corresponding NOx to NO2 calculator is not yet available to enable assessments to be undertaken.

The baseline dispersion modelling has been based on the year **2019**, with background emissions, traffic data selected accordingly.

4.6 Meteorological Data

The assessment has used hourly sequential meteorological data from Heathrow Airport, which is approximately 24km south west of the proposed development.

4.7 Sensitive Receptors

Pollutant concentrations have been predicted across the development site using a Cartesian receptor grid of 5m resolution.

4.8 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 2016 Local Air Quality Management Technical Guidance (LAQM.TG16) 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 more accurately reflect local air quality.

The modelled NO_2 concentrations have been verified using 2019 data from the roadside passive monitoring station CA16 - situated on Kentish Town Road, approximately 220m to the south of the development site, very similar traffic conditions.

Full details of the model verification process are presented in **Appendix B** – Model Verification.

4.9 Building-related Emissions

Heat and hot water will be provided to the proposed development through electrically driven heat pump systems, emitting zero local emissions.

5.0 Baseline Air Quality

Through an analysis of local monitoring data, a description of existing air quality in the vicinity of the proposed development is provided.

5.1 Local Air Quality Monitoring

5.1.1 Automatic Data

Camden has a network of automatic monitoring sites in the vicinity of the proposed development; this report has identified the most relevant in terms of roadside and urban background monitoring - details of these sites are provided in Table 2.

Table 2: Automatic Monitoring Sites

Site Name	Type	Easting	Northing	Pollutants Monitored	Location relative to development site
London Bloomsbury	Urban Background	530123	182014	NO_2, PM_{10} $PM_{2.5}$	3.8km to south
Swiss Cottage	Roadside	526629	184391	NO_2, PM_{10} PM2.5	2.4km to west

Annual mean NO_2 and PM_{10} concentrations measured at the above locations between 2016 and 2020 have been obtained from Camden Council's Air Quality Annual Status Report for 2020 (July 2021), which are summarised in Table 3, together with the number of measured exceedances of the short-term AQO's.

The data indicate that urban background NO_2 concentrations in the area are likely to be within the relevant long and short-air quality standards.

Table 3a: Urban Background NO_2, PM_{10} concentrations measured at the Bloomsbury Background Monitoring site

Criteria	2016	2017	2018	2019	2020
Annual Mean NO_2 (µg/m^3)	42	38	36	32	28
Number of Predicted Exceedances of the 1-Hour Mean AQO of 200 µg/m^3	0	0	0	0	0
Annual Mean PM_{10} (µg/m^3)	20	19	17	18	16
Number of Predicted Exceedances of the 24-Hour Mean AQO of 50 µg/m^3	9	6	1	9	4
Annual Mean $PM_{2.5}$ (µg/m^3)	12	13	10	11	9

Table 3a: Roadside NO_2 and PM_{10} concentrations measured at the Swiss Cottage Roadside Monitoring site

Criteria	2016	2017	2018	2019	2020
Annual Mean NO_2 (µg/m^3)	66	53	54	43	33
Number of Predicted Exceedances of the 1-Hour Mean AQO of 200 µg/m^3	37	1	2	1	0
Annual Mean PM_{10} (µg/m^3)	21	20	21	19	16
Number of Predicted Exceedances of the 24-Hour Mean AQO of 50 µg/m^3	7	8	4	8	3
Annual Mean $PM_{2.5}$ (µg/m^3)	15	16	11	11	10

5.1.2 Non-automatic Data

Annual mean NO_2 concentrations are measured in Camden via an extensive network of. passive diffusion tubes.

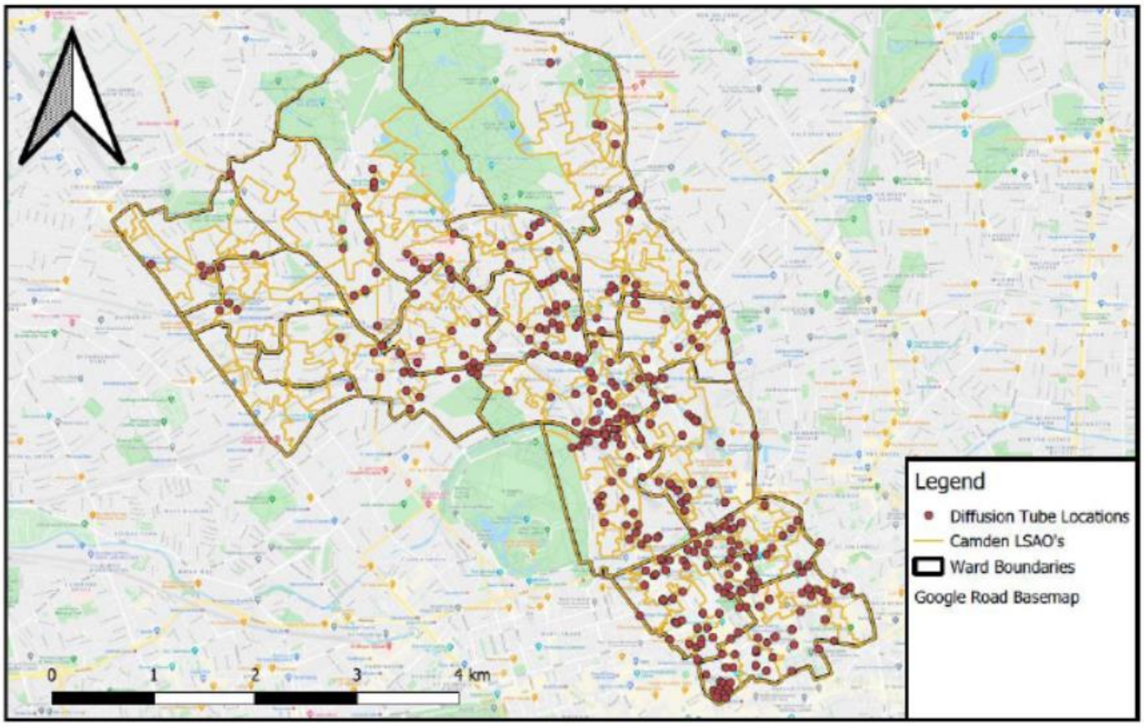


Figure 3 - Camden's Diffusion tube Network

The nearest roadside tube to the proposed development is PBN2 - situated on Ballards Lane, approximately 430m to the south west of the development site.

A summary of the annual average NO_2 concentrations measured at this location between 2016 and 2020 is presented in Table 4.

Table 4: Annual Mean NO_2 Concentrations Measured by Diffusion Tube (µg/m3)

Site ID		2016	2017	2018	2019	2020
CA16 Kentish Town Road	529013-185102	58.72	68.84c	54.66	45.03	33.41

The data indicates that annual mean NO_2 concentrations at the development site have only limited potential to exceed the air quality standard of 40 µg/m^3 at ground floor level.

Measurements across the UK have shown that the 1-hour mean AQO for NO_2 may also be exceeded where the annual mean concentration is greater than 60µg/m^3.

The data therefore indicates that an exceedance of the short-term objective is perhaps even less of a concern, but this will also be assessed as part of overall consideration of all traffic generated and background data.

5.1.3 DEFRA Mapped Background Concentrations

For comparison with the background monitoring data for NO_2 and PM_{10} and in the absence of local $PM_{2.5}$ data, concentrations have been obtained from the Defra UK Background Air Pollution maps. 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.

A summary of the mapped and measured annual mean background concentrations for the proposed development site is presented in Table 5, together with the concentrations assumed for the purposes of the assessment.

Table 5: Defra Mapped, Measured and Assessment Background Pollutant Concentrations (µg/m3)

Pollutant	2019 Mapped	2019 Measured	Assessment	AQO/EAL
NO_2	28.28	32.00	32.00	40
PM_{10}	18.73	18.00	18.73	40
$PM_{2.5}$	11.84	11.00	11.84	25

6.0 Potential Impacts

The potential impacts and significance of these impacts on air quality during the construction phase of the development are identified in this section. Suggested mitigation measures are outlined in a subsequent section of the report.

6.1 Construction Dust

This matter has been dealt with via a bespoke report under separate cover:

Phlorum - Dust Management Plan - 19 – 37 Highgate Road - November 2021

6.2 Baseline Traffic - 2019

Dispersion modelling has been undertaken for the baseline year **2019** – utilising 2019 background emissions data, emission year 2019 with data set 10.1 and traffic data for 2019.

The modelling has been undertaken with the ADMS Roads v5.0.01 with contours modelled in Surfer" software

Predicted annual mean NO_2 concentrations at the proposed development site at the ground and 1st floors are presented as contour plots Figures 5 & 6.

The modelled centration's of NO_2 are close to the AQO at ground floor level, but are well within the required AQO across the development at first floor

Predicted ground level annual mean PM_{10} and $PM_{2.5}$ concentrations are presented as contour plots in Figure 7 and Figure 8 respectively; these concentrations are well within the relevant air quality standards across the site.

Short term concentrations of NO_2 and PM_{10} where modelled at the proposed development façade at grid reference 528858, 185436 at ground floor level – the closest of the proposed new build accommodation to Highgate Road; max short term NO_2 levels are 134.88µg/m^3, while PM10 levels do not exceed 20.93µg/m^3, both figures well within AQO.

It can be summarised that the residential units are well within the required air quality objectives at first floor and above, but further investigation of ground floor pollutant levels will be undertaken for the proposed year of opening. (See 6.3)

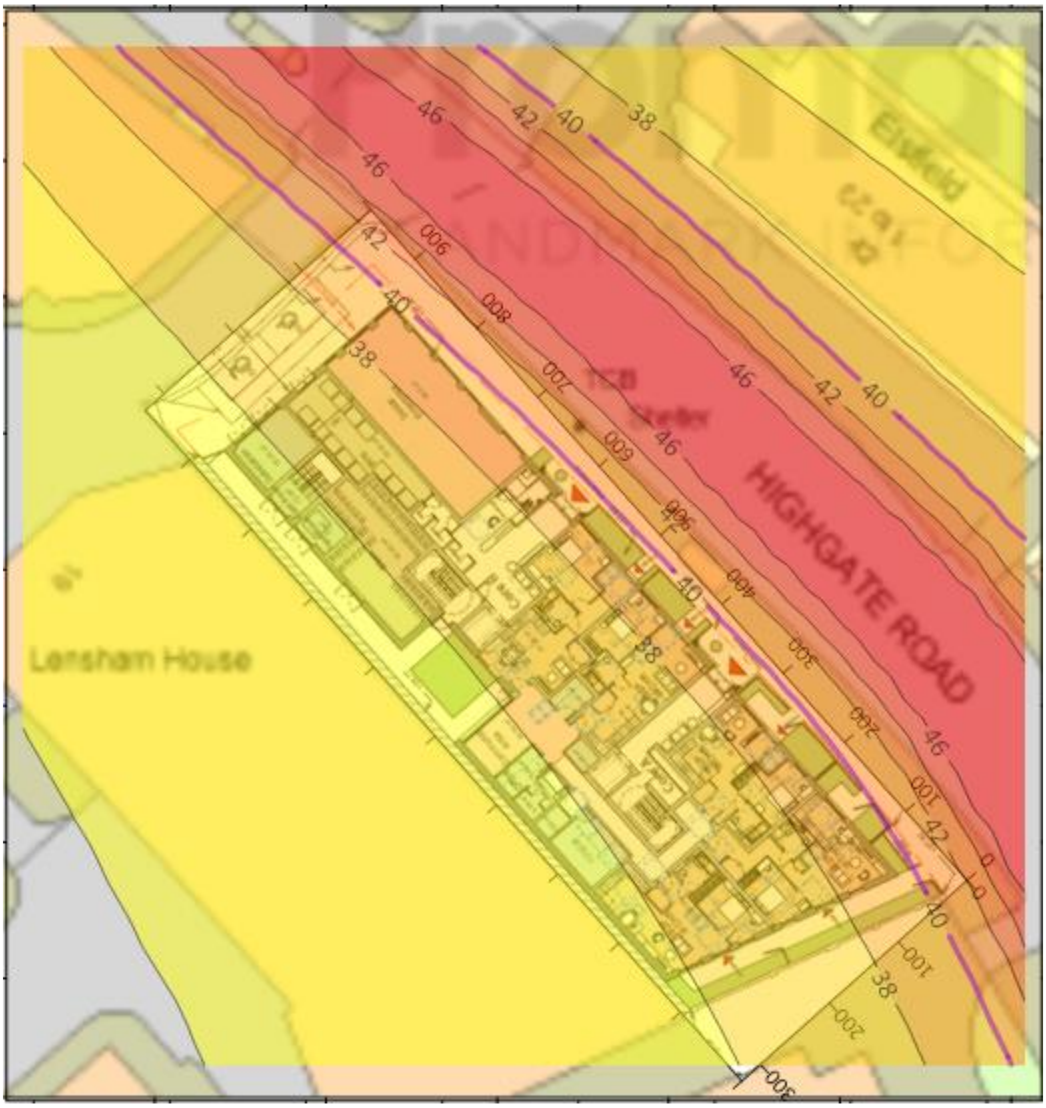


Figure 5 – NO_2 concentrations – Ground Floor

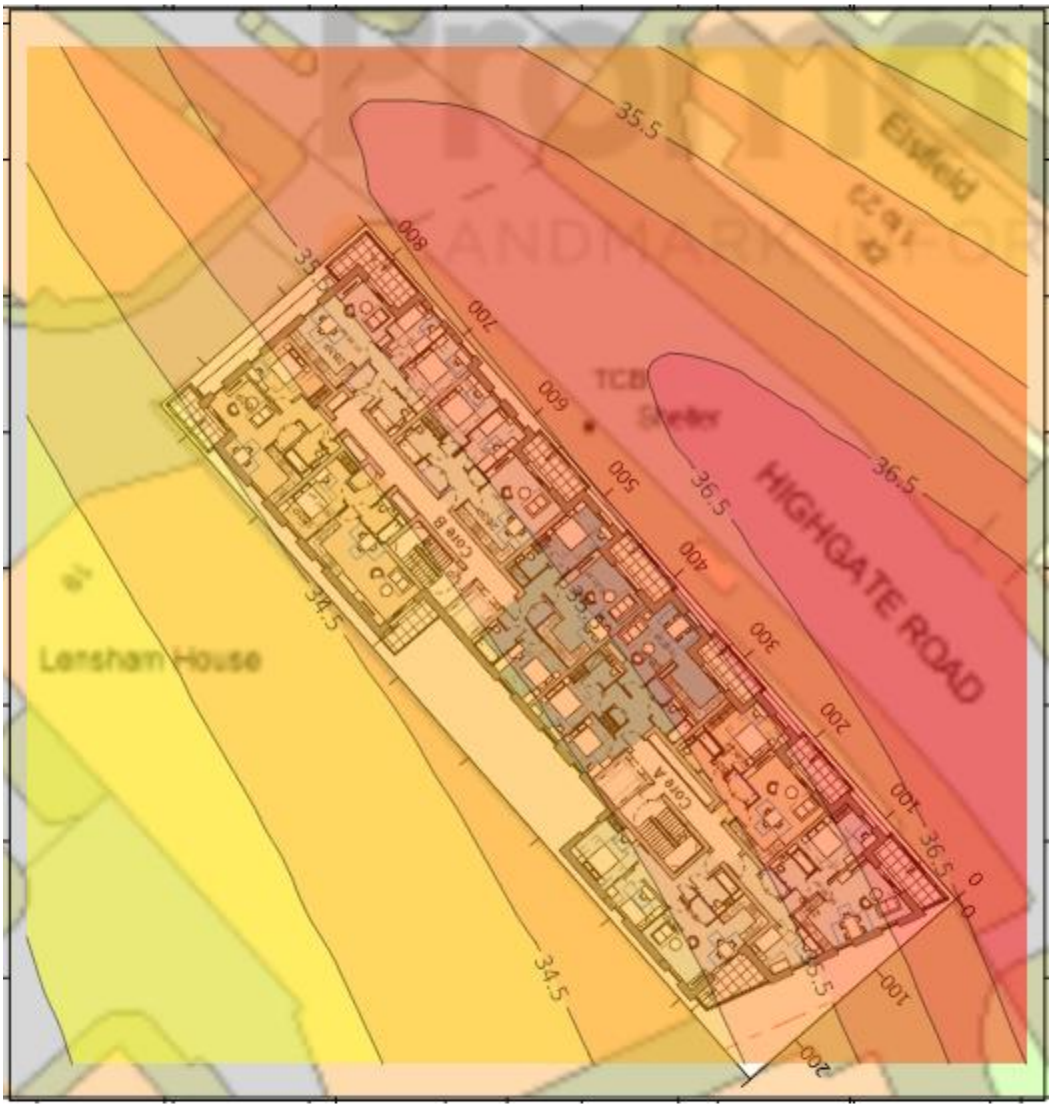


Figure 6 – NO_2 concentrations – 1st Floor

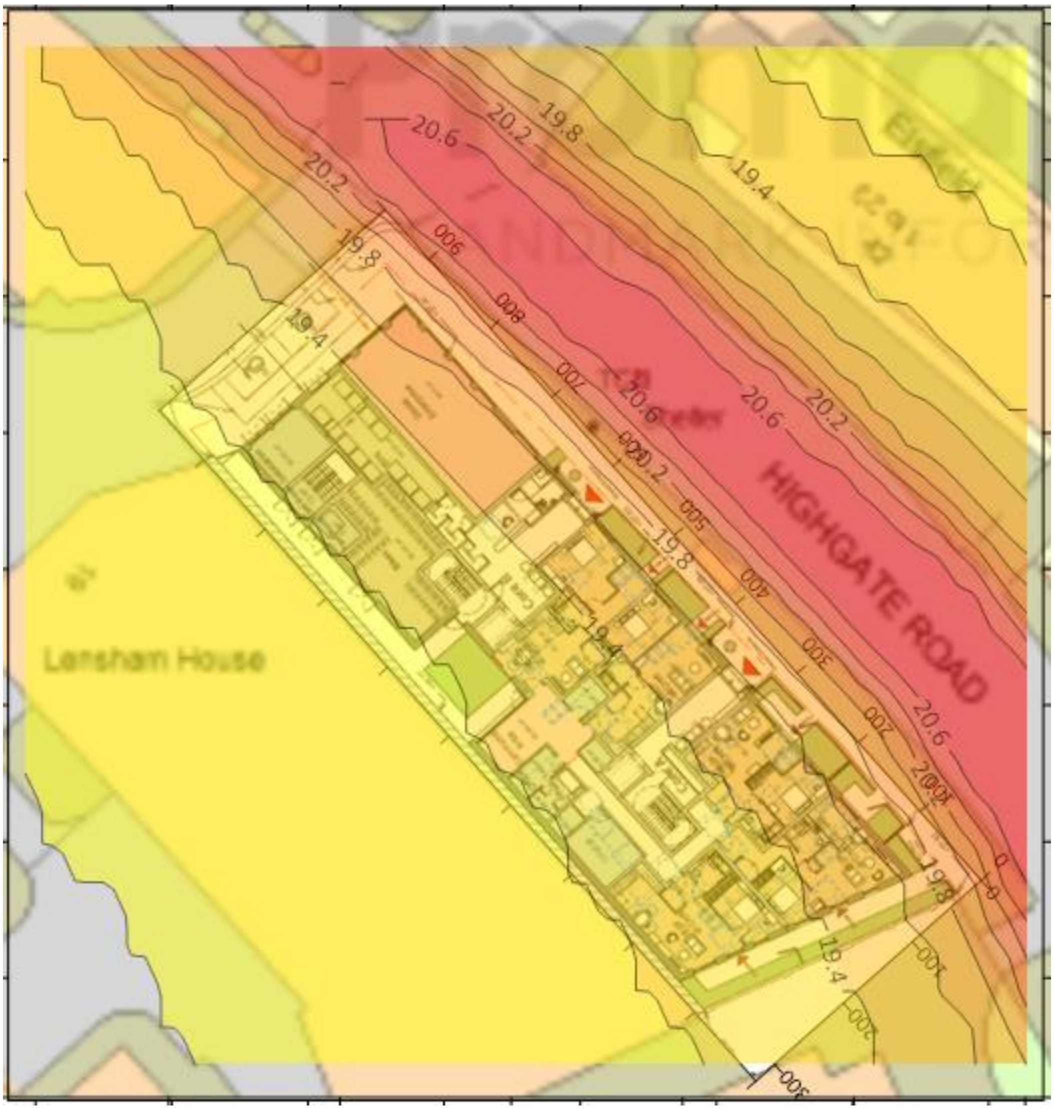


Figure 7 - PM_{10} concentrations – Ground Floor

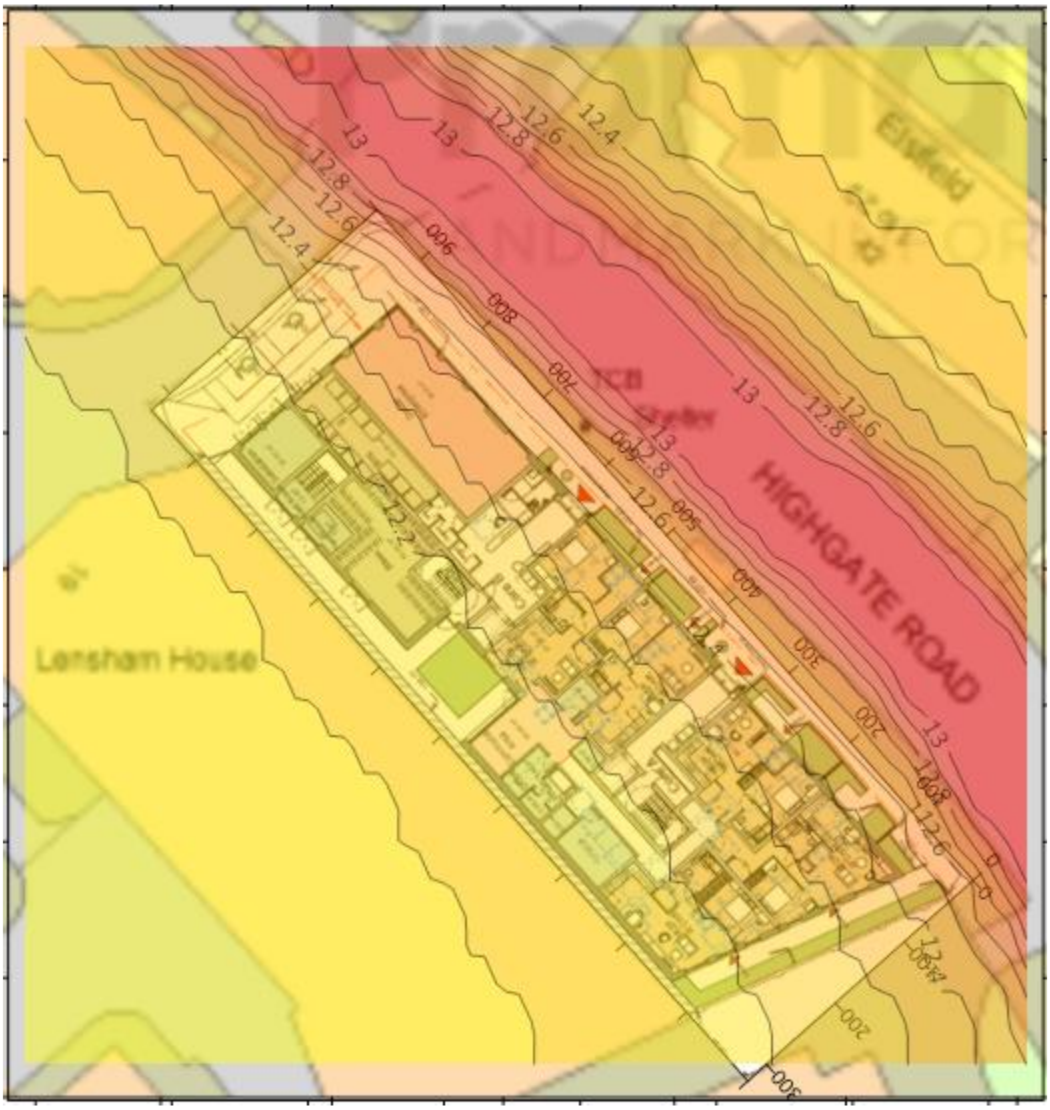


Figure 8 – PM2.5 Concentrations – Ground Floor

6.3 Year of Opening - 2023

Given the marginal long term air quality modelled for the 2019 baseline year, further dispersion modelling has been undertaken for the proposed/potential year of opening - 2023

The projected background NO_2 emissions can be downloaded in spreadsheet format from the UK Air website

For Camden, grid ref 528500 185500, the background NO_2 levels are projected to be at 23.02µg/m^3, this has been adjusted pro-rata for the baseline background emissions as measured at the Bloomsbury urban background monitoring station for 2019; the figure used in the 2023 modelling is 26.05µg/m^3.

The year of modelling is 2023 – the projected year of opening.

According to Tempro data Traffic volumes in 2023 are predicted to be 3.6% higher than the 2019 traffic data in the Borough of Camden

The model at figure 9 shows the predicted maximum long-term concentrations of NO_2 to be at a maximum of 30.0µg/m^3 against the façade of the proposed development; well within the required air quality standards.

Figure 9 – NO_2 concentrations 2023 – Ground Floor

7.0 Air Quality Neutral Assessment

Policy SI 1 of the London Plan includes requirements for new development to be Air Quality Neutral. This section presents an air quality neutral assessment in accordance with The London Plan Guidance Air Quality Neutral Consultation Draft (Nov 2021).

'Air Quality Neutral' (AQN) is a term for developments that do not contribute to air pollution beyond allowable benchmarks. The benchmarks, set out in this guidance, are based on research and evidence carried out by building and transport consultants.

7.1 Excluded Developments

Developments, including major developments which do not include additional emissions sources are assumed to be Air Quality Neutral and do not need an Air Quality Neutral assessment. This would include, for example, developments that have no additional motor vehicle parking, do not lead to an increase in motor vehicle movements , and do not include new combustion plant such as gas-fired boilers.

The Highgate project does not provide any car parking facilities and thereby can be considered Car Free..

The development is proposed to use electrical driven HVAC systems only.

7. 2 Building Emissions

In accordance with the Air Quality Neutral Guidance document (AQNG), the project is air quality neutral by default, as it does not introduce any new fossil fuel combustion plant

7.3 Transport Emissions

In accordance with the Air Quality Neutral Guidance document (AQNG), the project is air quality neutral by default, as the project can be considered Car Free.

8.0 Mitigation

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

8.1 Construction Phase

London Best Practice Guidance for dust control will be implemented, as appropriate, during the construction phase through the Dust Management Plan (DMP) for the proposed development.

The Dust Management Plan has been produced under separate cover - Phlorum Dust Management Plan November 2021

8.2 Operational Phase

The proposed development will include secure cycle spaces to encourage sustainable transport in line with the guidance received from TfL.

The central location with excellent access to central tube and bus services will only generate highly limited vehicle movements.

Detailed dispersion modelling of local traffic flows indicates that NO_2, PM_{10} and $PM_{2.5}$ concentrations at the site are likely to be well within the relevant short and long-term air quality standards and are appropriate for the residential accommodation proposed.

The use of heat pump driven systems for heating and hot water will have zero impact on local sensitive receptors; the nearby residential accommodation.

9.0 Summary and Conclusions

The following summarise the outcomes of the assessment and provide details of any air quality constraints to the development of the site. Based on the results of the assessment, it is considered that redevelopment of the site would not cause a significant impact on local air quality.

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

The additional traffic generated by the proposed development is not expected to significantly affect local air quality, however detailed dispersion modelling of the local road network has been undertaken to assess whether the site is suitable for residential use, as proposed.

The modelling indicates that both long term and short term air quality standards are well within the targets set by the Air Quality Standards Regulations 2010 for the year of opening - project to be in 2023.

In addition, the site has been assessed as air quality neutral with respect to transport-related emissions.

Building-related emissions from the site are air quality neutral by default due to the use of heat pump driven heating and hot water systems.

It is therefore considered that air quality does not pose a constraint to the re-development of the site as proposed.

Appendix A

ADMS-ROADS INPUT PARAMETERS

ADMS-Roads Input Parameters

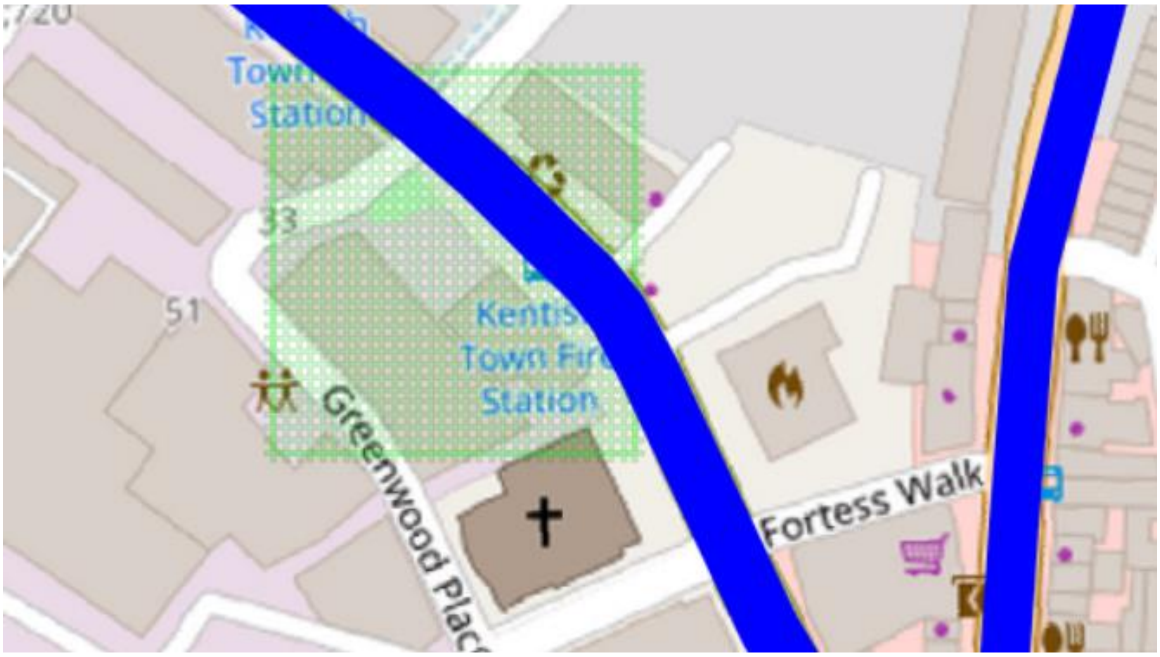
Table B1: Summary of ADMS-Roads Input Parameters

Parameter	Value
ADMS-Roads Model Version	5.0.0.1
Vehicle Emission Factors	EFT v10.1 2020
Meteorological Data	Hourly sequential data from London Heathrow Airport
Surface Roughness	1.0m
Monin-Obukhov Length	75m

Table B2: Summary of Traffic Data

Road Link	2019 AADT (Hourly)	HGV (%)	Average Speed (kph)
Highgate Road	590	10.1	10 slow speed traffic around pedestrian crossing
Fortress Road	583	6.9	15

Figure 10 – Monitoring Points relative to development site



Appendix C

MODEL VERIFICATION

Predicted annual mean NO_2 concentrations have been compared with the 2019 annual mean concentrations measured by the passive monitoring station at CA16 on Kentish Town Road, about 220m along from the Highgate Road site - as identified in Figure 8 below.

Traffic was assumed to be slow moving and impacted by the pedestrian crossing to the south of the monitoring station and the traffic lit junction to the north - assumed average speed at 10km/h.

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.TG16.

The modelled NO_x concentration has been converted into an equivalent Road-NO_2 (i.e. the component of total NO_2 coming from road traffic) concentrations using the Defra NOx to NO_2 calculator.

The ratio of the measured and modelled Road-NO_2 contributions provides an adjustment factor for the modelled Road-NO_2 concentrations. This factor is then applied to the modelled road NOx concentrations, before they are converted to Road-NO_2 using the Defra NOx to NO_2 calculator and added to the background NO_2 concentration for to produce a total adjusted modelled NO_2 concentration.

The model verification calculations are presented in Tables C1; the emissions as modelled are below the measured data for the site for 2019. Accordingly, in order to offer a conservative assessment, a **+2.3%** adjustment factor has also been applied to the modelled Road NO_2,

Tables C1: Verification Calculations

PBN2 Ballards Lane

Parameter	Value
Measured NO_2 Concentration (2019)	45.03 µg/m^3
Modelled NO_2 Concentration*	44.00 µg/m^3
Adjustment Factor	2.3%

*Using the DEFRA NOx to NO_2 Converter

Figure 11 – Verification Diffusion Tube Monitoring Site