Air Quality Assessment

11-12 Grenville Street
London
WC1V 1LZ

21st December 2021V2

Prepared for:

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Document Control

V1	03-09-21	
V2	21-12-21	Amendments in RED

1.0 Executive Summary

An assessment of potential air quality impacts arising from the construction and operation of the proposed development 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.

This is based upon a worst case scenrio generated from predicted high background NO_2 levels utilised from the DEFRA website, as actual traffic related emissions are highly limited. Should the urban background level be taken from local authority monitoring stations, the situation would be considerably improved

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 a low NOx fired LTHW systems, generating very low NOx & PM emissions

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

2.0 Introduction

This report presents an assessment of the potential impact on local air quality of the construction and operation of a proposed mixed use development scheme at 11-12 Grenville Street in Camden.

The building at 11-12 Grenville Street is currently part of a typical London terrace arranged over 4 floors with ground floor commercial space and upper floor residential.

The redevelopment proposals are for the creation of a rear mews house at lower ground, ground and first floor, internal alterations to improve the accommodation - including a new top floor - with retention of the commercial use.

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

The site falls within the London Borough of Camden (Camden);

Camden's Camden Clean Air Action Plan (2019-2022) confirms that:

This Air Action Plan has been produced as part of our duty to London Local Air Quality Management. It outlines the action we will take to improve air quality in Camden between 2019 and 2022.

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.

The Plan has seven main strands:

- Working to reduce emissions from our own estate and operations;
- Helping residents and visitors to reduce emissions and exposure;
- Using planning policy and regulation to reduce air pollution;
- Implementing innovative projects across the borough to improve air quality;
- Using our influence to lobby for increased financial and regulatory support for the mitigation of air pollution;

- Maintaining a monitoring network and ensuring the data is freely accessible;
- Raising awareness on how to reduce emissions and exposure

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.

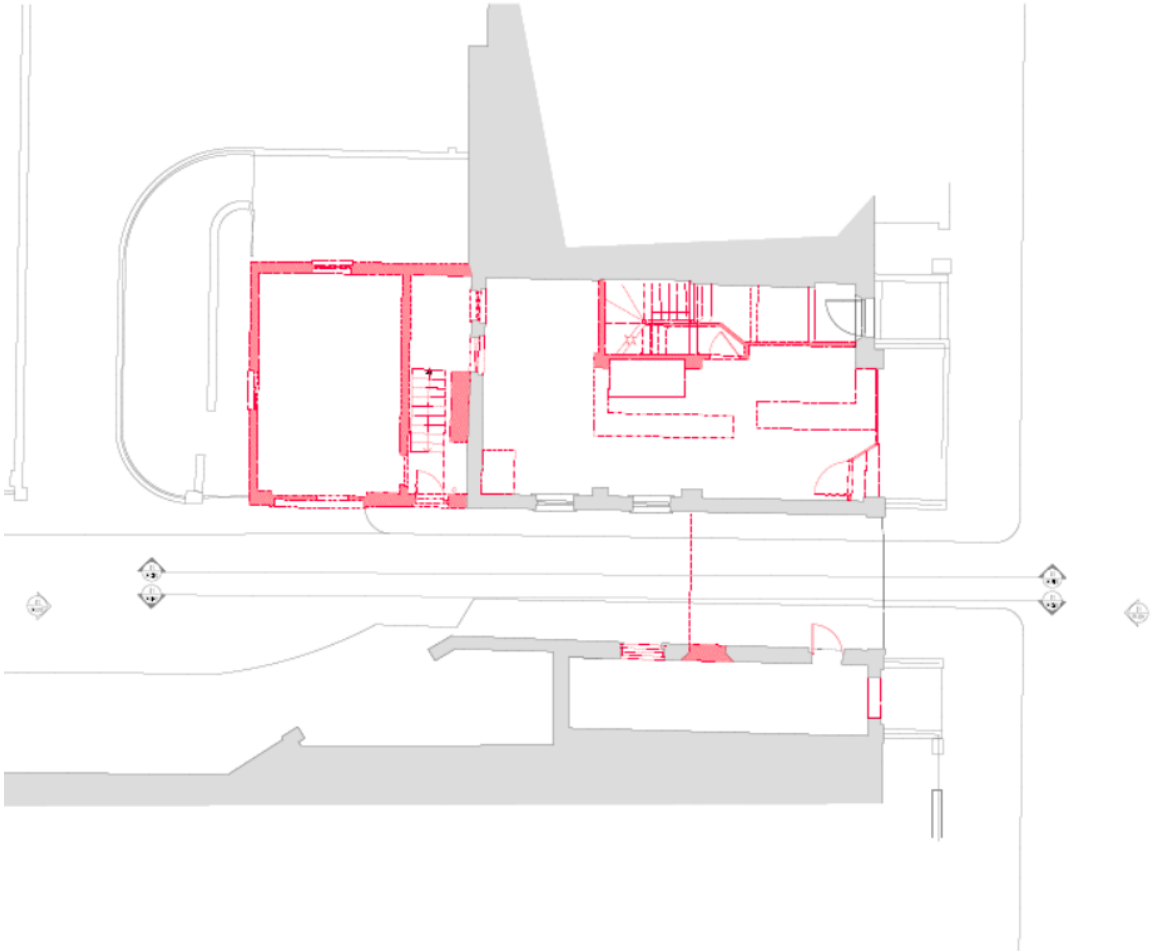

Fig 1. Site Location Plan

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 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

The Local Plan was adopted by Camden Council on 3 July 2017. It replaced the Core Strategy and Camden Development Policies.

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

The potential impact of dust generated during site enabling, earthworks and construction works at the proposed development has been undertaken in accordance with the Mayor of London's SPG for the control of dust and emissions during construction and demolition, which is closely aligned with the Institute of Air Quality Management (IAQM) construction dust guidance . A full description of the construction dust methodology is provided in **Appendix A** – IAQM Construction Dust Methodology.

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

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

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

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

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

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

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

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 risk of dust soiling and human health impacts from the site has been assessed as medium:-

- Development of between 1,000 and 15,000 square metres of land and;
- Development of between ten to 150 properties and;
- Potential for emissions and dust to have an intermittent or likely impact on sensitive receptors

Prior to mitigation, therefore in accordance with the IAQM guidance it is recommended that the measures detailed in the table below are incorporated into the DMP. The significance of dust impacts on nearby receptors following the implementation of appropriate and best practice mitigation is considered to be negligible.

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 Grenville Street does not trigger any of the above requirements; Indeed, operation traffic movements are predicted to be no more than 8 per day - this represents a 0.2% increase in current traffic levels on Grenville Street, clearly beyond the accepted margins of accurate air quality modelling.

Due to the highly accessible location of the site it is expected that a vast majority of trips will be undertaken by sustainable modes, limiting the number of vehicle trips to the site to an absolute minimum

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 B** – 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.

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 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 CA21 Bloomsbury Road at 529962-181620, just 650m west from the development site offering very similar central London conditions.

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

4.9 Building-related Emissions

Heat and hot water will be provided to the proposed development through a ultra low NOx boilers with NOx emissions at less than 35mg/kWh, and gross efficiency above 90%, making use of flue gas heat recovery to achieve this level.

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
BL0 London Bloomsbury	Urban Background	530123	182014	NO_2, PM_{10}, $PM_{2.5}$	0.5km to north west
CD9 Euston Road	Roadside	529878	182648	NO_2, PM_{10}, $PM_{2.5}$	0.9km to north 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 2021 (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 and PM_{10} 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} & $PM_{2.5}$ concentrations measured at the London Bloomsbury Background Monitoring site

Criteria	2016	2017	2018	2019	2020
Annual Mean NO_2 ($\mu g/m^3$)	42	38	36	32	28
Number of Predicted Exceedances of the 1-Hour Mean AQO of 200 $\mu g/m^3$	0	0	0	0	0
Annual Mean PM_{10} ($\mu g/m^3$)	20	19	17	18	16
Number of Predicted PM_{10} Exceedances of the 24-Hour Mean AQO of 50 µg/m3	9	6	1	9	4
Annual Mean $PM_{2.5}$ ($\mu g/m^3$)	12	13	10	11	9

Table 3a: Roadside NO_2 and PM_{10} & $PM_{2.5}$ concentrations measured at the Euston Road Monitoring site

Criteria	2016	2017	2018	2019	2020
Annual Mean NO_2 ($\mu g/m^3$)	88	83	82	70	43
Number of Predicted Exceedances of the 1-Hour Mean AQO of 200 $\mu g/m^3$	39	25	18	7	0
Annual Mean PM_{10} ($\mu g/m^3$)	24	20	21	22	18
Number of Predicted PM_{10} Exceedances of the 24-Hour Mean AQO of 50 $\mu g/m^3$	10	3	2	8	2

Annual Mean $PM_{2.5}$ (µg/m^3)	17	14	15	14	11

5.1.2 Non-automatic Data

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

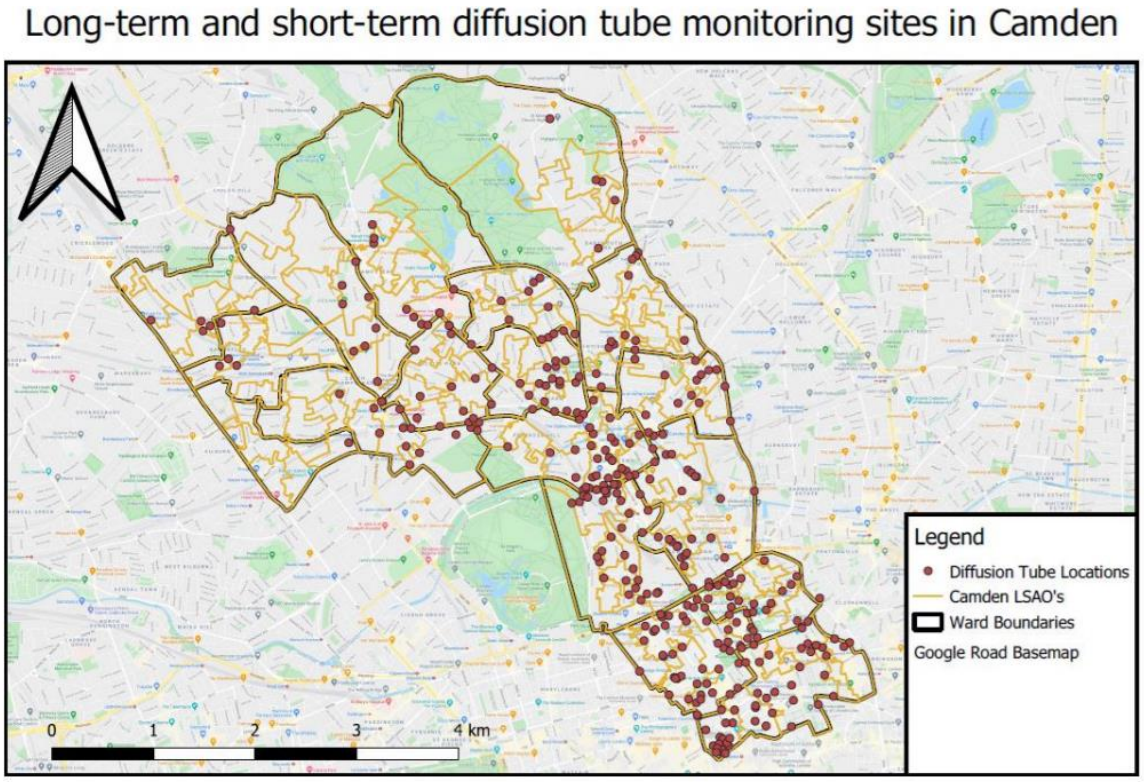

Fig 3. Camden Diffusion Tubes

The nearest tube to the proposed development is CA21 - situated on Bloomsbury Street, approximately 650m to the 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
CA21 Bloomsbury Street	72.20	71.18	59.43	48.48	28.82

The data indicates that annual mean NO_2 concentrations at the development site have the potential to exceed the air quality standard of 40 µg/m^3 at ground floor level, albeit there is clearly a pattern of a reduction in overall levels v time; a reflection of the mix of vehicles using the London roads .

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 not such 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	39.39	32.00	39.39*	40
PM_{10}	20.93	18.00	20.93	40
$PM_{2.5}$	12.97	11.00	12.97	25

*It is worthy of note that urban background measurements from around the proposed development site at London Bloomsbury and St George's Gardens and have measured NO_2 figures at 28.00, 24.65, 27.67; the use of the DEFRA figure at 39.39 is thereby taking a highly conservative approach.

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

6.1.1 Sensitivity of the Area to Dust Impacts

The assessment of dust impacts is dependent on the proximity of the most sensitive receptors to the site boundary. The area is clearly dominated by high density residential uses, including the proximity to Great Ormond Street Hospital to the south; all of which would be considered **HIGH** sensitivity receptors.

Accordingly, it can clearly be assumed that, with >100 High Sensitivity Receptors within 50m of the site boundary, the sensitivity of the area to dust soiling effects on people and property could be considered **HIGH.**

Finally, for the range of sensitive receptors in the range >100 within 50m of the development site, and with the background PM levels less than 24µg/m^3, sensitivity of the area to human health impacts would be considered **LOW.**

Figure 4 – Local sensitive receptors - Proposed development site – Sensitive Receptors

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

6.1.2 Dust Emission Magnitude

The risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high risk.

A development is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emission
- magnitude as small, medium or large (see Table 6);

and

- the sensitivity of the area to dust impacts, which is defined as low, medium or high sensitivity.

Table 6 – Dust emission risk categories

Activity	Dust Emission Class		
	Large	Medium	Small
Demolition	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level	Total building volume 20,000 – 50 000m^3, potentially dusty construction material, demolition activities 10-20 m above ground level	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months
Earthworks	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes	Total site area 2,500 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes	Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10,000 tonnes, earthworks during wetter months
Construction	Total building volume >100,000 m^3, piling, on site concrete batching; sandblasting	Total building volume 25,000 m3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber)
Track out	>50 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m	10 – 50 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100 m;	<10 HDV (>3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50 m.

These factors are combined to determine the risk of dust impacts with no mitigation applied (see Table 8). The risk category assigned to the development can be different for each of the four potential activities (demolition, earthworks, construction and trackout).

Demolition - The site is currently occupied by buildings that are, in the main, to be converted. There are limited demolition works to the rear and internal soft strip and break out works only.

There is no potential that crushing and screening of the existing material will be undertaken on-site.

All demolition works will be at a level <12m, the magnitude of the dust emission is considered to be 'small'.

Earthworks - Earthworks will be highly limited, to the excavation of the small rear basement area only. The site areas is small at circa 120m^2 and there is no space for earth moving vehicles on site.

The magnitude of the dust emission during the earthworks phase is therefore considered to be 'small'.

Construction - Dust emissions during construction will depend on the scale of the works, method of construction, construction materials and duration of build.

The proposed development will be of brick and block construction for the new build at the rear, a lightweight clad roof extension and internal reconfiguration.

There is no potential for concrete batching to take place on site and no expectation of piling works.

Based on the small scale of the proposed works –the magnitude of the emission during construction is considered to be 'small'.

Trackout – the site area is very limited - there will be no construction vehicles entering the site. Dust emissions will be "small"

Table 7: Risk of Dust Impacts Prior to Mitigation

Dust Source	Emissions Magnitude
Demolition	Small
Earthworks	Small
Construction	Small
Track Out	Small

6.1.3 Assessment of Dust Risk Prior to Mitigation

Referring to Chapter 7 of the IAQM "Assess the Risk of Dust Impacts" – tables 3 – 9; a summary of the potential risk of dust impacts prior to mitigation, based on the low sensitivity of the area to dust soiling and human health impacts is presented in Table 8.

Table 8: Risk of Dust Impacts Prior to Mitigation

Dust Source	Emissions Magnitude	Human Health Risk	Dust Soiling Risk
Demolition	Small	Negligible	Medium risk
Earthworks	Small	Negligible	Low risk
Construction	Small	Negligible	Low risk
Track Out	Small	Negligible	Low risk

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, taking into account the canyon impact of the high rise buildings either side of Grenville Street

Predicted annual mean NO_2 concentrations at the proposed development site at the ground and 1st floor levels are presented as contour plot in Figure 5 & 6.

Clearly, modelled centration's of NO_2 are contained within the modelled canyon and exceed the air quality objectives across the 1st floor residential accommodation. This is principally due to the assumed high background NO_2 levels utilised within the modelling

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 530368-182166 at 1st floor level – the closest residential accommodation to Grenville Street; max short term NO_2 levels are 65.85µg/m^3, while PM10 levels do not exceed 21.79µg/m^3, both figures well within AQO.

It can be summarised that the residential units are within the particulate matter air quality objectives for the 2019 baseline year, but due to the high background NO_2 level, exceed the standards for total NO_2.

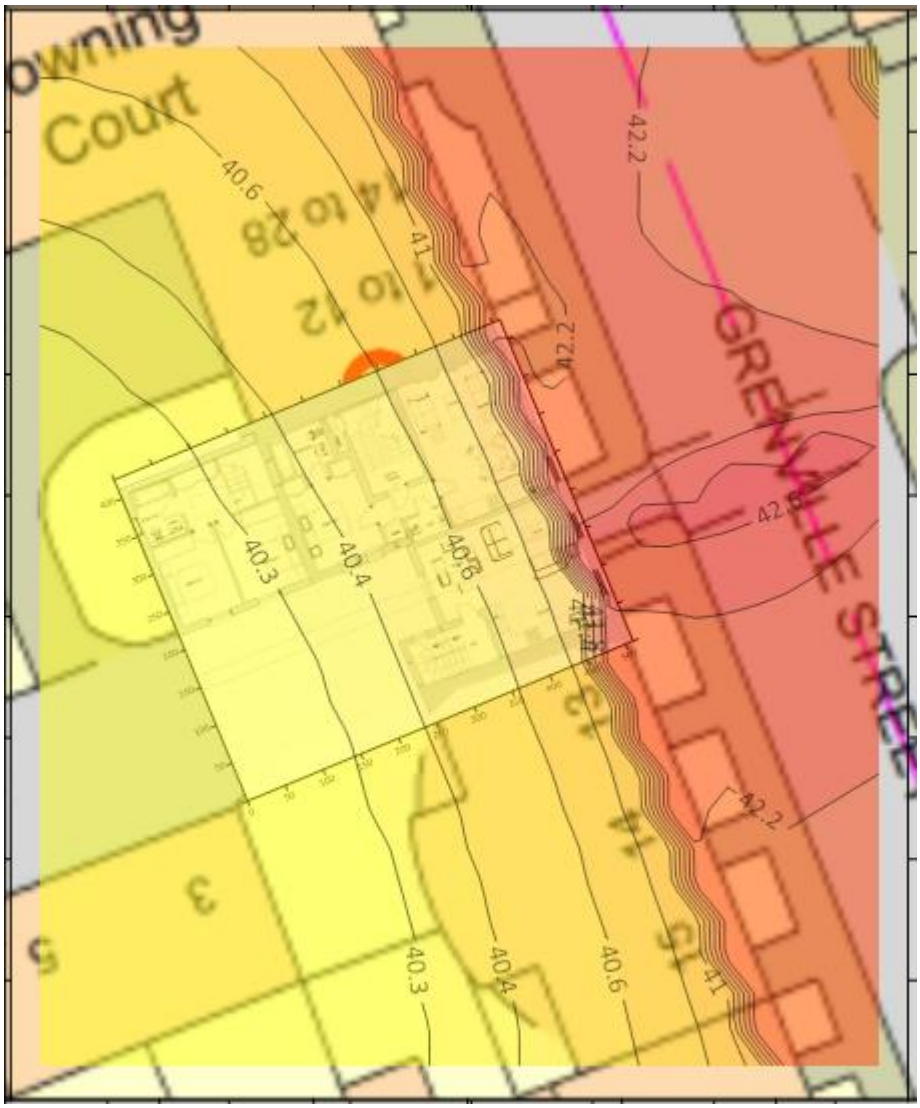

Figure 5 – NO_2 concentrations – Ground Floor

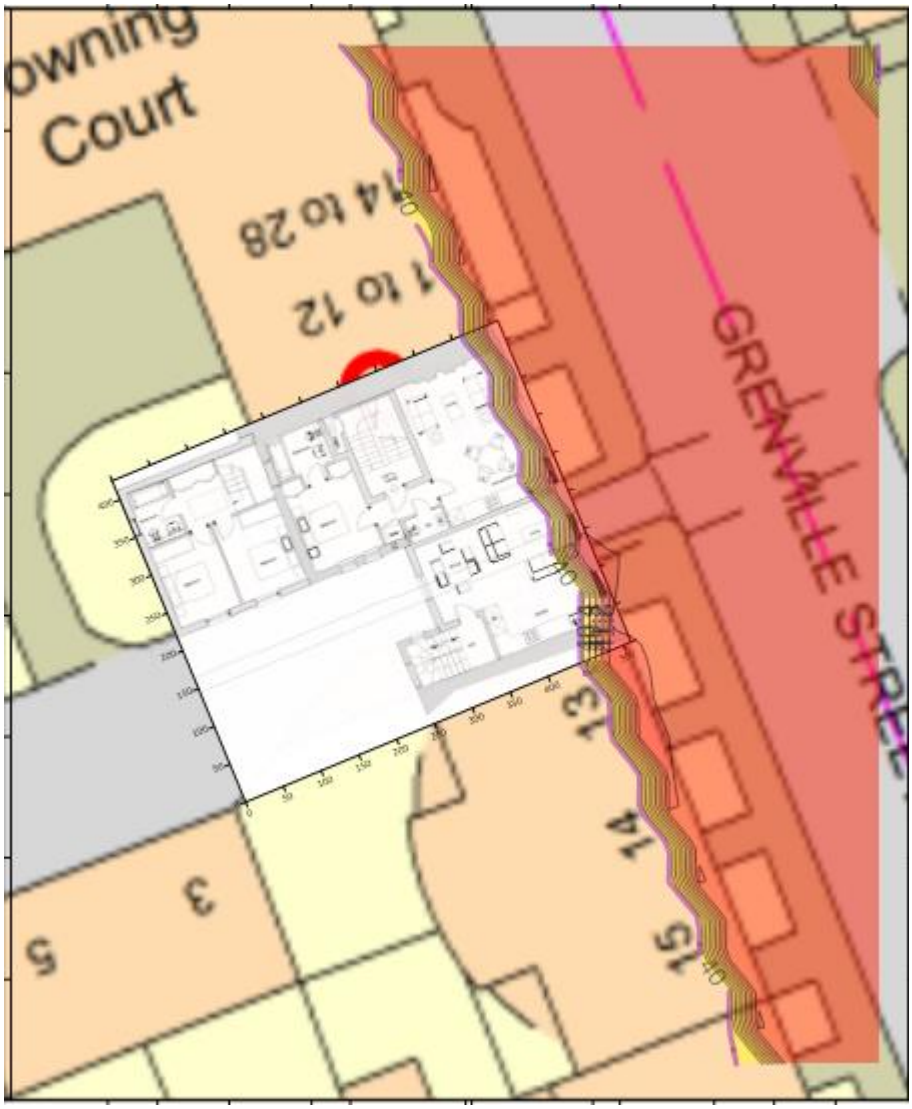

Figure 5 – NO_2 concentrations – 1st Floor

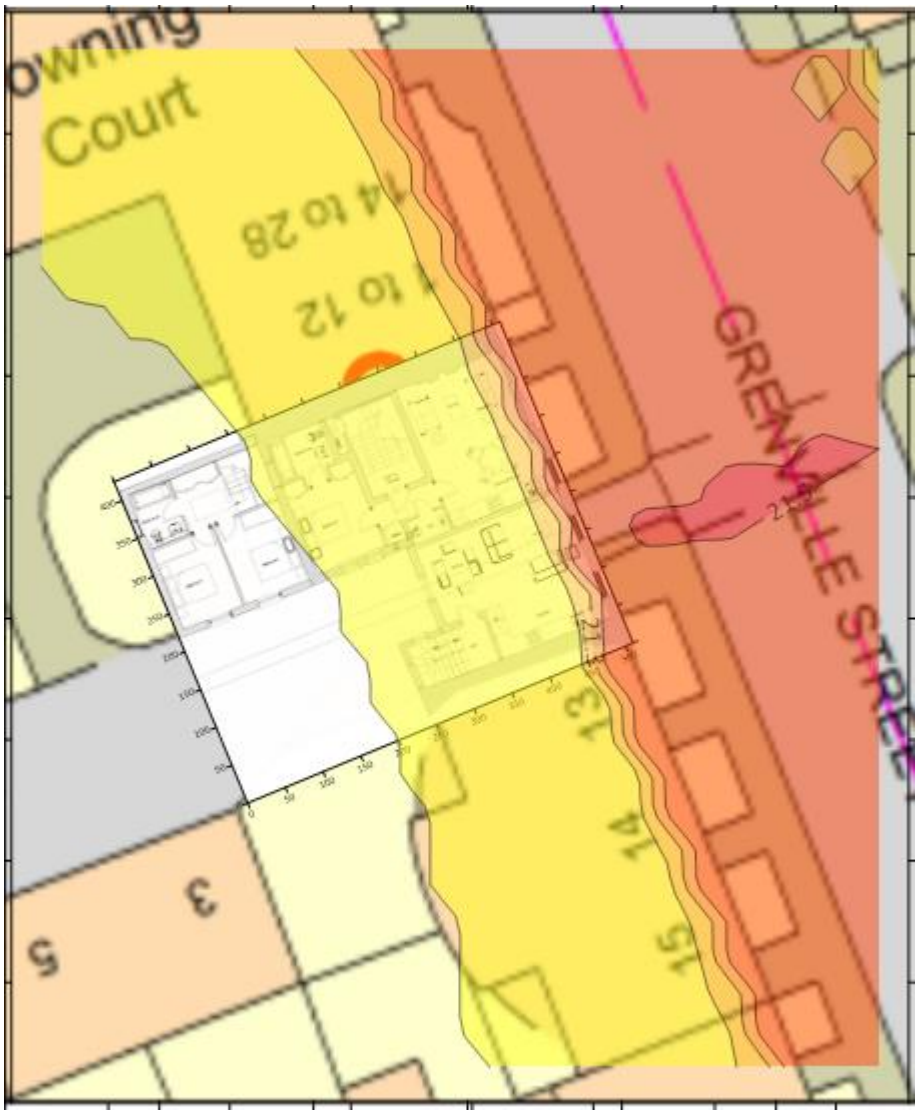

Figure 7 - PM_{10} concentrations – Ground Floor

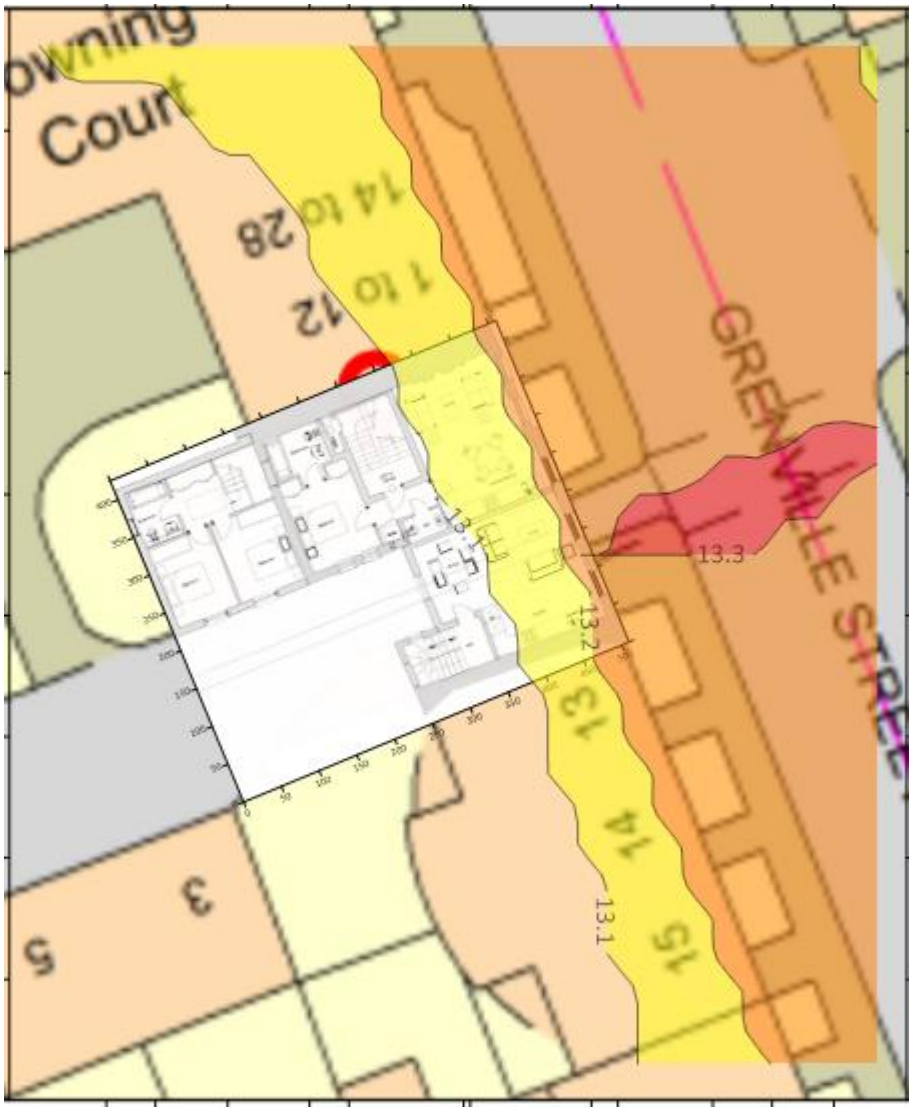

Figure 8 – PM2.5 Concentrations – Ground Floor

6.3 Year of Opening - 2022

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 - 2022

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

For Camden, grid ref 530500 182500, the background NO_2 levels are projected to be at 33.60µg/m^3.

The year of modelling is 2022 – the projected year of opening.

According to Tempro data Traffic volumes in 2023 are predicted to be 4.1% higher than the 20 traffic data in the Borough of Camden

The model at figure 6 shows the predicted maximum long-term concentrations of NO_2 to be at a maximum of 36.0µg/m^3 against the façade of the proposed development; within the required air quality standards.

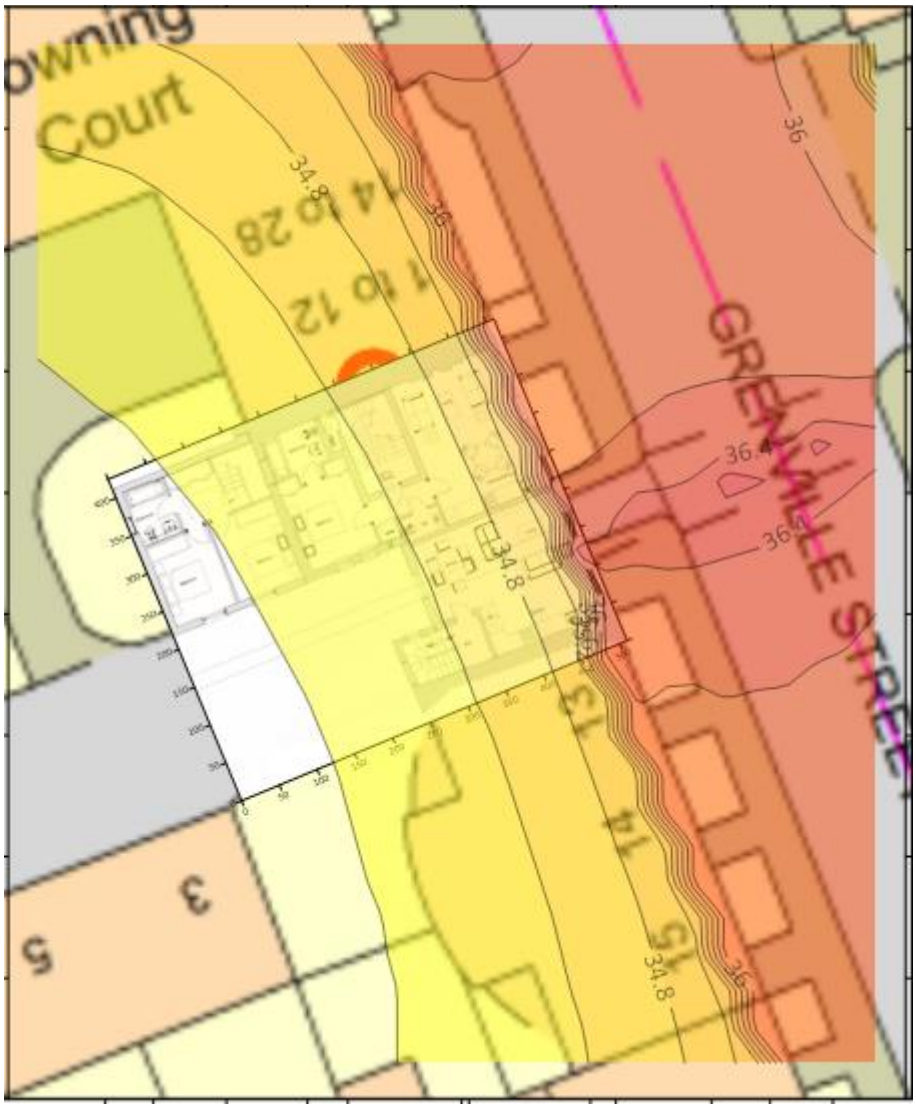

Figure 8 – NO_2 concentrations 2022 – Ground Floor

7.0 Air Quality Neutral Assessment

This section presents an air quality neutral assessment in accordance with The London Plan. It is found that the proposed development will be Air Quality Neutral with respect to building and transport related emissions.

7. 1 Building Emissions

The air quality neutral assessment for building-related emissions compares the emissions from the boilers at the site with benchmarked emissions based on the floor space and land-use as specified in the Air Quality Neutral Planning Support document (PSD)

The Building Emission Benchmarks (BEBs) and benchmarked emissions for the proposed development are presented in Table 9. As the notional proposed boilers will be natural-gas fired, the benchmarked emissions have been calculated for NOx only.

Table 9: Benchmarked Building Emissions

Land Use Class	GFA (m^2)	BEB (g NOx/m^2/annum	Benchmarked Emissions (kg NOx/annum
Residential (C3)	400	26.2	10.48
Total Benchmarked NOx Emissions			**10.48**

Building-related emissions for the proposed development are presented in Table 10 and have been derived from the anticipated energy usage for the site and the London Atmospheric Emissions Inventory (LAEI) default NOx emission factor for domestic land-uses as specified in the PSD.

Table 10: Development Building Emissions

Land Use Class	Energy Usage (Kwh/annum)	Emissions Factor (KgNOx/Kwh)	Building Emissions (kg NOx/annum
Residential (C3)	12,000	0.0000785	0.942
Total Building NOx Emissions			**0.942**

The project is therefore, Air Quality Neutral with respect to building-related emissions.

7.2 Transport Emissions

The air quality neutral assessment for transport-related emissions compares the emissions from traffic generated by the site with benchmarked emissions based on land-use as specified in the Air Quality Neutral PSD.

The transport emission benchmarks (TEBs) and benchmarked emissions for NOx and PM_{10} are presented in Table 11.

The additional traffic generated by the proposed development will be associated with the new dwellings.

Table 11: Benchmarked Transport Emissions

Pollutant/Land Use	Number of Dwellings or GFA (m2)	TEB (g/(dwelling or m^2)/annum	Benchmark Emissions (kg/annum)
NOx			
Residential	6	234	1.40
Total Benchmarked NOx			**1.40**
PM_{10}			
Residential	6	40.7	0.24
Total Benchmarked PM_{10}			**0.24**

Transport-related emissions associated with the residential component of the proposed development are presented in Table 12 and have been calculated using the a nominal trip generation associated the site based on the central London location - assumed a 1 x round trip per day maximum - with trip lengths and emission factors for CAZ London.

Table 12: Development Transport Emissions

Parameter	Residential
Daily Trips	2
Annual Trips	730
Average Distance travelled per trip (km)	4.3
Annual Distance (km)	3,139
NOx Emissions Factor (g/km)	0.4224
NOx Emissions (kg/annum)	1.33
Total Development NOx	**1.33**
PM_{10} Emission Factor (g/km)	0.0733
PM_{10} Emission (kg/annum)	0.23
Total Development PM_{10}	**0.23**

The development transport emissions for NO_2 and PM_{10} are below the benchmarked emissions, therefore the proposed development is assessed to be Air Quality Neutral with respect to transport-related emissions.

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 risk of dust soiling and human health impacts from the site has been assessed as **"Medium"** prior to mitigation, therefore in accordance with the IAQM guidance it is recommended that the measures detailed in Table 13 are incorporated into the DMP. The significance of dust impacts on nearby receptors following the implementation of appropriate and best practice mitigation is considered to be negligible.

Table 13 Recommended Mitigation Measures

Description	Mitigation Measure
General	• Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. • Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary; this may be the environment manager/engineer or the site Manager. • Display the head or regional office contact information.
Site management	• Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. • Make the complaints log available to the local authority when asked. • Record any exceptional incidents that cause dust and/or air emissions, either on or offsite, and the action taken to resolve the situation in the log book.
Monitoring	• Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.

	• Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. • Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.
Preparing and maintaining the Site	• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. • Erect solid screens or barriers around dusty activities or at the site boundary that is at least as high as any stockpiles on site. • Fully enclose the site or specific operations where there is a high potential for dust production and the site is active for an extensive period • Avoid site runoff of water or mud. • Keep site fencing, barriers and scaffolding clean using wet methods. • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. • Cover, seed or fence stockpiles to prevent wind whipping.
Operating vehicle & machinery and sustainable travel	• Ensure all vehicles switch off engines when stationary - no idling vehicles. • Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable. • Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
Operations	• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems. • Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. • Use enclosed chutes and conveyors and covered skips.

	• Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. • Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Waste management	• Avoid bonfires and burning of waste materials
Demolition	• Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground. • Avoid explosive blasting, using appropriate manual or mechanical alternatives. • Bag and remove any biological debris or damp down such material before demolition.
Construction	• Ensure sand and other aggregates are stored in bundled areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
Track out	• Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. • Avoid dry sweeping of large areas. • Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. • Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). • Access gates to be located at least 10m from receptors where possible.

8.1.1 Method Statement

A method statement should cover all phases of the development and take account of all contractors or sub-contractors. It should be submitted to the local planning authority (LPA) prior to any works being carried out and include a timetable of dust generating activities accompanied with proposed dust control measures.

The content of a Method Statement will be determined by a site specific evaluation but typical features to include are outlined below:-

- summary of work to be carried out
- description of site layout and access – including proposed haul routes, location of site equipment including supply of water for damping down, source of water (wherever possible from dewatering or extraction), drainage and enclosed areas
- inventory and timetable of all dust generating activities
- list of all dust and emission control methods to be used
- details of any fuel stored on site
- Identification of an authorised responsible person on-site for air quality. Ideally this person needs to have knowledge of pollution control and vehicle emissions;
- summary of monitoring protocols and agreed procedure of notification to the local authority nominated person(s)
- a site log book to record details and action taken in response to exceptional incidents or dust-causing episodes. It should also be used to record the results of routine site inspections.

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 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 for the residential accommodation proposed at the time of opening - utilising a highly conservative approach to the use of background NO_2 emissions.

The use of ultra low-NOx gas fired systems for heating and hot water will have highly limited effect 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.

An assessment of the potential impacts during the construction phase has been carried out in accordance with the latest Institute of Air Quality Management guidance; this has shown that releases of dust and PM_{10} are likely to occur during site activities. The risk of dust soiling and health impacts at neighbouring properties has been assessed as low to medium, with the risk to human health assessed as low. Through good site practice and the implementation of suitable mitigation measures, the impact of dust and PM_{10} releases may be effectively mitigated and the resultant impacts are considered to be negligible.

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 within the targets set by the Air Quality Standards Regulations 2010 for particulate matter in the baseline year, whilst NO_2 levels are demonstrated within compliant levels in the year of opening 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 due to the use of low NOx gas fired heating and hot water systems – giving rise to very limited local emissions.

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

Appendix A

IAQM CONSTRUCTION DUST METHODOLOGY

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

Table A1: Receptor Sensitivity

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

a) In the case of the 24-hour objective, a relevant location would be one where individuals may be exposed for eight hours or more in a day.
b) Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete).
c) Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.
d) Does not include workers' exposure to PM_{10} as protection is covered by Health and Safety at Work legislation.
e) Except commercially sensitive horticulture.

The sensitivity of the area as a whole is dependent on the number of receptors within each sensitivity class and their distance from the source. Human health impacts are also dependent on the existing PM_{10} concentrations in the area.

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

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

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

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

Receptor Sensitivity	Annual Mean PM_{10} Concentration ($\mu g/m^3$)	Number of Receptors	Distance from the Source				
			<20m	<50m	<100m	<200m	<350m
High	>32	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28	**>100**	**High**	**Medium**	**Low**	**Low**	**Low**
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28	**>10**	**Low**	**Low**	**Low**	**Low**	**Low**
		1-10	Low	Low	Low	Low	Low
	<24	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low	Low

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

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

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

Table A5: Dust Emission Magnitude

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

a) HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes

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

Table A6: Risk of Dust Impacts from Demolition, Earthworks and Construction

Area Sensitivity	Distance from the Source		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible Risk

Table A7: Risk of Dust Impacts from Trackout

Area Sensitivity	Distance from the Source		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible Risk
Low	Low Risk	Low Risk	Negligible Risk

Appendix B

ADMS-ROADS INPUT PARAMETERS

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)
A502	80	1.5	10 central London slow speed traffic
Grenville Street	168	2.1	10 central London slow speed traffic
Guilford Street	168	2.1	10 central London slow speed traffic

Figure 9 – 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 CA21 Bloomsbury Street, 600m to the west– as identified in Figure 8 below.

Traffic was assumed to be slow moving on the congested central London street and the road has been modelled as a canyon.

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; as modelled concentration are almost at parity with that than measured, a **+0%** adjustment factor has also been applied to the modelled Road NO_2,

Tables C1: Verification Calculations

AC21 Bloomsbury Street

Parameter	Value
Measured NO_2 Concentration (2019)	48.48 µg/m^3
Modelled NO_2 Concentration*	48.54 µg/m^3
Adjustment Factor	0.00%

*Using the DEFRA NOx to NO_2 Converter

Figure 10 – Verification Diffusion Tube Monitoring Site