Air Quality Assessment & Indoor Air Quality Plan

West London Mission

King's Cross Methodist Church

58a Birkenhead Street
London
WC1H 8BB
London Borough of Camden

Version	Revision	Date	Author	Reviewer	Project Manager
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Executive Summary

This Air Quality Assessment (AQA) and Indoor Air Quality Plan (IAQP) have been conducted by SRE Ltd on behalf of West London Mission (The Client) to address the London Plan and the Camden Local Plan planning policy requirements for the refurbishment and extension proposals at King's Cross Methodist Church, London (the Proposed Development).

The proposal involves the internal upgrading and a roof extension to the original historic parts of the church facing Birkenhead Street, as well as the complete rebuilding of the 1950s extension facing the Crestfield Street side. This fulfils a brief to deliver a mix of modern church/community spaces, along with upgraded student accommodation, which when implemented will bring the building up to full contemporary design and technical standards.

The Proposed Development is located within the Camden Air Quality Management Area (AQMA), which was declared by the London Borough of Camden in 2002 due to Nitrogen Dioxide (NO_2) and Particulate Matter (PM_{10}) concentrations exceeding the national air quality objectives for these pollutants. The development aims to mitigate the risks of air pollution to the area and future occupants, and this has been evaluated as part of the AQA.

A detailed dispersion air quality modelling has been performed for the Proposed Development to assess the general air quality issues around the proposed site and determine its suitability for future development. The Atmospheric Dispersion Modelling System for small road networks (ADMS-Roads) model suggests that annual mean concentrations of NO_x exceed the current UK objectives, while the concentrations of NO_2, $PM_{2.5}$ and PM_{10} remain within the current UK objectives. Therefore, it is considered that the local air quality is poor due to the exceedance of NO_x. Filtered mechanical ventilation will therefore be specified to provide suitable ventilation rates to the internal areas, to avoid the need for openable windows and potential ingress of external air pollution.

Since the Proposed Development consists of church/community spaces and student accommodations, a substantial human presence is expected within the building at any given time. Consequently, the potential health hazards for future occupants posed by local air quality are expected to be significant. These hazards need to be further mitigated through the incorporation of appropriate measures during the building's design and construction.

This AQA is aligned with the Greater London Authority (GLA) planning policy requirement, by addressing Air Quality Neutral (AQN). Following the 'Air Quality Neutral London Plan Guidance (February 2023)', the Building Emissions Benchmark (BEB) and Transport Emissions Benchmark (TEB) have been assessed separately for the Proposed Development. As a result, the Proposed Development has been found to meet the criteria for being Air Quality Neutral.

This report has tackled external pollution concerns to assess the suitability of the site for the proposal with regards to local air quality. Internal pollution concerns have been identified in the IAQP section, with essential mitigation measures outlined to mitigate potential hazards to indoor air quality for future occupants.

Following the assessment, construction and operational phase impacts on the local air quality have been considered. Key mitigation measures have been addressed relating to the increased traffic, odour, and aerosols from the proposed scheme.

A Dust Risk Assessment (DRA) has been undertaken in accordance with the recommended practices outlined in the 'Guidance on the assessment of dust from demolition and construction V2.2', and the site is defined as a medium risk site. Dust mitigation measures have been implemented following the 'Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance' as the best practice guidance document, to minimise air pollution derived from construction-related activities.

The proposed energy strategy does not incorporate gas-fired or solid-/oil-fuelled heating systems and therefore there are no associated Nitrogen Oxides (NO_x) emissions during the operation of the building. No emergency or backup generators have been proposed. The proposal for cycle storage also promotes sustainable transport to and from the site.

In summary, the proposed location is deemed acceptable for the proposed scheme in terms of local air quality. The anticipated future impact of the Proposed Development on local air quality is expected to be minimal, as there are no Nitrogen Oxides (NO_x) emissions anticipated during the operation of the building, coupled with low level transport emissions. Suggestions have been made in this report to reduce the potential health hazards for the local area and future building occupants.

Introduction

1.0 Introduction

The World Health Organisation (WHO) defines air pollution as ‘the contamination of indoor or outdoor areas by biological, chemical, or physical particles that modify the natural characteristics of the atmosphere’. Depending on the level of exposure, this pollution can provoke a wide range of health effects with the most dangerous forms of air pollution being Particulate Matter ($PM_{2.5}$/PM_{10}) and Nitrogen Oxides (NO_2/NO_x) due to their high concentration. In the UK, power generators and transport are the largest human-made sources of PM with Nitrogen Oxides, representing a human-made pollutant released through combustion processes such as heating, power generation and vehicle/ship engines[1].

This Air Quality Assessment (AQA) and Indoor Air Quality Plan (IAQP) have been perfromed by SRE Ltd on behalf of West London Mission (The Client) to address the London Plan and the Camden Local Plan planning policy requirements for the refurbishment and extension proposals at King’s Cross Methodist Church, London (the Proposed Development).

The Proposed Development is situated at 58a Birkenhead Street, in the heart of the King's Cross area of Camden, Greater London. The church is conveniently located near key landmarks, such as King's Cross Station, and is in an area that has undergone significant development and renewal in recent years. The surrounding area includes a mix of residential, commercial, and cultural spaces. Figure 1 shows the location of the proposed site.

Figure 1 - Location of the Proposed Development (Google Earth)

[1] Demystifying Air Pollution in London: Full Report, January 2018

King's Cross Methodist Church boasts a rich history, with its original construction dating back to 1824. Over the decades, the building has undergone numerous changes. The proposals involve the internal upgrading and a roof extension to the original historic parts of the church facing Birkenhead Street, as well as the complete rebuilding of the 1950s extension facing the Crestfield Street side. This fulfils a brief to deliver a mix of modern church/community spaces, along with upgraded student accommodation, which when implemented will bring the building up to full contemporary design and technical standards. The proposals follow retrofit principles in order to retain the historic presence of the building in the street and to promote longer-term sustainability goals. Figure 2 shows the ground floor plan of the Proposed Development.

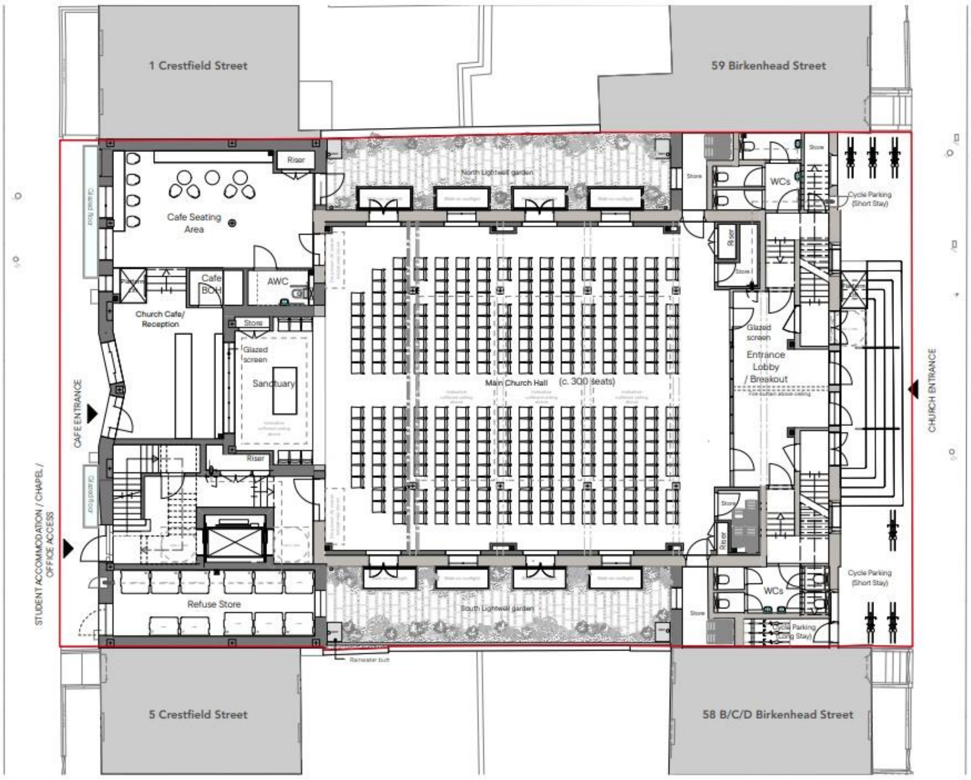

Figure 2 – Proposed Ground Floor Plan of the Proposed Development (Matthew Lloyd Architects)

The Proposed Development is situated near King's Cross Railway Station, St Pancras International Railway Station, and Euston Railway Station, drawing a substantial number of visitors due to its key transportation connections. Additionally, recent developments and regeneration projects in the area have attracted even more people, making it a vibrant and heavily trafficked part of London.

The church benefits from its proximity to King's Cross Station, providing easy access for commuters and visitors. The location has the best connection in terms of public transport, currently falling within the PTAL[2] 6b (Figure 3), where 0 indicates the worst and 6b denotes the best level of connectivity.

[2] PTAL: Public Transport Accessibility Levels

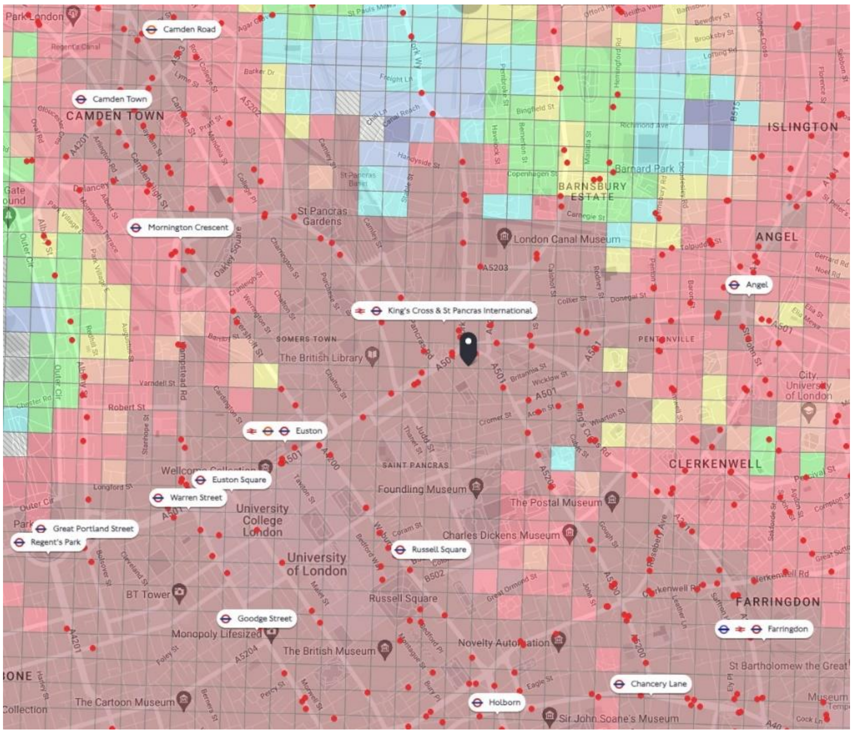

Figure 3 - PTAL Map of the Proposed Development (WebCAT)

1.1 Air Quality Objectives

There is growing evidence that air pollution, even when experienced at very low levels, can cause damage to human health. Table 1 below represents the current national air quality objectives and targets for the protection of human health from the national DEFRA Air Quality Limits[3].

Pollutant	Applies	Objective	Concentration measured as	Date to be achieved by (and maintained thereafter)
Particles (PM_{10})	UK	50 µg/m^3 not to be exceeded more than 35 times a year	24 hours mean	31 December 2004
	UK	40 µg/m^3	annual mean	31 December 2004
Particles ($PM_{2.5}$) Exposure Reduction	UK (except Scotland)	20 µg/m^3	annual mean	1 January 2020
	UK urban areas	Target of 15% reduction in concentrations at urban background		Between 2010 and 2020
Particles ($PM_{2.5}$) (Population Exposure Reduction Target)	England	Target of 35% reduction in population exposure compared with the average population exposure baseline period (2016 – 2018)	population exposure reduction	31 December 2040

[3] DEFRA National Air Quality and European Directive Limit and Target Values for the Protection of Human Health

Pollutant	Applies	Objective	Concentration measured as	Date to be achieved by (and maintained thereafter)
Particles ($PM_{2.5}$) (Annual Mean Concentration Target)	England	10 µg/m³ not to be exceeded at any relevant monitoring station	annual mean	31 December 2040
Nitrogen Dioxide	UK	200 µg/m³ not to be exceeded more than 18 times a year	1 hour mean	31 December 2005
	UK	40 µg/m³	annual mean	31 December 2005

Table 1 - National Air Quality Objectives and Targets for the protection of human health (UK AIR, 2020)

As per London's $PM_{2.5}$ guidelines[4], the recommended guideline limit for $PM_{2.5}$ is an annual mean concentration of 10 µg/m³. In the London Environment Strategy[5], the Mayor set out the ambition for all of London to have $PM_{2.5}$ concentrations below the World Health Organization guideline[6] limit by 2030. The WHO Air quality guidelines (AQGs) present recommended levels for common air pollutants, as shown in Table 2. The average $PM_{2.5}$ concentration in London was 13.3 µg/m³, with no areas in London within the WHO guideline limit.

Pollutant	Averaging Time	2005 AQGs	2021 AQGs
$PM_{2.5}$, µg/m³	Annual	10	5
	24-hour	25	15
PM_{10}, µg/m³	Annual	20	15
	24-hour	50	45
NO_2, µg/m³	Annual	40	10
	24-hour	-	25

Table 2 - Recommended AQG levels (Last modified 2023)

Road transport is the largest single source of $PM_{2.5}$ in London, accounting for 30% of local emissions. Biomass burning, including domestic woodburning, is the second largest source, accounting for 16%. Construction, which includes emissions from Non-Road Mobile Machinery (NRMM), follows closely, making up 15% of local emissions. The next largest source is cooking, including commercial cooking, contributing 13% of local emissions.

4 $PM_{2.5}$ in London: Roadmap to meeting World Health Organization guidelines by 2030 (October 2019)
5 Mayor of London: London Environment strategy (May 2018)
6 WHO global air quality guidelines

1.2 Planning Context

This AQA has addressed the London Plan[7] Policy SI1 Improving Air Quality requirement, stating that "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, and c) create unacceptable risk of high levels of exposure to poor air quality." In order to meet the requirements, development proposals must meet a minimum standard of Air Quality Neutrality and large-scale development proposals should provide an air quality positive statement. To achieve this goal, the GLA has recently issued revised guidance 'Air Quality Neutral London Plan Guidance (February 2023)[8], to determine whether a proposed development is considered to be Air Quality Neutral (AQN).

The Camden Local Plan[9] sets out the Council's planning policies and replaces the Core Strategy and Development Policies planning documents (adopted in 2010). It ensures that Camden continues to have robust, effective and up-to-date planning policies that respond to changing circumstances and the borough's unique characteristics, contribute to delivering the Camden Plan and other local priorities. The Local Plan will cover the period from 2016-2031. The Camden Clean Air Strategy 2019-2034 and Camden Clean Air Acton Plan 2023-2026[10] sets out Camden's approach for improving air quality and protecting health from exposure to air pollution in Camden. The Camden Clean Air Strategy 2019-2034 sets out our strategic objectives for realising the vision for a borough in which no person experiences poor health as a result of the air they breathe. The Camden Clean Air Action Plan 2023-2026 describes the actions that should be taken over the next four years (2023-2026). This follows on from the previous Camden Clean Air Action Plan 2019-2022.

Table 3 below summarises the policy context of the relevant policy.

Planning Policy	Sections	Policy Summary
The London Plan (March 2021)	Policy SI 1 Improving air quality	A: Development Plans, through relevant strategic, site-specific and area-based policies, should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality. B: To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed: 1) Development proposals should not: a) lead to further deterioration of existing poor air quality. b) create any new areas that exceed air quality limits or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits. c) create unacceptable risk of high levels of exposure to poor air quality. 2) In order to meet the requirements in Part 1, as a minimum: a) development proposals must be at least Air Quality Neutral. b) development proposals should use design solutions to prevent or minimise increased exposure to existing air

[7] The London Plan Guidance (March 2021)
[8] Air quality Neutral London Plan Guidance (February 2023)
[9] Camden Local Plan 2017
[10] Camden Clean Air Strategy 2019-2034 and Camden Clean Air Acton Plan 2023-2026

Planning Policy	Sections	Policy Summary
		pollution and make provision to address local problems of air quality in preference to post-design or retrofitted mitigation measures. c) major development proposals must be submitted with an Air Quality Assessment. d) development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure. C: Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this, a statement should be submitted demonstrating: 1) how proposals have considered ways to maximise benefits to local air quality, and 2) what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this. D: In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance. E: Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development.
Air quality Neutral London Plan Guidance (February 2023)	Air Quality Neutral	An Air Quality Neutral development is one that meets, or improves upon, the Air Quality Neutral benchmarks set out in this document. These benchmarks set out the maximum allowable emissions of NO_x and Particulate Matter based on the size and use class of the proposed development. These benchmarks are based on research and evidence carried out by building and transport consultants and are designed to prevent the degradation of air quality from the combined emissions of individual developments. There are two sets of benchmarks, which cover the two main sources of air pollution from new developments: • Building Emissions Benchmark (BEB) – emissions from equipment used to supply heat and energy to the buildings. • Transport Emissions Benchmark (TEB) – emissions from private vehicles travelling to and from the development. The Proposed Development must meet both benchmarks separately in order to be Air Quality Neutral. If one or both benchmarks are not met, appropriate mitigation or offsetting will be required. As the benchmarks are based on evidence and are

Planning Policy	Sections	Policy Summary
		designed to be challenging but achievable, mitigation or offsetting provisions should be the exception.
Camden Local Plan	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.
Camden Clean Air Strategy 2019-2034 and Camden Clean Air Acton Plan 2023-2026	Theme 2: Reducing emissions from buildings	'Building emissions' refers to air pollution produced during the operation and use of buildings (not during their construction), from heating systems, power generation, industrial processes and cooking or food preparation. 6. Reduce emissions from building heating systems • We will raise awareness of the impact of building heating emissions on local air quality and public health to encourage residents, landlords and building operators to switch from fossil fuel heating systems to electric heating systems, where possible. • We will explore synergies with Camden's Climate Programme to capitalise on behaviour change messaging addressing both the climate crisis and air quality health crisis. • Through Camden's Carbon Management Plan and Climate Programme we will reduce air pollution emissions (in addition to carbon dioxide) from Camden's own non-domestic buildings by replacing gas heating systems and improving building insulation and energy efficiency. • Camden's housing retrofit decarbonisation programme will achieve co-benefits for air quality and public health. • We will promote and signpost any grant funding opportunities to support residents, businesses and other organisations to replace or upgrade fossil fuel heating systems with electric alternatives, to reduce air pollution as well as CO_2 (for example, the Camden Climate Fund and other grants as set out in the Council's Housing Renewal Assistance Policy). • Collaborating with other social landlords to assist with the identification of heat decarbonisation measures. • Behaviour change to reduce heating use in buildings, for example through the Council's Well & Warm programme and other affordable warmth services (including as part

Planning Policy	Sections	Policy Summary
		of the Mayor of London-funded Somers Town Future Neighbourhood 2030 programme). • Push for 100% of relevant planning applications to achieve the Air Quality Neutral benchmark (2022) and subsequent more stringent standards. 7. Reduce emissions from backup diesel generators • We will explore all available opportunities to reduce and prevent the installation and operation of any further diesel backup generators in Camden, instead requiring or mandating the use of cleaner alternatives such as electric battery storage systems, additional mains power connections. • Where non-fossil fuel power systems are not viable, we will enforce the use of the cleanest and most efficient generators available, avoidance of over-sized generators, with the minimum possible number of hours of routine testing, and with a requirement to avoid testing at times of forecast or current high levels of air pollution.

Table 3 - Relevant Planning policy summary

1.3 Building Regulations Approved Document F: Ventilation

The Proposed Development is being designed as a mechanically ventilated building and will follow the requirements detailed dispersion in Building Regulations Approved Document F: Ventilation where applicable. This includes providing suitable ventilation rates to avoid the internal collection of air pollutants, whilst also limiting internal ingress of external pollutants into building.

Background Pollution Levels

2.0 Background Pollution Levels

2.1 Air Quality Management Area (AQMA)

Where significant levels of gaseous pollutants such as Nitrogen Oxides are identified in the outdoor air, as identified in areas located within an Air Quality Management Area (AQMA), the use of appropriate gas phase filtration in the building ventilation system should be considered. Developments where a portion of the site is within a local authority AQMA are automatically considered to be in a high pollution location. The Proposed Development is located within the Camden Air Quality Management Area declared by the London Borough of Camden in 2002 due to exceedances in Nitrogen Dioxide NO_2 and Particulate Matter PM_{10} (Figure 4).

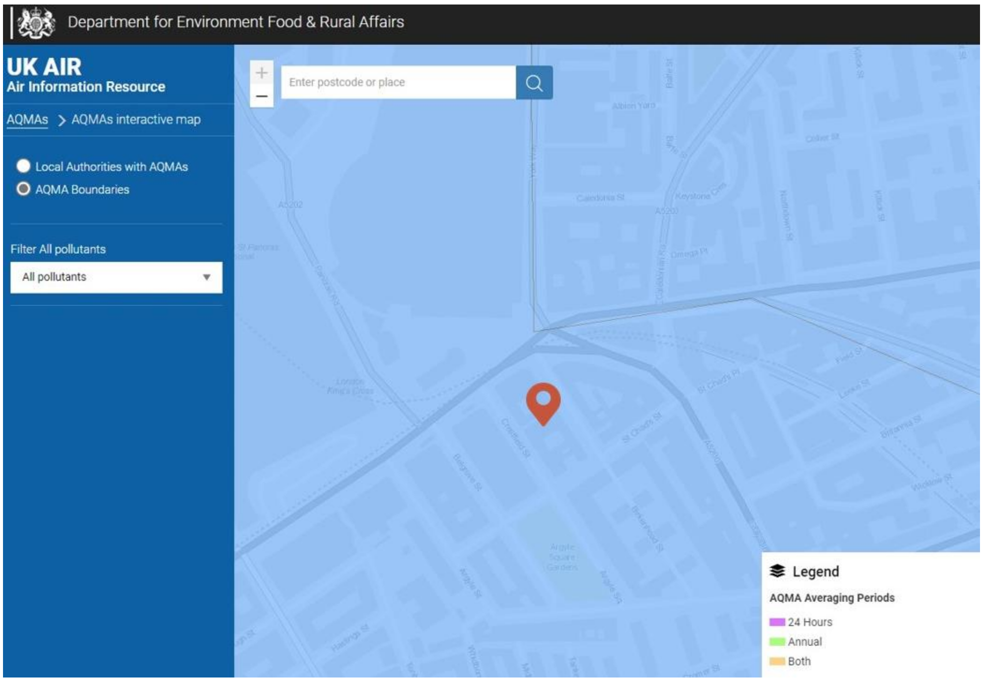

Figure 4 – Camden AQMA Boundaries of the Proposed Development (DEFRA)

The entirety of the borough falls within an Air Quality Management Area (AQMA), where road transport serves as the main contributor to pollution. It is therefore important to consider the traffic impact from the Proposed Development during both the construction and operation phases on local air quality.

In the local area of central London, background concentrations of Particulate Matter (PM_{10}/$PM_{2.5}$) and Nitrogen Dioxide (NO_2) are shown to be within the national air quality objectives listed in Table 1 above, including the area in which the Proposed Development is located (as evidenced in Figure 5). Background pollutant concentrations are selected from the year of 2022 in order to illustrate pollution data during a year of normalised emissions rates.

As shown in Figure 5 below, the annual mean concentration for Nitrogen Dioxide was 32.46 µg/m³, NO_x (as NO_2) was 55.32 µg/m³, PM_{10} was 20.68 µg/m³, and $PM_{2.5}$ was 10.94 µg/m³. The background concentration of NO_x exceeded the national air quality objectives of 40 µg/m³ in 2022. It is recommended that suitable mitigation measures should be implemented during the design of the development to reduce health risks to the future site and building users.

Figure 5 - 2022 Background Concentrations of NO_X, NO_2, PM_{10}, $PM_{2.5}$ (DEFRA UK)

2.2 Air Quality Focus Areas

Air Quality Focus Areas (AQFA) are locations that not only exceed the EU annual mean limit value for Nitrogen Dioxide (NO_2) but are also locations with high human exposure. AQFAs are not the only areas with poor air quality, but they have been defined to identify areas where currently planned measures to reduce air pollution may not fully resolve poor air quality issues. Development proposals in AQFAs are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people. The list of AQFAs is updated as the London Atmospheric Emissions Inventory (LAEI) is reviewed and the latest list in the London Datastore should always be checked.

In accordance with the LAEI 2019[11], revised in April 2023, Figure 6 illustrates the AQFA Borough map for Camden. No. 29 (ID 2019) represents the Marylebone Road from Marble Arch/Euston/King's Cross Junction NO_2 Focus Areas. These details are outlined in the LAEI 2019, with updates to the Focus Area lists made in November 2022. The Proposed Development is situated in the No. 29 AQFA. Development proposals in AQFAs are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people.

[11] LAEI 2019 is the latest version of the London Atmospheric Emissions Inventory and replaces previous versions of the inventory.

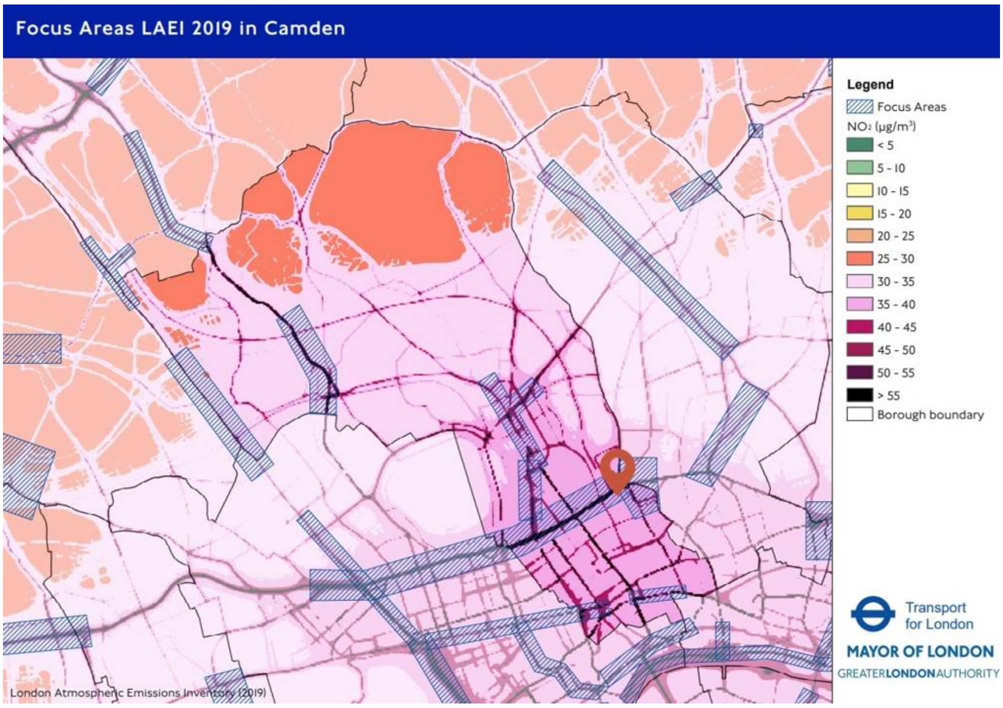

Figure 6 – Camden AQFA Map (LAEI 2019)

2.3 High Pollution Location

In accordance with the BREEAM manual, under Pollution Section 02 (Pol 02) Local air quality:

> ‘Any developments where any portion of the site is within a local authority AQMA are automatically considered to be in a high pollution location. For developments that are wholly outside of an AQMA, the following levels define high pollution locations:
>
> - NO_x > 15 µg/m³ averaged over a year
> - PM_{10} > 10 µg/m³ averaged over a year’

As the entirety of the borough falls within the Camden AQMA, the proposed site can be classified as being in a high pollution location. Therefore, suitable mitigation measures should be considered during the design of the development to reduce health risks to the building users.

2.4 External Sources

2.4.1 Roads

The Proposed Development is situated on Birkenhead Street and Crestfield Street. Euston Road (A501), a dual carriageway, provides access to both Birkenhead Street and Crestfield Street. The development is near the King's Cross junction, where the A501 intersects with A5203 York Way, facilitating significant traffic flow and connectivity in the area.

Figure 7 below represents the impact of solely roadside emissions on the air quality of the area, to gauge the influence of roads upon local air quality (2022). It can be seen that the annual mean roadside concentration from A501 Euston Road for Nitrogen Dioxide was 34.99

µg/m³, NO_x (as NO_2) was 78.35 µg/m³, PM_{10} was 23.21 µg/m³, and $PM_{2.5}$ was 11.96 µg/m³. Notably, NO_x (as NO_2) emissions from roadside sources along the A501 exceeded the current national air quality objectives and targets of 40 µg/m³. Table 4 below provides a summary of the roadside concentrations for the relevant roads surrounding the Proposed Development.

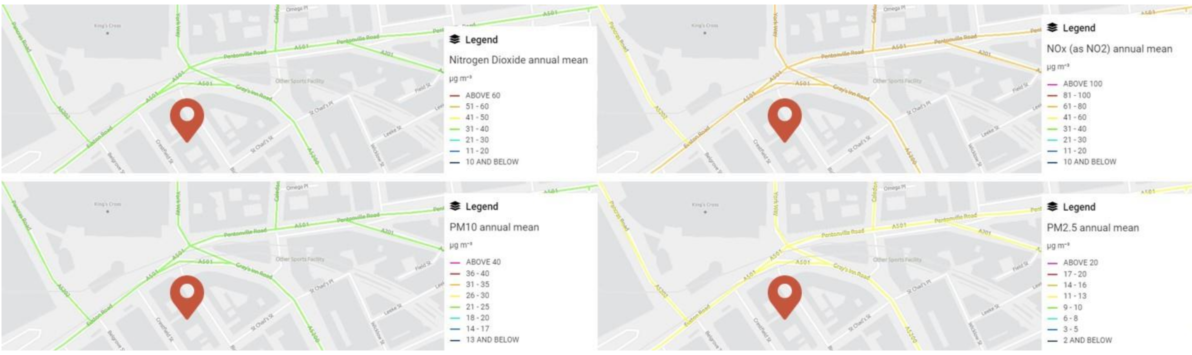

Figure 7 - Roadside concentrations near the Proposed Development (DEFRA UK, 2022)

Road	Nitrogen Dioxide (µg/m³)	NO_x as NO_2 (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)
A501 Euston Road	34.99	78.35	23.21	11.96
A501Gray's Inn Road	33.98	75.20	22.18	11.56
A501 Pentonville Road	32.56	71.72	22.36	11.57
A5200 York Way	31.35	67.18	21.77	11.33

Table 4 - Summary results of the Roadside concentrations near the Proposed Development (DEFRA UK, 2022)

Comparing the annual mean pollutant concentrations for all the roads around the junction, Euston Road shows the highest levels. This is because Euston Road experiences more traffic, which impacts the three other roads it connects.

2.4.2 Wind

Wind plays a vital role in the dispersion of pollutant particles across long distances dependent on the speed and direction of the prevailing wind. Whilst assisting in the removal of pollutants from certain areas, it simultaneously acts to worsen air quality in other areas to which the airmass is transported.

The wind rose below (Figure 8) shows how many hours per year the wind blows from the indicated direction for the area. Air pollution produced from the site is likely to be blown from West (W) and South-West (SW) to North-East (NE). To the northeast of the site are mixed-use buildings, including retail and residential developments, where the construction-related air pollution is expected to disperse. Given that the proposed development is situated in central London, where buildings typically average around four floors, the dense urban environment can trap air pollutants. Therefore, it is crucial to implement effective measures to mitigate air pollution; otherwise, pedestrians in the area may be exposed to elevated levels of pollutants.

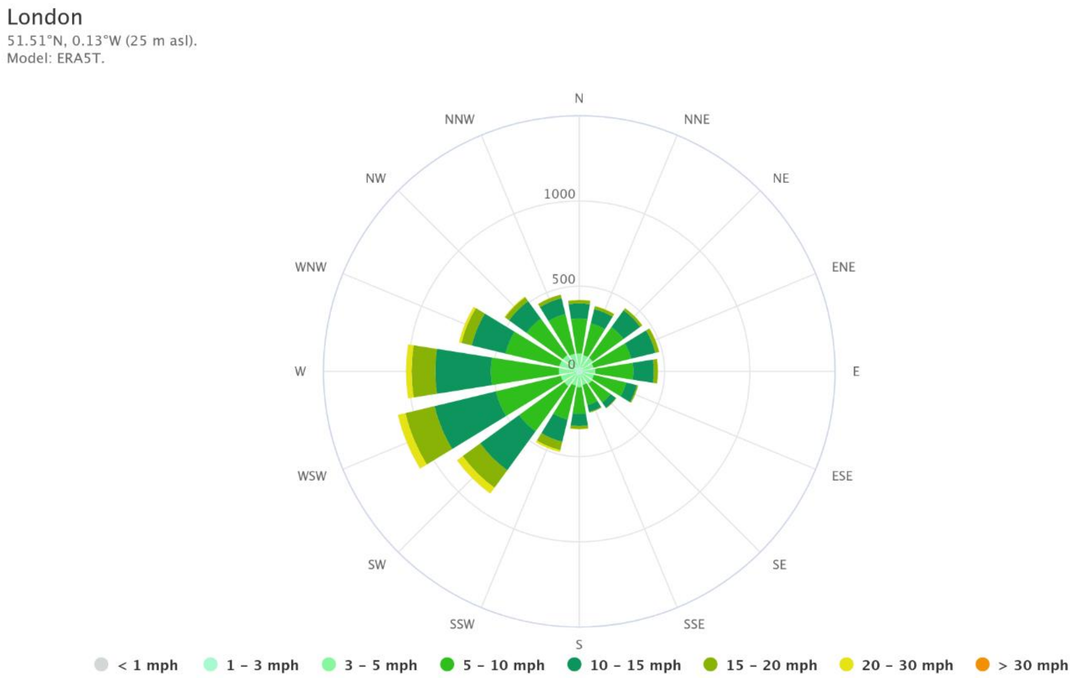

Figure 8 - Wind rose of the Proposed Development (Meteoblue)

Air Quality Assessment

3.0 Air Quality Assessment

A detailed dispersion AQA has been performed for the Proposed Development, in accordance with the guidance requirements of EPUK/IAQM 2017[12]. There is an initial step in the consultation process aimed at determining the necessity of an assessment, which is further discussed in section 1.0.

3.1 Requirement for a Detailed Dispersion Air Quality Assessment

Professional judgement will be required to determine whether an air quality assessment is necessary, taking into account the following considerations:

- the impacts of existing sources in the local area on the development; and
- the impacts of the development on the local area.

Appendix A – Air Quality Assessment Criteria has outlined the criteria for a two-stage approach to assess the impact of development in the local area. The first stage is intended to screen out smaller development and/or developments where impacts can be considered to have insignificant effects. The second stage relates to specific details regarding the Proposed Development and the likelihood of air quality impacts. If none of the criteria are met, then there should be no requirement to carry out an air quality assessment.

The Proposed Development met the criteria under 'A – 10 or more residential units' and 'B – the development will have a centralised energy facility', and consequently should be considered to Stage 2.

3.2 Transport Emissions

3.2.1 Demolition and Construction Traffic Impacts

The potential impacts as a result of demolition and construction traffic generated by the Proposed Development have taken into consideration the volume and composition of generated traffic, the anticipated duration of the construction period and any mitigation measures that are considered likely to be implemented.

A Construction Environmental Management Plan (CEMP) has been created by the transport consultants and clients to manage demolition and construction vehicles, focusing on reducing emissions. At this stage it is envisaged that typically no more than one or two construction vehicles will access the site at any given time during the demolition and construction phases. As a result, the impact of construction traffic emissions on local air quality is anticipated to be minimal. During track-out, it is projected that there will be no outward Heavy-Duty Vehicle (HDV) movements per day, as no vehicles will be entering the site.

All NRMM will comply with the emission standards specified in the GLA's Control of Dust and Emissions during Construction and Demolition SPG, which has been discussed in section 6.8.

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[12] Land-Use Planning & Development Control: Planning for Air Quality (January 2017)

3.2.2 Operational Road Traffic Impacts

No car parking space is proposed for the Proposed Development. Therefore, the anticipated trips by cars or car shares during the building's operation are likely to be minimal or non-existent.

The expected church space net trip generation reflects typical attendance and the increase in scale of development. Furthermore, the trips to/ from Kings Cross Methodist Church for the Mandarin, English and Cantonese services are expected on Sunday's, outside of typical network peak periods. The student accommodation net trip generation is negligible across the 14-hour weekday period.

As verified by the external transport consultant, i-Transport, the Proposed Development is designed to be car-free, with the majority, if not all, of the trips to and from the site expected to be made via public transport or active travel modes. As a result, no increase in vehicular traffic to the site is anticipated from this Proposed Development.

Consequently, the impact of operational traffic emissions on local air quality is expected to be negligible.

3.3 Air Quality Assessment

This AQA has been performed to calculate the concentrations of pollutants at specified receptor points around the Proposed Development to determine the site suitability for future occupancy. The site suitability refers to the exposure of building occupants to potentially harmful pollutants, specifically NO_x, NO_2, PM_{10} and $PM_{2.5}$. The Atmospheric Dispersion Modelling System for small road networks model (ADMS-Roads) has been used to analyse the concentrations of these pollutants.

The assessment has involved the comparison of the air quality anticipated post-completion with and without the development, alongside with the comparison with current conditions. These should be comprised with the current national objectives and the WHO limits in Table 1 and Table 2.

Three steps have been considered in this AQA:

1. Assess the existing air quality in the study area (existing baseline);
2. Predict the future air quality without the development in place (future baseline which may or may not include the contribution of committed development);
3. Predict the future air quality with the development in place (with development).

3.4 Baseline Air Quality

The current baseline air quality has been obtained by collating the results of monitoring carried out by London Borough of Camden. The 'current' baseline year for the purposes of this assessment has been taken to be 2022 as this is the most recent year for which representative annual mean monitoring data are available for local monitoring sites (referred to the Air Quality Annual Status Report[13]).

[13] London Borough of Camden Air Quality Annual Status Report for 2022 August 2023

In 2022, the London Borough of Camden had five operational automatic monitoring stations, with sites BL0, CD1, and CD9 measuring NO_2, PM_{10} and $PM_{2.5}$; site KGX measuring PM_{10}; and site CD010 measuring NO_2.

The Proposed Development is located near automatic monitoring station site CD9 – Euston Road and site KGX – Coopers Lane. Figure 9 below shows all the air quality monitoring sites in Camden Council, including automatic monitoring sites and non-automatic monitoring sites using passive diffusion tubes for monitoring annual mean NO_2 concentrations.

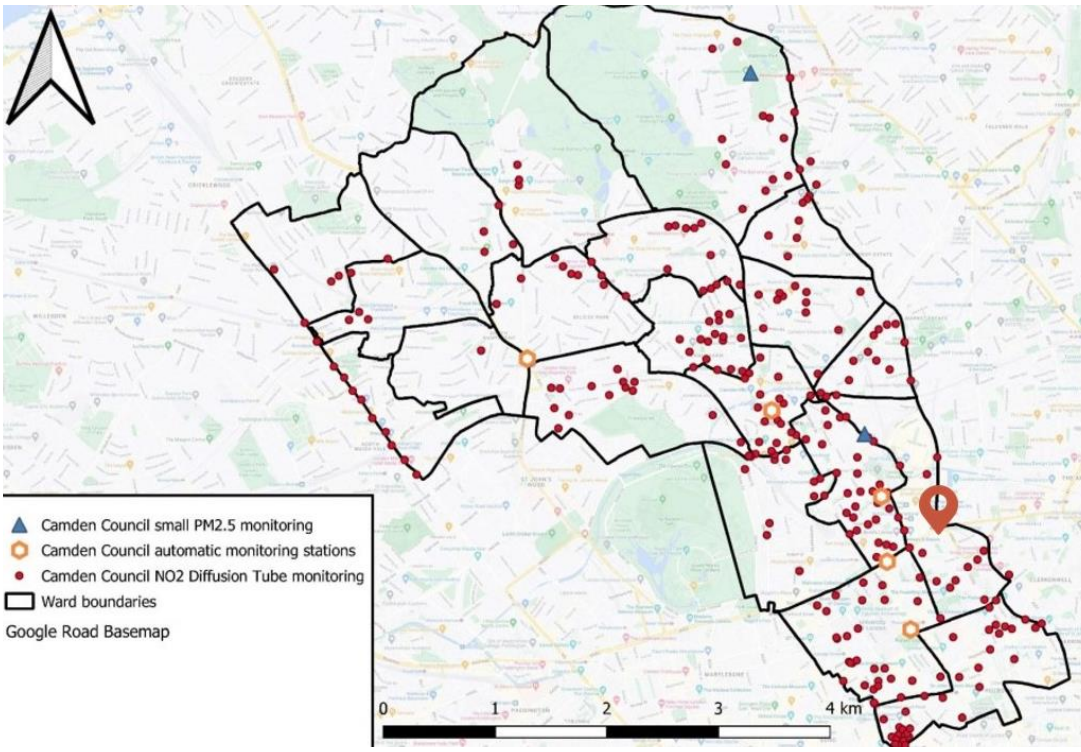

Figure 9 – Camden Council air quality monitoring sites in 2022 (LBC Air Quality Annual Status Report)

Table 5 presents the annual mean NO_2 ratified and bias-adjusted monitoring results for the sites around the proposed area from 2016 to 2022. NO_2 annual means in excess of 60 µg/m³, indicating a potential exceedance of the NO_2 hourly mean AQS objective are shown in bold and underlined. It is noted that NO_2 annual mean concentration levels are higher on Euston Road (site CD9 and CAM70) and exceed current national limits. In contrast, sites CAM16 and CAM200, which are roadside monitoring sites on roads connected to Euston Road, experience less traffic and have lower NO_2 emissions.

Overall, a decrease in NO_2 emissions has been observed each year, with a significant reduction between 2019 and 2020 due to the COVID-19 pandemic and resulting lockdowns, which massively reduced road traffic. There was a slight increase in NO_2 emissions from 2020 to 2021, as traffic levels began to rise following the end of lockdown restrictions.

Site ID	Site Name	Site Type	Site Type	2016	2017	2018	2019	2020	2021	2022
BL0	London Bloomsbury (Russell Square Gardens)	Urban Background	Automatic	**42**	38	36	32	28	27	26

Site ID	Site Name	Site Type	Site Type	2016	2017	2018	2019	2020	2021	2022
CD9	Euston Road	Roadside	Automatic	**88**	**83**	**82**	**70**	**43**	**48**	**45**
CAM70	Euston Road (new)	Kerbside	Diffusion Tube	-	-	-	**70.65**	**53.68**	**56.9**	**50.64**
CAM16	HSS Phase 4&5 4 - Argyle Primary School - Tonbridge Street	Roadside	Diffusion Tube	-	-	-	-	-	24.91	24.22
CAM200	Torrington-Tavistock/Midland-Judd 22 - Midland Road	Roadside	Diffusion Tube	-	-	**71.2**	**57.86**	39.85	35.17	35.09

Table 5 - Annual Mean NO_2 Ratified and Bias-adjusted Monitoring Results (µg/m³)

Table 6 presents the 1-hour mean NO_2 monitoring results at automatic monitoring stations between 2016 to 2022. Results are presented as the number of 1-hour periods, where concentrations greater than 200 µg/m³ have been recorded. Exceedance of the NO_2 short term AQO of 200 µg/m³ over the permitted 18 hours per year are shown in bold. In 2022, automatic site BL0 did not exceed the 1-hour mean NO_2 objective (200 µg/m³ not to be exceeded more than 18 times a year), while site CD9 exceed the 1-hour mean NO_2 objective two times.

Site ID	Site Type	2016	2017	2018	2019	2020	2021	2022
BL0	Automatic	0	0	0	0	0	0	0
CD9	Automatic	**39**	**25**	18	7	0	1	2

Table 6 - NO_2 Automatic Monitoring Results: Comparison with 1-hour Mean Objective, Number of 1-Hour Means > 200 µg/m³

Based on reviewing the local air quality monitoring data, the roadside emissions of NO_2 on Euston Road exceed the NO_2 annual mean Air Quality Standard (AQS) objective. Given that the Proposed Development is located near Euston Road and the King’s Cross junction, the general air quality is accessed to be poor due to traffic emissions.

3.5 Methodology

ADMS-Roads Air Quality Modelling system has been used to model the concentration of pollutants at the site of the Proposed Development for future scenarios.

3.5.1 Modelling road source

The road geometry, including A501 Euston Road, A501 Gray’s Inn Road, A501 Pentonville Road, and A5200 York Way, has been incorporated into the map. Figure 10 below shows the modelled road network. The modelled road links have been extended to 200m past the development.

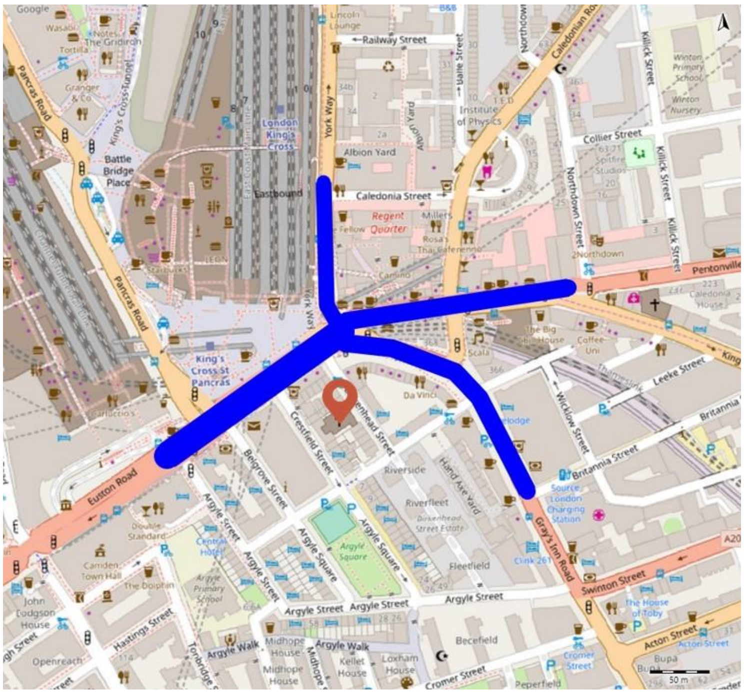

Figure 10 - The road geometry modelled in blue on the mapper

3.5.2 Traffic emission data and source

The ADMS-Roads software has incorporated data on the proportion of heavy-duty and light-duty vehicles, sourced from the UK Government Department for Transport (DfT) Road Traffic Statistics[14]. This data includes the annual average daily flow of traffic, categorized into Cars and Taxis, Buses and Coaches, Light Goods Vehicles, and Heavy Goods Vehicles. Table 7 outlines the annual average daily flow of each road from DfT Road Traffic Statistics. The annual average daily flow indicates the number of vehicles that travel past the count point (in both directions) on an average day of the year.

Road	Year	Road classification	Cars and taxis	Buses and coaches	Light goods vehicles	Heavy goods vehicles
A501 Euston Road	2022	'A' road	26940	1482	5161	1463
A501Gray's Inn Road	2022	'A' road	13495	605	3655	894
A501 Pentonville Road	2022	'A' road	11252	1108	3280	939
A5200 York Way	2022	'A' road	5821	973	2122	454

Table 7 – Annual average daily flow of each road (Map Road Traffic Statistics)

Light-duty vehicles comprise cars and taxis, and light goods vehicles, while heavy-duty vehicles include buses and coaches, and heavy goods vehicles. The annual average daily

[14] Map Road traffic statistics

traffic flow was then divided by 12 to convert to vehicles per hour. Table 8 below shows the LDV and HDV per hour for each road at year 2022.

Road	Speed Limits[15] mph	Light duty vehicles per hour	Heavy duty vehicles per hour
A501 Euston Road	20	2,675	245
A501Gray's Inn Road	20	1,429	125
A501 Pentonville Road	20	1,211	171
A5200 York Way	20	662	119

Table 8 – Baseline Traffic flow data at year 2022

Future baseline traffic flow data is derived from National Road Transport Projections 2022[16]. In London, for A-road, there is an increase in car and light goods vehicle (lgv) from year 2025 to 2030. There is no change in heavy goods vehicle (hgv) and public service vehicle (psv). Table 9 below shows the predicted traffic flow at year 2030.

Road	Speed Limits mph	Light duty vehicles per hour	Heavy duty vehicles per hour
A501 Euston Road	20	2,832	245
A501Gray's Inn Road	20	1,513	125
A501 Pentonville Road	20	1,282	171
A5200 York Way	20	701	119

Table 9 – Future Baseline Traffic flow data at year 2030

As discussed in section 3.2.2 previously, the Proposed Development will not generate a significant increase in operational traffic, as people are expected to travel to and from the site through public transports. Therefore, the future baseline scenario and the future with development scenario can be considered the same.

The traffic flow data in Table 8 and Table 9 have been inputted into the Emissions Factors Toolkit (EFT) V12.0 tool to calculate the traffic emissions for current baseline, future baseline scenarios. These road traffic emissions have then been inputted into the ADMS-Roads model.

Comparing the traffic emissions from the EFT V12.0 tool for the current baseline and future baseline reveals a significant decrease in NO_x, PM_{10}, and $PM_{2.5}$ emissions from 2022 to 2030.

3.5.3 Predicted background pollutant concentrations

As discussed in section 2.0, the annual mean background concentrations for all pollutants in 2022 have been derived from the DEFRA UK Ambient Air Quality Interactive Map. To ensure that the background concentrations used in this assessment align with the year for the traffic flow in future years, the future background concentrations have been derived from the Background Mapping data for local authorities - 2018[17].

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[15] Speed Limits (Gov.UK)
[16] National Road Transport Projections
[17] Background Mapping data for local authorities - 2018

Year	Nitrogen Dioxide (µg/m³)	NO_x as NO_2 (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)
2022	32.46	55.32	20.68	10.94
2030	32.40	54.74	18.61	11.81

Table 10 - Summary of the background concentrations of the Proposed Development in year 2022 and 2030 (DEFRA UK, 2022)

From Table 10 above, the annual mean concentrations for NO_2, NO_x, and PM_{10} show a slight decreasing trend. However, the annual mean concentrations of $PM_{2.5}$ have slightly increased. Major sources of $PM_{2.5}$ include combustion from fireplaces, car engines, and coal or natural gas-fired power plants.

3.5.4 Source of the meteorological data

The next has been included in the ADMS-Roads model is the meteorology of the site. This is required as temperature, wind and precipitation will all affect the concentrations of pollutants at the site of the Proposed Development. A typical meteorological year (TMY) weather data file from Heathrow Airport has been used for the model in-line with best practice for developments in large urban areas. This weather data is then transposed on to the local area of the Proposed Development by applying the parameter changes stated in Table 11.

	Parameter	Site location
Dispersion Site	Surface Roughness	1.5 (Large Urban Areas)
	Min. Monin-Obukhov length (m)	100 (Large conurbations > 1 millions)
Met. Measurement site	Surface Roughness	0.5 (Parkland, Open suburbia)
	Min. Monin-Obukhov length (m)	30 (Mixed urban/industrial)

Table 11 - Meteorological parameters used when transposing TMY file to site location

3.5.5 Choice of receptors

In order to distinguish different areas for pollutant analysis, individual receptor points have been specified around the site of the Proposed Development, with a grid being selected to cover the entire site to ensure all areas of occupancy are included within the assessment.
The receptor points have been selected at the facade of the Proposed Development where the openings are expected to be located.

For each given height, 4 no. receptor points have been modelled at the corner of the building. This was done at heights of 1.5m (approximate height of a human), 4m (assuming average each floor has a height of 4m), 8m and 12m. The receptor locations chosen were therefore well distributed across the site of the Proposed Development. Figure 11 shows the grid being selected and Figure 12 shows the locations of the receptors within the model.

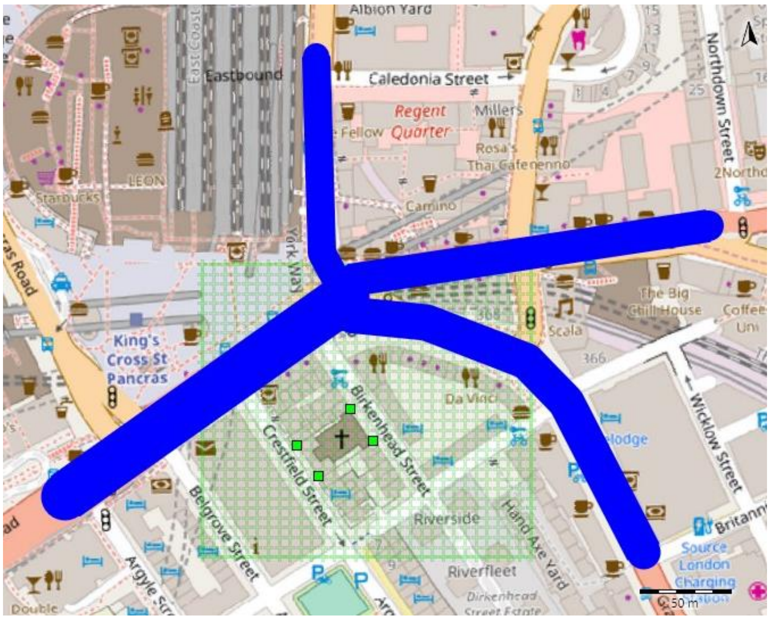

Figure 11 - Grid specified for measuring pollutant concentrations and specified receptor points

Figure 12 - Specified receptor points for the ADMS-Roads model

3.6 Model Verification

Model verification involves a comparison of the predicted versus measured concentrations and allows an adjustment to be made to account for systematic errors. Such errors may include uncertainties in traffic flow, vehicle emission factors and estimated background concentrations, as well as limitations of the model to represent dispersion in settings where air flow is affected by roadside buildings, trees etc. Model verification will be important and should be based on the most appropriate available monitoring data.

A model verification has been carried out for the assessment. The model has been run to predict the annual mean NO_2 concentrations in year 2022 at automatic monitoring site BL0,

CD9 and diffusion tube CAM70, and the annual mean PM_{10} at automatic monitoring site BL0 and CD9. Concentrations have been modelled at the height of the inlet.
The choice of appropriate monitoring site for verification has been based on:

- Appropriateness of site (roadside rather than background sites, presence of additional emission sources etc)
- Distance from study area; and
- Availability of traffic data for modelling.

Table 12 below summaries the relevant information for the monitoring sites.

Parameter	NO_2		PM_{10}	$PM_{2.5}$
Monitor	CD9	CAM70	CD9	CD9
Site Type	Automatic	Diffusion Tube	Automatic	Automatic
Measured Concentration at year 2022 (μg/m^3)	45	50.64	21	12
Data Capture (%)	96.05	75	80.82	79.25
Site Type	Roadside	Kerbside	Roadside	Roadside
Inlet Height (m)	2.5	2.2	2.5	2.5

Table 12 – Monitoring sites summary

3.6.1 Adjustment of NO_x/NO_2

NO_x is predominantly emitted into the atmosphere in the form of nitric oxide (NO) which is then converted to Nitrogen Dioxide (NO_2) through chemical processes in the atmosphere. Most Nitrogen Dioxide (NO_2) is produced in the atmosphere by a reaction between nitric oxide (NO) and ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emission of Nitrogen Oxides ($NO_x = NO + NO_2$).

Table 13 below summaries the data gathered from the monitoring sites, data from the background concentrations and the modelled outputs.

Monitoring location	Monitoring Result NO_2 (μg/m^3)	Background NO_x (μg/m^3)	Background NO_2 (μg/m^3)	Modelled Road NO_x (μg/m^3)
CAM70	50.64	55.32	32.46	56.85

Table 13 – Continuous monitoring site summary and modelled results

The NO_x to NO_2 calculator has been used to determine the modelled NO_2 concentrations at the site. As shown in Table 14 below, the model tends to slightly overestimate the concentrations compared to the monitored values. However, the differences remain within the ideally 10% range, indicating that no adjustments to the modelling results are necessary.

Monitoring location	Monitoring Result NO_2 (µg/m^3)	Background NO_x (µg/m^3)	Background NO_2 (µg/m^3)	Modelled Road NO_x (µg/m^3)	Total Modelled NO_2 (µg/m^3)	% Difference
CAM70	50.64	56.60	32.83	56.85	55.21	9%

Table 14 – NO_x to NO_2 calculator result

3.6.2 PM_{10} and $PM_{2.5}$

Table 15 below shows the verification results for PM_{10} and $PM_{2.5}$. The modelled PM_{10} result is slightly higher than the monitored values, while the $PM_{2.5}$ result is slightly lower. Both are within the ideal 10% difference, so no adjustments are necessary.

Monitoring location	Monitoring Result PM_{10} (µg/m^3)	Modelled Road PM_{10} (µg/m^3)	% Difference	Monitoring Result $PM_{2.5}$ (µg/m^3)	Modelled Road $PM_{2.5}$ (µg/m^3)	% Difference
CD9	21	21.36	2%	12	11.30	-6%

Table 15 – Verification results for PM_{10} and $PM_{2.5}$

3.7 Assumptions and Limitations

There are many components that contribute to the uncertainty in predicted concentrations.

The model used in this assessment is dependent on the traffic data that have been input, which will have inherent uncertainties associated with them. There is then the uncertainty as the model is required to simplify real-world conditions into a series of algorithms.

Per-vehicle exhaust emissions are predicted to reduce year-on-year due to technological advances and changes to the vehicle mix such as Low and Ultra Low emission technologies. Current emissions factor predictions are likely to sufficiently reflect real-world conditions as long as appropriate verification processes are followed. It is therefore considered appropriate to use emissions factors as provided by the EFT for this assessment without adjustment beyond appropriate verification.

The model relies on meteorological data for Heathrow Airport which may not represent conditions in the future. Whilst our understanding of climate change indicates that future conditions are likely to be more unsettled, which is likely to lead to better dispersion, this general trend may not be representative of conditions in the specific area or year of assessment.

3.8 Results

The ADMS-Roads model was then run with concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ calculated at the specified receptor points for each hour of the day for 365 days of the year. Table 16 represent the future baseline (future with development) scenario of the annual mean concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ calculated for specified receptor points. Figure 13 shows a contour plot of NO_x concentrations based on the grid. This is to give an indication of how the pollutants vary across the site of the Proposed Development.

Receptor	Annual mean NO_x (μg/m^3)	Annual mean NO_2 (μg/m^3)	Annual mean $PM_{2.5}$ (μg/m^3)	Annual mean PM_{10} (μg/m^3)
R1	55.03	32.46	11.86	18.71
R2	54.94	32.44	11.85	18.68
R3	54.92	32.44	11.84	18.67
R4	55.00	32.45	11.86	18.70
R5	55.01	32.45	11.86	18.70
R6	54.93	32.44	11.84	18.68
R7	54.92	32.43	11.84	18.67
R8	54.98	32.45	11.85	18.69
R9	54.95	32.44	11.85	18.68
R10	54.90	32.43	11.84	18.67
R11	54.89	32.43	11.84	18.66
R12	54.93	32.44	11.84	18.68
R13	54.87	32.42	11.83	18.65
R14	54.86	32.42	11.83	18.65
R15	54.88	32.43	11.83	18.66
R16	54.88	32.43	11.83	18.66

Table 16 - Annual mean concentrations at specified receptor points (Future Baseline)

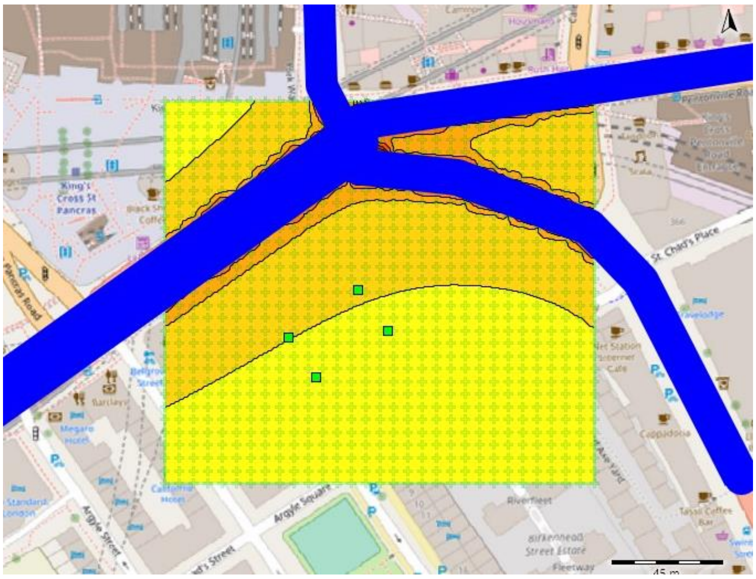

Figure 13 - Contour map showing how annual mean concentrations of NO_x varies across the site of the Proposed Development

3.9 Discussion

The results have then been compared to the current national air quality objectives stated in Table 1 and WHO AQGs in Table 2, to assess the suitability of the site for future occupancy. The following discussions have been based on the results to assess the site suitability.

3.9.1 Nitrogen Oxides (NO_x) concentrations

The current national air quality objective for Nitrogen Oxides concentrations is an annual mean of <40 µg/m^3, with a permitted exceedance of up to 200 µg/m^3 for 18 no. 1-hour periods each year. After analysing the short-term output files, there are no periods where the concentration NO_x exceeds 200 µg/m^3 for any of the receptors.

The annual mean concentration of NO_x exceeds the target of 40 µg/m^3 at all receptors point. Therefore, any occupants experiencing discomfort such as sore eyes, cough or sore throat should consider reducing activity, particularly outdoors. The ventilation system should feature suitable filters to prevent external pollutants from entering the interior space. It is recommended to keep the windows closed during the day.

3.9.2 Nitrogen Dioxide (NO_2) concentrations

The current national air quality objective for Nitrogen Dioxide concentrations is an annual mean of <40 µg/m^3, with a permitted exceedance of up to 200 µg/m^3 for 18 no. 1-hour periods each year. After analysing the short-term output files, there are no periods where the concentration NO_2 exceeds 200 µg/m^3 for any of the receptors. The annual mean concentration of NO_2 is below the target of 40 µg/m^3 at all receptors located and also below the 2005 AQGs level of 40 µg/m^3, indicating the Proposed Development is suitable for occupants in relation to NO_2 emissions.

It is challenging to reduce the level of NO_2 to the 2021 AQGs of 10 µg/m^3 at the Euston Road junction, as it is a major transport hub with train stations, underground stations and bus stops around the area. The Proposed Development will adopt an all-electric scheme with zero heat related NO_x emissions and sustainable transport modes to reduce negative impacts on local air quality.

3.9.3 $PM_{2.5}$ concentrations

The current national air quality objective for $PM_{2.5}$ concentrations is an annual mean of <20 µg/m^3, with no target related to permitted exceedance for 1-hour periods. At all receptor locations, the annual mean concentration of $PM_{2.5}$ is below this target, indicating the Proposed Development is suitable for occupants in relation to $PM_{2.5}$ emissions.

The annual mean concentration of $PM_{2.5}$ is slightly above the 2005 AQGs level, also Mayor of London's $PM_{2.5}$ guidelines recommended limit of 10 µg/m^3 at all receptors. As discussed in section 1.1, the Mayor aims that all of London will have concentrations of $PM_{2.5}$ within the WHO guideline limit by 2030. Combustion/fireplaces, car engines, and coal or fracked/natural gas (fired power plants) are all major $PM_{2.5}$ sources. Since the Proposed Development is to function as a mix of modern church/community spaces, along with upgraded student accommodation, there will be no on-site combustion or product processes. Furthermore, the Proposed Development promotes an all-electric system and sustainable travel, which would limit these sources and reduce the impact on $PM_{2.5}$ emissions.

Section 6.8 discusses recommendations to limit $PM_{2.5}$ emissions from Non-Road Mobile Machinery during the demolition and construction phases.

3.9.4 PM_{10} concentrations

The current national air quality objective for PM_{10} concentrations is an annual mean of <40 µg/m^3, with a permitted exceedance of up to 50 µg/m^3 for 35 no. 24 hour average periods each year. After analysing the short-term output files, there are no periods where the concentration exceeds 50 µg/m^3 for any of the receptors. In addition, at all receptor locations, the annual mean concentration of PM_{10} is below the target of 40 µg/m^3, indicating the Proposed Development is suitable for occupancy in relation to PM_{10} emissions.

The annual mean concentration of PM_{10} is also lower than the 2005 AQGs of 20 µg/m^3, however, exceeds the 2021 AQGs of 15 µg/m^3 at all receptor locations. Similarly, combustion activities such as motor/vehicle, industrial processes and dust from unsealed roads are common sources of PM_{10} particles. Therefore, it is recommended that outdoor activities are limited and that filters are installed in ventilation systems to prevent roadside emissions from entering internal spaces.

3.9.5 Site variation in emissions

The contour map in Figure 13 shows that closer to the roads, the NO_x emissions are higher. The Proposed Development is located within an NO_x level around 54 µg/m^3.

Given that this area is located in central London, where the surrounding buildings average 3 to 4 floors with some high-rise structures, traffic emissions are likely to become trapped in the area rather than dispersing elsewhere. The limited dispersion, combined with the minimal impact of prevailing winds, suggests that the emissions will remain concentrated within the area.

3.10 Conclusions

In summary, the pollutant concentrations of NO_2, PM_{10} and $PM_{2.5}$ at these receptors are lower than the current national air quality objectives, and the pollutant concentrations of NO_x are above the current national air quality objectives at all receptors. Outdoor activities should be limited, and filters should be installed in ventilation systems to mitigate exposure to NO_x pollutant concentrations. Further mitigation measures must be implemented in order to reduce the pollutant concentrations during construction phase and operational phase.

Air Quality Neutral

4.0 Air Quality Neutral

An Air Quality Neutral (AQN) development is one that meets, or improves upon, the Air Quality Neutral benchmarks. These benchmarks set out the maximum allowable emissions of NO_x and Particulate Matter based on the size and use class of the proposed development. These benchmarks are based on research and evidence carried out by building and transport consultants and are designed to prevent the degradation of air quality from the combined emissions of individual developments.

There are two sets of benchmarks that cover the two main sources of air pollution from new developments:

- Building Emissions Benchmark (BEB) – emissions from equipment used to supply heat and energy to the buildings.
- Transport Emissions Benchmark (TEB) – emissions from private vehicles travelling to and from the development.

A development must meet both benchmarks separately in order to be Air Quality Neutral. If one or both benchmarks are not met, appropriate mitigation or offsetting measures will be required. In addition, all developments in London are expected to meet the Air Quality Neutral benchmarks.

4.1 Building Emissions Benchmark (BEB)

For the Proposed Development, the Design Team has confirmed that the space heating/cooling and hot water systems will be provided via fully electrical Air Source Heat Pumps (ASHPs), with no gas boilers being used. According to the Air Quality Neutral London Plan Guidance (February 2023)[18] section 3.1.4, most non-combustion heat sources such as electric panel heaters and heat pumps (including air source and ground source heat pumps) are assumed to have zero heat-related NO_x emissions. As no building emissions calculation can be defined, the Proposed Development complies with BEBs and 'Air Quality Neutral' concerning building emissions with no further abatement required.

4.2 Transport Emissions Benchmark (TEB)

For most developments, the key driver of transport emissions is the provision of car parking spaces. Car parking should be restricted in line with levels of existing and future public transport accessibility and connectivity. The Proposed Development is located in Central London with a range of services within walking distance. The site is well-served by public transportation, including several bus stops within walking distance.

The Design Team has verified that the Proposed Development will feature no car parking spaces. Cycle parking will be provided in accordance with the London Plan minimum cycle parking standards, including 25 no. long stay cycle parking spaces within the lower ground floor cycle parking store, 3 no. long stay cycle parking spaces within a separate store on the ground floor and 12 no. short stay cycle parking spaces on ground floor.

According to the Air Quality Neutral London Plan Guidance (February 2023) section 2.2.1, developments that have no additional motor vehicle parking, do not lead to an increase in

[18] Air quality Neutral London Plan Guidance (February 2023), section 3.1.4

motor vehicle movements can be assumed to be AQN. Taxi, delivery and servicing vehicle trips, as well as heavy vehicle trips produced by the operation of an industrial or commercial premises are not covered by AQN.

4.3 Conclusions

All developments that do not include additional emissions sources are assumed to be Air Quality Neutral, meeting the Air Quality Neutral benchmarks. As such, there is no need to do an AQN Assessment. This would include, for example, developments that have no additional motor vehicle parking, which will not lead to an increase in motor vehicle movements, and do not include new combustion plant such as gas-fired boilers. To summarise, the Proposed Development can be qualified as Air Quality Neutral (AQN).

With regards to building emissions, details of the specific appliance that will be installed in the completed development are not always known at the planning application stage. Even when an appliance is assumed at planning application stage, for many reasons, this may be different to the appliance that is actually installed in the development after construction completion. It is therefore strongly advised that a condition requiring approval of the appliance details is used to ensure that the installed system is as good as, or better than, that used in the AQN Assessment.

For larger and more complex systems, abatement equipment may be needed to minimise emissions. Where abatement is required, the installation, use and maintenance of the abatement equipment should similarly be required by condition.

Indoor Air Quality Plan

5.0 Indoor Air Quality Plan

5.1 Finishes and Furnishings

New buildings are often associated with high concentrations of VOCs; emitted mainly from paints, carpets, materials, and furniture. These emissions are the highest when the building has just finished construction and are reduced over time.

VOCs present a risk to the health and comfort of occupants if air concentrations exceed those known to cause adverse effects. Some are toxic and can impact children, particularly those in vulnerable groups (such as those who suffer from asthma and allergies). The most likely health impact from VOCs is short-term irritation of the eyes, nose, skin, and respiratory tract. Odour generated by VOCs can also be a concern to the occupants. Common indoor VOCs include formaldehyde, decane, butoxyethanol, isopentane, limonene, styrene, xylenes, perchloroethylene, methylene chloride and toluene. These products are often used within modern construction and could impact the indoor air quality of the building.

The following are various implementable methods to mitigate this risk:

- The internal finishes products specified should meet the emission limits, testing requirements and any additional requirements listed in Appendix C – TVOCs Emission criteria by product type.
- Product containers should be disposed of safely and purchased only as much as is necessary to reduce waste and the unnecessary release of VOCs.
- Work should be sequenced to ensure that absorbent surfaces (e.g., carpets) are not installed until work that emits high levels of VOCs (e.g., coating) is completed.
- HVAC equipment and ductwork should be protected from dust and other pollutants during installation and when near to other construction or installation works.
- Ventilation systems and ductwork should be checked and cleaned prior to and during commissioning, so that pollutants are not released into the building when in use.
- Sources of formaldehyde should be identified and removed where possible, as this is one of the few pollutants that can be readily measured. If it is not possible to remove, exposure can be reduced by using a sealant on all exposed surfaces of panelling and other furnishings.

Since the proposed development is a mixed-use building with student accommodation on the upper levels, there will be a significant amount of internal finishing materials that could pose a VOC (volatile organic compounds) risk. Therefore, the specified methodology must be implemented for all internal finishing materials installed.

5.2 Cleaning and Storerooms

VOCs and other pollutants present within cleaning products may evaporate, contaminating the surrounding air. This can be controlled by ensuring that any cleaning products are stored in areas with high levels of ventilation to facilitate adequate dilution and removal. All storerooms should have mechanical extract to promote dilution. Natural cleaning solutions should be used wherever possible, and workers/building users should always exercise caution and wear protective equipment when handling harsh chemical cleaning solutions.

5.3 HVAC Equipment

To ensure the Proposed Development does not impact the air quality of the local area, a gas-based system has been ruled unfeasible. Instead, a low to zero carbon strategy has been decided upon. This strategy includes the use of air-to-air heat pumps and VRF systems for space heating and cooling via radiators. For the student accommodation, a heat pump is proposed for space heating, while a hybrid VRF heat pump is proposed for space cooling. Additionally, two hybrid VRF heat pumps will be implemented to provide space heating and cooling on the lower floors. Hot water will be supplied by a heat pump.

Mechanical ventilation will be provided in most areas on lower ground floor, with mechanical ventilation and heat recovery systems used in the church area. The student accommodation will have a separate mechanical ventilation system. Extract fans will be installed in the WCs cleaner's store and kitchen, while natural ventilation will be used in the bins room.

Through this all-electric, low-to-zero carbon energy strategy the Proposed Development will not release any harmful NO_x emissions.

5.4 Kitchens

Kitchens can be a significant source of indoor air pollution due to the pollutants given off by cookware, appliances, and refrigeration units as well as harsh chemical degreasers and cleaning solvents that may be used during their maintenance. The kitchen space in the Proposed Development building will be located on lower ground floor, with extract fans installed to remove the pollutants during cooking.

5.5 Tobacco

Smoking is not permitted in any indoor spaces. Therefore, the risk of indoor air pollution from tobacco (for example Benzene, a known human carcinogen) is low.

5.6 People

People, as users of the building, will generate moisture, CO_2 and odours which contribute to the indoor air quality of the development. High CO_2 concentrations often indicate high odour levels and poor indoor air quality. Indoor CO_2 levels can be impacted by several factors including the number of occupants, their activity levels, time spent in a room, and the ventilation rate.

Given that the proposed development includes student accommodations on the upper floors, the number of building users is expected to be high. To ensure indoor air quality, mechanical ventilation will be implemented in each individual room to refresh the indoor air.

5.7 Removal of Contaminant Sources Summary

There are a variety of internal pollutants that may impact the indoor air quality of the Proposed Development. Non-VOC emitting products and low VOCs construction products should be selected to minimise the contaminant sources.

Ventilation with filters and intakes and airflow pathways must be designed and installed in accordance with the building policy in all spaces to minimise the build-up of air pollutants. When in the vicinity of construction and installation works, HVAC equipment is to be protected and ventilation systems are to be checked and cleaned prior to and during commissioning, to avoid releasing pollutants into the building during operation.

Construction and Demolition

6.0 Construction and Demolition

Demolition will take place in order to prepare the site for the new construction. In the case of material breakup and removal, the following impacts should be considered:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions;
- Elevated PM_{10}, $PM_{2.5}$ concentrations from demolition and construction activities (including earthworks and track out);
- An increase in concentrations of PM_{10}, $PM_{2.5}$ and Nitrogen Dioxide due to exhaust emissions from vehicles and equipment used on site (non-road mobile machinery) and vehicles accessing the site.

Air pollutants can result from on-site dust-generating activities such as the breaking-up of materials and the clearing of the existing site, as well as from the exhaust of diesel-powered vehicles and both static and non-road mobile machinery. Vehicles and people accessing and travelling across the site can also generate dust.

It is therefore important that the creation or release of any air pollutants is minimised as far as possible, so that the air pollution levels are not significantly elevated as a result of the construction works carried out on the Proposed Development.

6.1 Dust Risk Assessment

A Dust Risk Assessment (DRA) is conducted to assess the risk of dust impacts, as well as evaluate and identify suitable site-specific mitigation measures. As per the Institute of Air Quality Management's (IAQM) Guidance[19], the risk of dust impacts is categorized separately for demolition, earthworks, construction and track out. Figure 14 summarises the steps the steps to produce a Dust Risk Assessment.

[19] Guidance on the assessment of dust from demolition and construction V2.2, January 2024

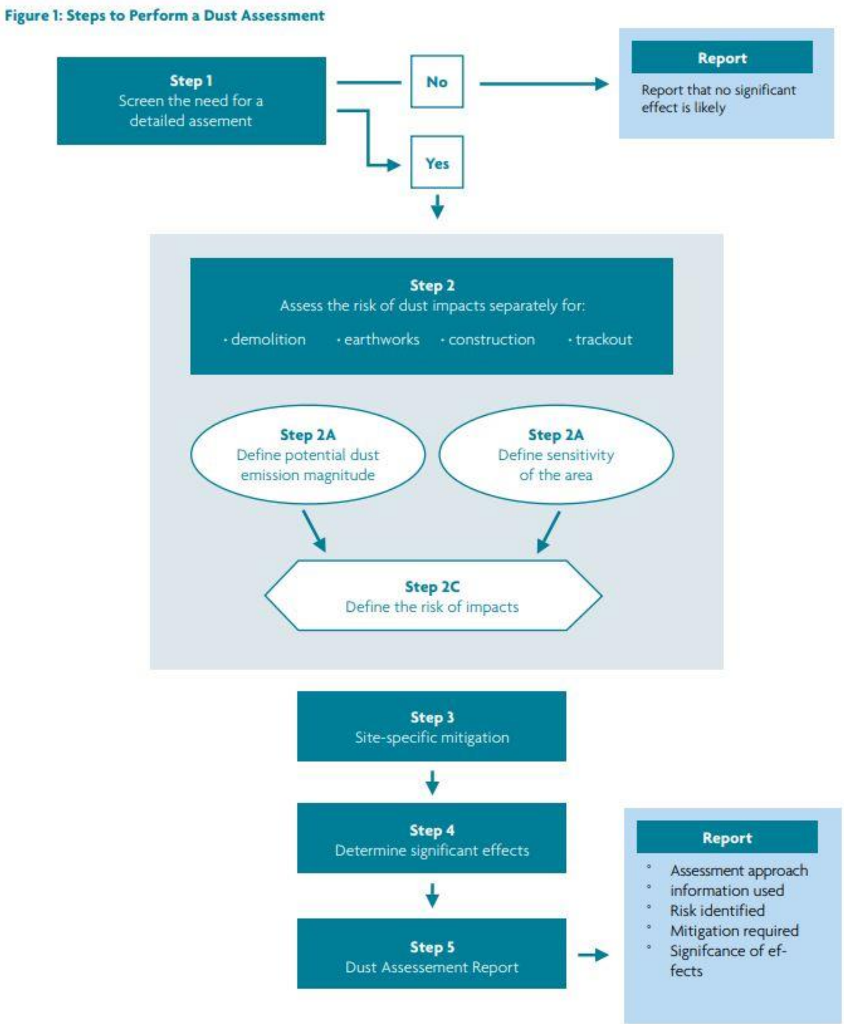

Figure 14 - Summary of Dust Risk Assessment process (Guidance on the assessment of dust from demolition and construction V2.2)

As with any impact, the risk will be determined by the magnitude of the source, the effectiveness of the pathway and the sensitivity of the receptor.

6.2 Define the Potential Dust Emission Magnitude

The dust emission magnitude has been based on the scale of the anticipated works and should be classified as small, medium, or large. Appendix D – Dust Emission Magnitude Criteria outlines the criteria for defining the potential dust emission magnitude for different activities. Table 17 below presents the dust emission magnitude results for the Proposed Development based on the information provided by the Design Team.

Dust Source	IAQM Criteria	Proposed Development	Dust Emission Magnitude
Demolition	Total building volume (m^3)	Estimated existing building volume is circa. 6,500m^3	Small
	Potentially dusty material?	Brick	Medium

Dust Source	IAQM Criteria	Proposed Development	Dust Emission Magnitude
	On-site crushing and screening?	No	Small
	Maximum height of demolition activities above ground-level (m)	Assume > 12 m	Large
	Demolition during wetter months?	Assume winter	Small
Overall Dust Emission Magnitude from Demolition			**Medium**
Earthworks	Site area (m^2)	Estimated site area is circa. 800m²	Small
	Soil type?	Clay, silt and sand	Medium
	Number of heavy earths moving vehicles active at any one time?	Assume < 2	Small
	Maximum bund height (m)	2m	Small
Overall Dust Emission Magnitude from Earthworks			**Small**
Construction	Total building volume (m^3)	Estimated proposed building volume is circa. 9,800m³	Small
	Potentially dusty construction materials?	Concrete, Brick	Medium
	On-site concrete batching?	No	Small
	Sandblasting?	No	Small
Overall Dust Emission Magnitude from Construction			**Small**
Track out	Number of outward HDV movements in any one day	0	Small
	Dusty surface material?	No	Small
	Unpaved road length (m)	0	Small
Overall Dust Emission Magnitude from Track out			**Small**

Table 17 - Evaluation of Dust Emission Magnitude

6.3 Define the Sensitivity of the area

The sensitivity of the area takes account of a number of factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of PM_{10}, the local background concentration; and
- site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

6.3.1 Receptor Type and Sensitivity

A 'human receptor' refers to any location where a person or property may experience the adverse effects of airborne dust or dust soiling, or exposure to PM over a time period relevant to the air quality objectives, as defined in the Government's technical guidance for Local Air Quality Management[20]. An 'ecological receptor' refers to any sensitive habitat affected by dust soiling. This includes the direct impacts on vegetation or aquatic ecosystems of dust deposition, and the indirect impacts on fauna (e.g. on foraging habitats).

[20] Local Air Quality Management Technical Guidance LAQM. TG22

The type of receptors at different distances from the site boundary should be included. Consideration should also be given to the number of 'human receptors'. Exact counting of the number of 'human receptors', is not required. Instead, it is recommended that judgement is used to determine the approximate number of receptors (a residential unit is one receptor) within each distance band.

6.3.2 Sensitivity of the Area

The sensitivity of different types of receptors to dust soiling[21], health effects and ecological effects is indicated in Appendix E – Define the Sensitivity of the Receptors. Additionally, the criteria to define the sensitivities of the area to dust soiling, health effects and ecological effects based on the sensitivity of the receptors is illustrated in Appendix F – Define the Sensitivity of the Area. The sensitivities of the receptors and areas are categorized into high, medium, and low sensitivity categories. There are trees within the 50-meter radius of the site, therefore the ecological effects resulting from the construction of the Proposed Development have been considered in this assessment.

The assessment of dust impacts is dependent on the proximity of the most sensitive receptors to the construction area and existing PM_{10} concentrations. As previously discussed in section 2.0, the local background PM_{10} concentrations within the Proposed Development were measured at 20.68 $\mu g/m^3$, which did not surpass the limit of 24 $\mu g/m^3$ specified in Appendix F – Define the Sensitivity of the Area.

Local wind speed and direction influences the dispersion of dust. Higher wind speeds will result in the highest potential for release of dust from a site. Buildings, structures, and trees can also influence dispersion. A wind rose was presented in Figure 8 indicating that the prevailing wind direction is from the southwest. Receptors located northeast of the site, which primarily consist of a mix of residential buildings and retail shops, are highly vulnerable to dust impacts during the construction phase.

A summary of the receptor and area sensitivity to dust soiling, health effects for the Proposed Development are presented in Table 18. The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and track out. The outcome of defining the sensitivity of the area is presented in Table 19. The highest level of sensitivity from each table should be recorded.

Receptor	Distance [22] from Site Boundary	Number of Receptors	Sensitivity to Dust Soiling Impacts		Sensitivity to Health Impacts		Sensitivity to Ecological Impacts	
			Receptor	Area	Receptor	Area	Receptor	Area
Trian Station/ Square	<20m	0	High	Low	Low	Low	-	-
	<50m	0		Low		Low		-
	<100m	1-10		Low		Low		-
	<250m	1-10		Low		Low		-
	<20m	0	High	Low	Low	Low	-	-

[21] Dust Soiling will arise from the deposition of dust, and this is most relevant to disamenity, rather than health effects.
[22] For trackout, the distances should be measured from the side of the roads used by construction traffic. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

Receptor	Distance [22] from Site Boundary	Number of Receptors	Sensitivity to Dust Soiling Impacts		Sensitivity to Health Impacts		Sensitivity to Ecological Impacts	
			Receptor	Area	Receptor	Area	Receptor	Area
Long-term Parking	<50m	0		Low		Low		-
	<100m	1-10		Low		Low		-
	<250m	1-10		Low		Low		-
Residential Properties/ Hotel	<20m	1-10	High	Medium	High	Low	-	-
	<50m	10-100		Medium		Low		-
	<100m	10-100		Low		Low		-
	<250m	<100		Low		Low		-
Retail Units or Shops	<20m	1-10	Medium	Medium	Medium	Low	-	-
	<50m	1-10		Low		Low		-
	<100m	10-100		Low		Low		-
	<250m	10-100		Low		Low		-
Office	<20m	0	Medium	Low	Medium	Low	-	-
	<50m	0		Low		Low		-
	<100m	1-10		Low		Low		-
	<250m	10-100		Low		Low		-
Park and Garden/ Trees/ Basketball Court	<20m	0	Low	Low	Low	Low	Low	Low
	<50m	1-10		Low		Low		Low
	<100m	1-10		Low		Low		Low
	<250m	1-10		Low		Low		Low

Table 18 - Sensitivity of the Receptors and areas to Dust Soiling Impacts, Health Impacts and Ecological Impacts

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Track out
Dust Soiling	Medium	Medium	Medium	Low
Human Health	Low	Low	Low	Low
Ecological Impacts	Low	Low	Low	Low

Table 19 – Outcome of Defining the Sensitivity of the Area

6.4 Define the Risk of Impacts

The dust emission magnitude determined in Table 17 should be combined with the sensitivity of the area determined in Table 19 to determine the risk of impacts when no mitigation measures are applied. The matrices in Appendix G – Risk of Dust Impacts from Demolition, Earthworks, Construction and Track Out provide a method of assigning the level of risk for demolition, earthworks, construction and track out. This should be used to determining the level of mitigation that must be applied. Table 20 summarises the dust risk associated with potential impacts of dust soiling, human health and ecological impacts for four construction phases.

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Track out
Dust Soiling	Medium Risk	Low Risk	Low Risk	Negligible Risk
Human Health	Low Risk	Negligible Risk	Negligible Risk	Negligible Risk
Ecological Impacts	Low Risk	Negligible Risk	Negligible Risk	Negligible Risk

Table 20 - Risk of Dust Impacts based on Dust Emission Magnitude for Demolition, Earthworks, Construction and Track out

6.5 General Dust Emissions Mitigation Measures

Mitigation measures for London are set out in The Control of Dust and Emissions from Construction and Demolition Supplementary Planning Guidance[23]. A brief summary of the general measures is outlined below, addressing key measures for dust control.

6.5.1 Site management and maintenance

Responsible site management is imperative during any site clearance and the following construction phase, which require stakeholder engagement and regular site inspections. The application site must also be prepared through an effective site layout and implementation of green infrastructure while also maintaining runoff, cleaning, and soiling, and effectively dealing with spillages.

6.5.2 Vehicle emissions

The construction site will involve the use of vehicles and machinery which can significantly contribute to local air pollution. Therefore, all mobile vehicles should comply with the latest low emissivity targets; vehicle idling should be discouraged, and deliveries should be managed by a Construction Logistic Plan (CLP) to effectively deliver and remove items from the site.

In London, all major developments are required to submit a CLP or Construction Environmental Management Plan (CEMP) prior to commencement. A CLP prepared by an External Transport Consultant, aims to address emissions from construction sites and vehicles, thus regulating the environmental impact of new developments.

[23] The control of dust and emissions during construction and demolition SPG, July 2014

Workers and future building users of the Proposed Development and public areas will be encouraged to use public transport and/or cycle routes as alternatives to single-occupancy cars. Plant items for the site will be from renewable or battery sources where possible to reduce the higher levels of Particulate Matter and NO_x emitted from petrol- or diesel-powered equipment.

6.5.3 Operations

Cutting, grinding, and sawing should be limited on-site and managed by dampening with water to reduce excessive dust generation. If mobile crushing and concrete bashing occur on-site, Local borough must be notified, and best practice procedures should be followed. Skips, chutes, and conveyors should be covered to limit dust escaping. Plant items for the site will be operated from renewable or battery sources where possible, to reduce the higher levels of PM and NO_x emitted from petrol- or diesel-powered equipment.

6.5.4 Waste

Bonfires are forbidden, and the recycling or reuse of materials will be encouraged. A Pre-Demolition Waste Audit for the Proposed Development should be undertaken so that the amount of demolition (site clearance) and construction waste can be assessed and monitored.

6.6 Site-specific Dust Emissions Mitigation Measures

The mitigation measures have been divided into general measures applicable to all site and measures applicable specifically to demolition, earthworks, construction and track out (site-specific), for consistency with the assessment methodology. Appendix H – Measures Relevant for Demolition, Earthworks, Construction and Track Out details the mitigation required for high, medium and low risk sites.

Based on the risk of dust impacts in Table 20, the site is defined as a medium risk site. For those cases where the risk category is 'negligible', no mitigation measures beyond those required by legislation will be required. Table 21 outlines the mitigation measures[24] specific to demolition and construction.

Mitigation Measure Specific to Demolition	Low Risk	Medium Risk	High Risk
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	X	X	XX
Ensure water suppression is used during demolition operations.	XX	XX	XX
Avoid explosive blasting, using appropriate manual or mechanical alternatives.	XX	XX	XX
Bag and remove any biological debris or damp down such material before demolition.	XX	XX	XX
Avoid scabbling (roughening of concrete surfaces) if possible.	X	X	XX

[24] Key to tables: X – Desirable / XX – Highly recommended

Mitigation Measure Specific to Demolition	Low Risk	Medium Risk	High Risk
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	X	XX	XX
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.		X	XX
For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.		X	X

Table 21 – Mitigation Measures Specific to Demolition

6.7 Site monitoring

It is important to continually monitor the site to manage the generation of Particulate Matter and Nitrogen Oxides during construction and demolition. The Proposed Development should take regular energy and water meter readings during the construction phases and transport will be recorded for all deliveries to and from the site. Quantities and types of waste should also be monitored.

6.8 Non-road mobile machinery

Non-Road Mobile Machinery (NRMM) is a broad category which includes:

- mobile machines
- transportable industrial equipment
- vehicles which are fitted with an internal combustion engine that are not intended for transporting goods or passengers on roads

NRMM, particularly from the construction sector, is a significant contributor to London's air pollution. The NRMM Low Emission Zone uses the Mayor and London Borough's planning powers to control emissions from NRMM used on construction sites. NRMM audits should be conducted as part of the Pan-London NRMM Project, which is funded by the Mayor of London. All NRMM of net power of 37kW and up to and including 560kW used during the course of the demolition, site preparation and construction phases shall comply with the emission standards set out in chapter 7 of the GLA's supplementary planning guidance "Control of Dust and Emissions During Construction and Demolition" dated July 2014 (SPG)[25], or subsequent guidance. Unless it complies with the standards set out in the SPG, no NRMM shall be on site, at any time, whether in use or not, without the prior written consent of the local planning authority. The developer shall keep an up-to-date list of all NRMM used during the demolition, site preparation and construction phases of the development on the online register.

[25] The control of dust and emissions during construction and demolition SPG, July 2014

6.9 Emergency Generators

No backup or emergency generators have been proposed for the development. Traditional backup generators, which often rely on fossil fuels, will have a negative impact on the environment. The proposal aligns with sustainability goals and reduces carbon emissions.

Dilution and Control of Contaminant Sources

7.0 Dilution and control of contaminant sources

This section explores measures that control and regulate concentrations of indoor air pollutants from both external and internal sources. Indoor concentrations of pollutants, such as formaldehyde and VOCs, are to be minimised. The following strategy is to be implemented to dilute and control any contaminant sources.

7.1 Indoor Air Pollutant Concentrations

The World Health Organization (WHO)[26] recommends the following guidelines for the selected pollutants, as shown in Table 22.

Pollutant	Guidelines
Nitrogen Dioxide	200 µg/m^3 – 1 hour average 40 µg/m^3 – annual average
Formaldehyde	0.1 mg/m^3 – 30-minute average
Carbon monoxide	15 minutes – 100 mg/m^3 1 hour – 35 mg/m^3 8 hours – 10 mg/m^3 24 hours – 7 mg/m^3
Benzene	No safe level of exposure can be recommended Unit risk of leukaemia per 1 µg/m^3 air concentration is 6 × 10^{-6} The concentrations of airborne benzene associated with an excess lifetime risk of 1/10 000, 1/100 000 and 1/1 000 000 are 17, 1.7 and 0.17 µg/m^3, respectively

Table 22 - Summary of indoor air quality guidelines for selected pollutants

The space heating and cooling will be Air Source Heat Pump (ASHP) and VRF system for all spaces through radiators. This will be controlled through time and temperature zone. The ventilation strategy will be Mechanical Ventilation with ventilation rates in line with Building Regulations Part F requirements. Although these systems use fan power to overcome duct resistance, filter replacements and regular ongoing maintenance is recommended to ensure optimum operation; these systems are capable of providing good air quality in polluted areas while windows are closed.

7.2 Filtration

External pollutant levels are deemed to be high in the area for NO_x when compared to the maximum values outlined within Table 1. It is suggested to propose filtered supply air systems within the internal spaces. Filtration can prevent dirt accumulating in air handling plants, including on heat exchangers and ductwork while also filtering out external pollutants. It is standard practice to fit filters to mechanical ventilation systems. CIBSE Guides A & B, and BS EN 13779 recommend specifications for filters. Heavy pollution is not expected to be generated within the Proposed Development during the operation phase, and therefore the filtration of outgoing air will not be required beyond the requirements of Building Regulations for the ventilation system use. However, filters are recommended to be installed at both supply

[26] WHO guidelines for indoor air quality: selected pollutants

and extract for each unit. External air is mechanically pushed through these filters in order to remove Nitrogen Oxides (including NO_2) and Particulate Matter.
It is important that filters are replaced regularly to maintain good air quality. If filters are not maintained, they can become saturated leading to increased pollutant levels, potential microbial growth, odours, and increased energy consumption. Where filters are fitted, a means of warning building operators when filters are dirty and need changing is required. This can be based on differential pressure sensors, or by hours run since last filter change, altering through a local controller or a central BMS.

7.3 Kitchen

In line with Building Regulations, all rooms are required to provide extract ventilation, as well as where cooking will take place. These systems are required to reduce the level of odours and particulates generated by cooking. Adjacent to the hob, a minimum intermittent extract ventilation rate of 30 l/s is proposed. This will help protect residents from any fumes and particles/particulates that may be detrimental to health, and will also control potent cooking smells that may be a nuisance. Moreover, there is no commercial cooking on site.

7.4 Bathrooms/WCs

Each individual student room will have an en-suite bathroom. This space will be separated from the main living area by an internal door, and therefore will be supplied with its own ventilation system to remove moisture and odours in line with Building Regulations Part F. Minimum ventilation rates are to be applied in accordance with the building regulation, with at least 15 l/s of intermittent extract.

7.5 Air Intakes and Exhausts

Air intakes for the ventilation systems should be located in a position that reduces the intake of pollutants, and in such manner not to re-intake air which may have been expelled from other ventilation systems, including exhaust from other dwellings.

Exhaust locations for ventilation systems should:

- minimise re-entry to the building through natural intakes
- avoid adverse effects to the surrounding area
- be located downstream of any potential intakes where there is a prevailing wind direction and discharge away from any air conditioning condensers located nearby

7.6 Air tightness

An air permeability of 10 $m^3/hr/m^2$ or less is recommended to be implemented for the Proposed Development in accordance with the Building Regulations. It helps minimise infiltration of more polluted ground-level air, while also reducing energy consumption.

Procedures for Pre-Occupancy Flush-Out

8.0 Procedures for pre-occupancy flush-out

This section explores how the pre-occupancy flush-out can remove residual levels of pollutants that may have accumulated in the building during construction. The flush-out helps to ensure that the indoor air quality of the building is at an acceptable level when the building is occupied, and that post-construction testing is carried out in conditions that are representative of the indoor air quality when occupied.

Upon completion of construction, and once all relevant elements have been fitted, the building will undergo a period of ‘flush-out’. During this period, all ventilation ducting will be activated and purged as part of the commissioning process. Each room should be flushed-out once construction (including painting, carpet, and other finishes) and the cleaning of ventilation systems have been completed, but before the building is occupied.

In-line with best practices, an initial flush-out is to be carried out prior to occupation. All openable windows will be opened in order to assist in the removal of any minor levels of VOCs and/or formaldehyde, which may have accumulated during the fit-out period. To avoid ingress of pollutants where construction has not been completed in other areas of the site, it is essential that the areas being flushed out and tested are kept isolated from any other construction work.

Where snagging occurs and some parts of the building need rectifying, there will be a secondary flush out after those final touches have been made. Any changes to the building finishes and furnishings should remain in-line with the low VOC strategy outlined within this report.

Maintaining Indoor Air Quality In-use

9.0 Maintaining indoor air quality in-use

This section outlines the commitments and measures in place to maintain indoor air quality at acceptable levels throughout the building’s operational life. Regular maintenance tasks must be conducted, which will involve the proper procedure for removing, cleaning, and replacing ventilation filters within the ventilation system.

If there are any comments or complaints regarding the indoor air quality of the Proposed Development, a process should be introduced whereby these can be raised to the landlord/applicable representative of the development so that all concerns can be monitored, measured and improved where necessary. This might include any comments about odours or any side effects that appear to be correlated with indoor air quality – e.g., reports of headaches.

Third-Party Testing and Analysis

10.0 Third-party testing and analysis

This section explores how the third-party testing and analysis of indoor air uses a recognised method of testing for each air pollutant of interest, while providing impartial and objective measurement of the levels of indoor air quality in the newly constructed building. The air quality of the building should be assessed after construction works have finished and after the initial flush-out has been completed.

All organisations used for sampling and analysis of indoor air or for analysis of emissions from construction products should be accredited to ISO/IEC 17025 with specific accreditation covering:

- Sampling: Pumped sampling for formaldehyde in air; Pumped sampling for VOCs in air.
- Chemical analysis: Determination of formaldehyde; Determination of VOCs.

Summary

11.0 Summary

This Air Quality Assessment (AQA) and Indoor Air Quality Plan (IAQP) address the London Plan and the Camden Local Plan planning policy requirements for the Proposed Development at King's Cross Methodist Church in London. As referred in London Plan Guidance (February 2023), the Proposed Development is qualified to be AQN.

The Proposed Development is located within an AQMA, which was declared by the Local borough in 2002. A detailed dispersion AQA has been performed for the Proposed Development to predict the future air quality around the proposed site, and to access the site suitability for future building users. The Atmospheric Dispersion Modelling System for small road networks (ADMS-Roads) model suggests that annual mean concentrations of NO_x exceed the current UK objectives, while the concentrations of NO_2, $PM_{2.5}$ and PM_{10} remain within the current UK objectives. Therefore, the local air quality is assessed to be poor due to the exceed of NO_x. Filtered mechanical ventilation will provide suitable ventilation rates to the offices to reduce the need for openable windows and potential ingress of external air pollution.

This report has outlined key mitigation measures to reduce negative impacts to the external air quality, as far as possible, during construction and operation phases of the Proposed Development. A Dust Risk Assessment has been undertaken following the best practice 'Guidance on the assessment of dust from demolition and construction V2.2', and the site is defined as a medium risk site. Construction and demolition/fabric removal on site will be carried out in line with the Control of Dust and Emissions during Construction and Demolition SPG as a best practice guidance document, to minimise air pollution derived from these activities. The proposed energy strategy does not incorporate gas-fired or solid-/oil-fuelled heating systems and therefore there are no associated Nitrogen Oxides (NO_x) emissions during the operation of the building. The encouragement of the cycle storage also promotes sustainable transport to the site.

In summary, the Proposed Development has addressed the London Plan and Camden Local Plan planning policy requirements regarding air quality and is thought to have a limited impact on future local air quality. By following the guidance within this report during construction and operation phases, the Proposed Development will have minimal impact on the local air quality. By implementing the recommended active measures from this report, the indoor air quality will be improved, leading to greater satisfaction among building users.

Appendix

Appendix A – Air Quality Assessment Criteria

Stage 1 criteria: Criteria to proceed to stage 2

Criteria to Proceed to Stage 2
If any of the following apply: • 10 or more residential units or a site area of more than 0.5ha • more than 1,000 m2 of floor space for all other uses or a site area greater than 1ha
Coupled with any of the following: • the development has more than 10 parking spaces • the development will have a centralised energy facility or other centralised combustion process

Indicative criteria for requiring an air quality assessment

The development will:	Indicative Criteria to Proceed to an Air Quality Assessment
1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5t gross vehicle weight).	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA. - more than 500 AADT elsewhere.
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight).	A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA. - more than 100 AADT elsewhere.
3. Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA.
4. Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.
5. Introduce or change a bus station.	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA. - more than 100 AADT elsewhere.
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20 m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).

The development will:	Indicative Criteria to Proceed to an Air Quality Assessment
7. Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors. NB. this includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.	Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates. Conversely, where existing Nitrogen Dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.

Appendix B – EFT V12 Tool

Source Name	Pollutant Name	All Vehicles (g/km/s)	All LDVs (g/km/s)	All HDVs (g/km/s)	All Vehicles (g/km)	All LDVs (g/km)	All HDVs (g/km)	All Vehicles (Annual Emissions (kg/yr except CO2 tonnes/yr))	All LDVs (Annual Emissions (kg/yr except CO2 tonnes/yr))	All HDVs (Annual Emissions (kg/yr except CO2 tonnes/yr))
A501 Euston Road	NOx	0.02667	0.02113	0.00554	1,152.03189	912.73549	239.29640	168.19666	133.25938	34.93728
A501Gray's Inn Road	NOx	0.01419	0.01124	0.00295	613.10190	485.75032	127.35158	89.51288	70.91955	18.59333
A501 Pentonville Road	NOx	0.01353	0.00945	0.00408	584.42699	408.25093	176.17606	85.32634	59.60464	25.72170
A5200 York Way	NOx	0.00806	0.00509	0.00296	347.98839	219.98121	128.00719	50.80631	32.11726	18.68905
A501 Euston Road	PM10	0.00310	0.00252	0.00058	134.05861	108.83487	25.22374	19.57256	15.88989	3.68267
A501Gray's Inn Road	PM10	0.00165	0.00134	0.00031	71.34489	57.92102	13.42387	10.41635	8.45647	1.95988
A501 Pentonville Road	PM10	0.00156	0.00113	0.00043	67.25033	48.67997	18.57036	9.81855	7.10728	2.71127
A5200 York Way	PM10	0.00092	0.00061	0.00031	39.72360	26.23063	13.49297	5.79965	3.82967	1.96997
A501 Euston Road	PM2.5	0.00166	0.00135	0.00031	71.55100	58.21729	13.33370	10.44645	8.49972	1.94672
A501Gray's Inn Road	PM2.5	0.00088	0.00072	0.00016	38.07885	30.98276	7.09609	5.55951	4.52348	1.03603
A501 Pentonville Road	PM2.5	0.00083	0.00060	0.00023	35.85621	26.03960	9.81661	5.23501	3.80178	1.43323
A5200 York Way	PM2.5	0.00049	0.00032	0.00017	21.16375	14.03113	7.13262	3.08991	2.04854	1.04136

Source Name	Pollutant Name	All Vehicles (g/km/s)	All LDVs (g/km/s)	All HDVs (g/km/s)	All Vehicles (g/km)	All LDVs (g/km)	All HDVs (g/km)	All Vehicles (Annual Emissions (kg/yr except CO2 tonnes/yr))	All LDVs (Annual Emissions (kg/yr except CO2 tonnes/yr))	All HDVs (Annual Emissions (kg/yr except CO2 tonnes/yr))
A501 Euston Road	NOx	0.00855	0.00483	0.00372	369.35594	208.65332	160.70263	53.92597	30.46338	23.46258
A501Gray's Inn Road	NOx	0.00436	0.00260	0.00176	188.33699	112.29441	76.04258	27.49720	16.39498	11.10222
A501 Pentonville Road	NOx	0.00472	0.00218	0.00254	203.81088	94.19791	109.61297	29.75639	13.75289	16.00349
A5200 York Way	NOx	0.00305	0.00117	0.00187	131.61029	50.71639	80.89389	19.21510	7.40459	11.81051
A501 Euston Road	PM10	0.00294	0.00235	0.00060	127.22048	101.33670	25.88377	18.57419	14.79516	3.77903
A501Gray's Inn Road	PM10	0.00155	0.00126	0.00028	66.78595	54.53805	12.24790	9.75075	7.96256	1.78819
A501 Pentonville Road	PM10	0.00147	0.00106	0.00041	63.40407	45.74912	17.65495	9.25699	6.67937	2.57762
A5200 York Way	PM10	0.00087	0.00057	0.00030	37.66072	24.63144	13.02928	5.49847	3.59619	1.90227
A501 Euston Road	PM2.5	0.00154	0.00123	0.00031	66.63159	53.27265	13.35895	9.72821	7.77781	1.95041
A501Gray's Inn Road	PM2.5	0.00081	0.00066	0.00015	34.99192	28.67062	6.32130	5.10882	4.18591	0.92291
A501 Pentonville Road	PM2.5	0.00077	0.00056	0.00021	33.16223	24.05029	9.11195	4.84169	3.51134	1.33034
A5200 York Way	PM2.5	0.00046	0.00030	0.00016	19.67331	12.94873	6.72458	2.87230	1.89052	0.98179

Appendix C – TVOCs Emission criteria by product type

Emission limit			Testing
Formaldehyde	Total volatile organic compounds (TVOC)	Category 1A and 1B carcinogens	Requirement
Interior paints and coatings			
≤ 0.06 mg/m³	≤ 1.0 mg/m³	≤ 0.001 mg/m³	EN 16402 / ISO 16000-9 / CEN/TS 16516 / CDPH Standard Method v1.1
Additional requirements Meet TVOC content limits. Paints used in wet areas (e.g. bathrooms, kitchens, utility rooms) should protect against mould.			
Wood-based products (including wood flooring)			
≤ 0.06 mg/m³ (Non-MDF) ≤ 0.08 mg/m³ (MDF)	≤ 1.0 mg/m³	≤ 0.001 mg/m³	ISO 16000-9 / CEN/TS 16516 / CDPH Standard Method v1.1/ EN 717-1 (formaldehyde emissions only)
Flooring materials (including floor levelling compounds and resin flooring)			
≤ 0.06 mg/m³	≤ 1.0 mg/m³	≤ 0.001 mg/m³	ISO 10580/ ISO 16000-9/ CEN/TS 16516 / CDPH Standard Method v1.1
Ceiling, wall and acoustic and thermal insulation materials			
≤ 0.06 mg/m³	≤ 1.0 mg/m³	≤ 0.001 mg/m³	N/A
Interior adhesives and sealants (including flooring adhesives)			
≤ 0.06 mg/m³	≤ 1.0 mg/m³	≤ 0.001 mg/m³	EN 13999 (Parts 1-4) / ISO 16000-9 / CEN/TS 16516 / CDPH Standard Method v1.1

* Compliance with emission limits shall be demonstrated after 28 days in an emission test chamber or earlier as stipulated by the relevant testing requirements standard.

Appendix D – Dust Emission Magnitude Criteria

Source	Large	Medium	Small
Demolition	- Total building volume >75,000m^3 - Potentially dusty material (e.g., concrete) - Onsite crushing and screening - Demolition activities >12m above ground level.	- Total building volume 12,000 - 75,000m^3 - Potentially dusty construction material - Demolition activities 6 - 12m above ground level	- Total building volume <12,000m^3 - Construction material with low potential for dust release (e.g. metal cladding or timber) - Demolition activities <6m above ground level - Demolition during wetter months (October to January)
Earthworks	- Total site area >110,000m^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 >6m in height	- Total site area 18,000 - 110,000m^2 - Moderately dusty soil type (e.g., silt) - 5-10 heavy earth moving vehicles active at any one time. - Formation of bunds 3 - 6m in height	- Total site area <18,000m^2 - Soil type with large grain size (e.g., sand) - <5 heavy earth moving vehicles active at any one time. - Formation of bunds <3m in height
Construction	- Total building volume >75,000m^3 - On site concrete batching - Sandblasting	- Total building volume 12,000 - 75,000m^3 - Potentially dusty construction material (e.g., concrete) - On site concrete batching	- Total building volume <12,000m^3 - Construction material with low potential for dust release (e.g., metal cladding or timber)
Track-out	- >50 HDV (>3.5t) outward movements in any one day (a) - Potentially dusty surface material (e.g., high clay content) - Unpaved road length >100m	- 20 - 50 HDV (>3.5t) outward movements in any one day (a) - Moderately dusty surface material (e.g., high clay content) - Unpaved road length 50 - 100m	- <20 HDV (>3.5t) outward movements in any one day (a) - Surface material with low potential for dust release - Unpaved road length <50m

Appendix E – Define the Sensitivity of the Receptors

Receptor Sensitivity	Human Health Effects of PM_{10}	Dust Soiling Effects
High	• Locations where members of the public are exposed over a time period relevant to the air quality objectives for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	• Users can reasonably expect enjoyment of a high level of amenity; or • the appearance, aesthetics or value of their property would be diminished by soiling; and • the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • Indicative examples include dwellings, museums and other culturally important collections, medium- and long-term car parks and car showrooms.
Medium	• Locations where workers are exposed over a time period relevant to the air quality objectives for PM_{10}. • Examples include office and shop workers but will generally not include workers occupationally exposed to PM_{10}.	• Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or • the appearance, aesthetics or value of their property could be diminished by soiling; or • the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • Indicative examples include parks and places of work.
Low	• Transient human exposure • Examples include public footpaths, playing fields, parks and shopping streets	• The enjoyment of amenity would not reasonably be expected; or • property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or • there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. • Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads.

Appendix F – Define the Sensitivity of the Area

Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source			
		<20m	<50m	<100m	<200m
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

Human Health Impacts

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

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

Ecological Impacts

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

Appendix G – Risk of Dust Impacts from Demolition, Earthworks, Construction and Track Out

Risk of Dust impacts from Demolition activities

Receptor sensitivity	Dust Emission Magnitude		
	Large	Medium	Low
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible Risk

Risk of Dust impacts from Earthworks and Construction activities

Receptor sensitivity	Dust Emission Magnitude		
	Large	Medium	Low
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible Risk

Risk of Dust impacts from Track-out activities

Receptor sensitivity	Dust Emission Magnitude		
	Large	Medium	Low
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible Risk
Low	Low Risk	Low Risk	Negligible Risk

Appendix H – Measures Relevant for Demolition, Earthworks, Construction and Track Out

Mitigation Measure	Low Risk	Medium Risk	High Risk
Site management			
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.		XX	XX
Develop a Dust Management Plan.		XX	XX
Display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary.	XX	XX	XX
Display the head or regional office contact information.	XX	XX	XX
Record and respond to all dust and air quality pollutant emissions complaints.	XX	XX	XX
Make a complaints log available to the local authority when asked.	XX	XX	XX
Carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the local authority when asked.	XX	XX	XX
Increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions and dust are being carried out, and during prolonged dry or windy conditions.	XX	XX	XX
Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation is recorded in the log book.	XX	XX	XX
Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and Particulate Matter emissions are minimised.			XX
Preparing and maintaining the site			
Plan site layout: machinery and dust causing activities should be located away from receptors.	XX	XX	XX
Erect solid screens or barriers around dust activities or the site boundary that are, at least, as high as any stockpiles on site.	XX	XX	XX
Fully enclosure site or specific operations where there is a high potential for dust production and the site is active for an extensive period.	X	XX	XX
Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution.		X	X
Avoid site runoff of water or mud.	XX	XX	XX
Keep site fencing, barriers and scaffolding clean using wet methods.	X	XX	XX
Remove materials from site as soon as possible.	X	XX	XX

Mitigation Measure	Low Risk	Medium Risk	High Risk
Cover, seed or fence stockpiles to prevent wind whipping.		XX	XX
Carry out regular dust soiling checks of buildings within 100m of site boundary and cleaning to be provided if necessary.		X	XX
Provide showers and ensure a change of shoes and clothes are required before going off-site to reduce transport of dust.			X
Agree monitoring locations with the Local Authority.		XX	XX
Where possible, commence baseline monitoring at least three months before phase begins.		XX	XX
Put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly.		XX	XX
Operating vehicle/machinery and sustainable travel			
Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone.	XX	XX	XX
Ensure all non-road mobile machinery (NRMM) comply with the standards set within this guidance.	XX	XX	XX
Ensure all vehicles switch off engines when stationary – no idling vehicles.	XX	XX	XX
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where possible.	XX	XX	XX
Impose and signpost a maximum-speed-limit of 10mph on surfaced haul routes and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	X	X	XX
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.		XX	XX
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	XX	XX	XX
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.	XX	XX	XX
Ensure an adequate water supply on the site for effective dust/Particulate Matter mitigation (using recycled water where possible).	XX	XX	XX
Use enclosed chutes, conveyors and covered skips.	XX	XX	XX
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	XX	XX	XX
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.		XX	XX

Waste management			
Reuse and recycle waste to reduce dust from waste materials	XX	XX	XX
Avoid bonfires and burning of waste materials.	XX	XX	XX

XX Highly Recommended X Desirable

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