


Camden Lock Village, Area E

Air Quality Assessment

March 2015

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Camden Lock Village, Area E

Air Quality Assessment

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This document has been prepared and checked in accordance with Waterman Group's IMS (BS EN ISO 9001: 2008, BS EN ISO 14001: 2004 and BS OHSAS 18001:2007)

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Executive Summary

Stanley Sidings Limited is seeking to secure planning permission for the development at 39-45 Kentish Town Road (Area E). The proposals include the erection of a six storey building to provide flexible employment and gym space on the ground floor and basement (Class B1a/B1c/D1) and private residential accommodation on the floors above (Class C3).

This air quality assessment was prepared by Waterman Energy, Environment & Design Ltd to accompany the planning application. Its purpose is to provide a review of the existing air quality at and surrounding the Site and to assess the potential effect of the Development on local air quality. In particular, it considers pollution effects from construction activities associated with the Development and the air quality concentrations future residential users would be exposed to.

A qualitative assessment of dust effects during the construction phase has been carried out. With the implementation of a range of appropriate site management practices to control dust emissions, temporary effects associated with construction activities are considered to be negligible.

Any emissions from plant operating on the site during construction would be small in comparison to the emissions from the road traffic movements on the roads adjacent to the site and therefore would be negligible.

It is anticipated that the effect of construction vehicles entering and leaving the site would be negligible in the context of the relatively high local background pollutant concentrations and existing local road traffic emissions.

All construction effects would be temporary.

An assessment of the likely future air quality conditions at a number of future sensitive (residential) receptors within the Site itself has been undertaken using the ADMS-Roads air pollution dispersion model.

When taking into account the uncertainty of NO_x and NO_2, with the provision of mechanical ventilation for the residential units up to the third floor of the Development, the effect of introducing residential uses to the Site is considered to be negligible. In addition predicted PM_{10} and $PM_{2.5}$ concentrations are below the respective objectives at all modelled receptors onsite and therefore the effect of introducing residential uses would be negligible.

1. Introduction

1.1. This air quality assessment has been prepared by Waterman Energy, Environment & Design Limited ('Waterman') on behalf of Stanley Sidings Limited (hereafter referred to as the 'Applicant') in respect of the proposed planning application for the development at 39-45 Kentish Town Road (Area E) (hereafter referred to as the 'Site'). The proposals include the erection of a six storey building to provide flexible employment and gym space on the ground floor and basement (Class B1a/B1c/D1) and private residential accommodation on the floors above (Class C3) (hereafter referred to as the 'Development'). The Site is located wholly within the administrative boundary of the London Borough of Camden (LBC).

1.2. LBC have declared an Air Quality Management Area (AQMA) (areas where there is public exposure to pollutant concentrations that exceed the National Air Quality Objectives) for the entire Council for annual mean nitrogen dioxide (NO_2) and particulate matter (as PM_{10}). As such the Site is located within the LBC AQMA.

1.3. Area E is bounded by the Regent's Canal towpath, Kentish Town Road and Area D of the permitted planning permission 2012/4628/P (granted 23/01/2013). The area is highly accessible and has very good transport connections, with Camden Town underground station to the south; Camden Road overground station to the east and Kentish Town underground and national rail station to the north. The Regent's Canal Conservation Area covers the site.

1.4. The proposed Development would not generate traffic over and above that which uses the existing road network. However, sensitive uses are proposed within the Development and therefore this air quality assessment has considered the potential exposure of future occupants to poor air quality.

1.5. The purpose of this air quality assessment is to provide a review of the existing air quality at and surrounding the Site and to assess the potential exposure of future occupants of the proposed Development to poor air quality. In addition, it considers the potential effect of the Development on air quality during demolition and construction. The approach to the assessment has been agreed with the Environmental Health Officer (EHO) at LBC.

1.6. Section 2 of this report gives a summary of legislation and planning policy relevant to air quality. Section 3 sets out the assessment methodology, Section 4 sets out the baseline conditions at and around the Site; Section 5 sets out the assessment during the Construction Phase and Section 6 sets out assessment during the Operational Phase. Mitigation measures are presented in Section 7 and a summary of the main findings and conclusions of the assessment is given in Section 8.

2. Air Quality Legislation, Planning Policy and Guidance

European Legislation

2.1. Air pollutants at high concentrations can give rise to adverse impacts on the health of humans and ecosystems. European Union (EU) legislation on air quality forms the basis for national UK legislation and policy on air quality.

2.2. The European Union Framework Directive 2008/50/EC[1] on ambient air quality assessment and management came into force in May 2008 and was implemented by Member States, including the UK, by June 2010. The Directive aims to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

National Legislation

Air Quality Standards

2.3. The Air Quality Standards Regulations 2010[2] implement Limit Values prescribed by the Directive 2008/50/EC. The Limit Values are legally binding and the Secretary of State, on behalf of the UK Government, is responsible for their implementation.

The UK Air Quality Strategy

2.4. In a parallel process, the Environment Act 1995[3] required the preparation of a national air quality strategy setting health-based air quality objectives for specified pollutants and outlining measures to be taken by local authorities in relation to meeting these (the Local Air Quality Management (LAQM) regime).

2.5. The UK Air Quality Strategy (AQS)[4], adopted in 1997, was subsequently reviewed and revised in 2000 as the Air Quality Strategy for England, Scotland, Wales and Northern Ireland[5]; and a further amendment was published in 2003[6].

2.6. The current UK AQS was published in 2007[7] and updates the original strategy to set out new objectives (referred to hereafter as the 'AQS objectives') for local authorities in undertaking their local air quality management duties. The 2007 UK AQS introduces a national level policy framework for exposure reduction for fine particulate matter.

2.7. Objectives in the current UK AQS are in some cases more onerous than the Limit Values set out within the relevant EU Directives and the Air Quality Standards Regulations 2010. In addition, the AQS objectives were established for a wider range of pollutants. The Limit Values and AQS objectives of air pollutants relevant to this assessment are summarised in Error! Reference source ot found. below.

[1] European Council Directive 2008/50/EC of 21 May 2008 on ambient air quality and cleaner air for Europe
[2] Defra, 2010, 'The Air Quality Standards Regulations'
[3] Office of the Deputy Prime Minister (ODPM), 1995, 'The Environment Act 1995'
[4] Department of the Environment (DoE),1997, 'The UK National Air Quality Strategy'
[5] Department of the Environment, Transport and the Regions (DETR), 2000, 'UK Air Quality Strategy for England, Scotland, Wales and Northern Ireland'
[6] Defra, Scottish Executive, Welsh Assembly Government and the Department of the Environment in Northern Ireland, 2003, 'The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: (Addendum)'
[7] Defra, 2007, 'The Air Quality Strategy for England, Scotland, Wales & Northern Ireland'

Table 1: National Air Quality Strategy Objectives (England)

Pollutant	Objective		Date by which Objective is to be met
	Concentration	Measured as	
Nitrogen dioxide (NO_2)	200µg/m^3	1-hour mean not to be exceeded more than 18 times per year	31/12/2005
	40µg/m^3	Annual mean	31/12/2005
Particulate Matter (PM_{10}) (a)	50µg/m^3	24–hour mean not to be exceeded more than 35 times per year	31/12/2004
	40µg/m^3	Annual mean	31/12/2004
Particulate Matter ($PM_{2.5}$) (b)	Target of 15% reduction in concentrations at urban background locations	Annual mean	Between 2010 and 2020
	Variable target of up to 20% reduction in concentrations at urban background locations(c)	Annual mean	Between 2010 and 2020
	25µg/m^3	Annual mean	01/01/2020

(a) Particulate Matter with a mean aerodynamic diameter of less than 10µm (micrometres or microns)
(b) Particulate Matter with a mean aerodynamic diameter of less than 2.5µm
(c) Aim to not exceed 18µg/m^3 by 2020

2.8. There are currently no statutory UK standards in relation to deposited dust and its propensity to cause nuisance, although an annual deposition rate of 200mg/m^2/day is often used as a threshold value, over which significant nuisance effects are likely[8].

Local Authority Responsibility

2.9. Part IV of the Environment Act 1995 provides a system of LAQM, under which local authorities are required to review and assess air quality in their area by way of a staged process. Should this process suggest that any of the AQS objectives will not be met by the target dates, the local authority must consider the declaration of an Air Quality Management Area (AQMA) and the subsequent preparation of an Air Quality Action Plan (AQAP) to improve the air quality in that area in pursuit of the objectives.

2.10. LBC designated the whole Borough as an AQMA in 2002 for the annual mean NO_2 and 24-hour mean PM_{10}. A summary of LBC's review and assessment of air quality is provided in Section 5: 'Baseline Air Quality'. As a result of the declaration of an AQMA, LBC was required to produce an AQAP, to set out measures to reduce pollution within the Borough. A summary of the LBC AQAP, recently updated (2013), is provided in the 'Guidance' section below.

[8] Bate, K. J. and Coppin, N. J. ,1991, 'Dust impacts from mineral workings, Mine and Quarry' - 20 (3), pp31 – 35.

National Planning Policy

National Planning Policy Framework, 2012

2.11. Paragraph 109 of the National Planning Policy Framework (NPPF)[9] identifies that the planning system should aim to conserve and enhance the natural and local environment by:

…"preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of land, air, water or noise pollution or land instability."

2.12. Paragraph 124 states:

"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan".

Regional Planning Policy

The London Plan, Spatial Development Strategy for Greater London, 2011

2.13. Policy 7.14 'Improving air quality' of the London Plan[10] tackles the issue of air quality by proposing the following measures:

- minimising increased exposure to existing poor air quality and making provision to address local problems of air quality;
- promoting the use of sustainable design and construction methods in accordance with the Greater London Authority Best Practice Guidance;
- ensuring provisions are made to reduce emissions from a development on-site; and
- if the development includes the use of a biomass boiler, pollutant concentrations should be forecast and planning permission given only if there are no adverse air quality effects identified.

Revised Early Minor Alterations to the London Plan, 2013

2.14. Revised Minor Alterations to the London Plan[11] were published to ensure for consistency with the NPPF. Alterations relating to air quality are as follows:

- reference to the now superseded Planning Policy Statement 23: Planning and Pollution Control changed to paragraphs 120 -124 of the NPPF; and
- removal of the definition of 'air quality neutral' from the Glossary.

2.15. However, there are no alterations to the overall air quality policy within the London Plan. As such, Policy 7.14 of the London Plan remains valid.

[9] Department for Communities and Local Government, 2012, 'National Planning Policy Framework'
[10] Greater London Authority, 2011, 'The London Plan', GLA, London
[11] Greater London Authority (2012), 'Revised Early Minor Alterations; Consistency with the National Planning Policy Framework', Greater London Authority, London.

Draft Further Alterations to the London Plan, March 2015

2.16. In January 2014, the Mayor published Draft Further Alterations to the London Plan[12] (FALP) for public consultation. The Draft FALP does not alter any existing air quality policies within the London Plan.

Local Planning Policy

London Borough of Camden's Site Allocations Document, 2012

2.17. The LBC Site Allocations Document[13] states that:

"As set out in the Core Strategy, the Council will support and promote the Central London area of Camden as a successful and vibrant part of the capital to live in, work in and visit. We will:

…continue to designate Central London as a Clear Zone Region to reduce congestion, promote walking and cycling and improve air quality."

London Borough of Camden Core Strategy 2010-2025, 2010

2.18. The LBC Core Strategy[14] sets out the key elements of the Councils vision for the Borough. Policy CS9 - Achieving a successful Central London states:

"The Council will support and promote the Central London Area of Camden as a successful and vibrant part of the capital to live in, work in and visit. We will:

…k) continue to designate Central London as a Clear Zone Region to reduce congestion, promote walking and cycling and improve air quality;"

2.19. Policy CS16 - Improving Camden's health and well-being states:

"The Council will seek to improve health and well-being in Camden. We will:

…e) recognise the impact of poor air quality on health and implement Camden's Air Quality Action Plan which aims to reduce air pollution levels."

London Borough of Camden Development Policies 2010-2025, 2010

2.20. The LBC Development Policies 2010-2025[15] sets out the detailed planning criteria that LBC will use to determine applications for planning permission in the Borough. Policy DP32: 'Air quality and Camden's Clear Zone' states:

"The Council will require air quality assessments where development could potentially cause significant harm to air quality. Mitigation measures will be expected in developments that are located in areas of poor air quality.

The Council will also only grant planning permission for development in the Clear Zone region that significantly increases travel demand where it considers that appropriate measures to minimise the transport impact of development are incorporated. We will use planning conditions and legal

[12] Greater London Authority (2014); 'Draft Further Alterations to the London Plan', Greater London Authority, London
[13] LBC, March 2012, 'Camden Site Allocations Proposed Submission Document'
[14] LBC, 2010, 'Camden Local Development Framework Camden Core Strategy 2012-2025 - Adopted Version 2010'
[15] LBC, November 2010, 'Camden Development Policies 2010-2025 Local Development Framework'

agreements to secure Clear Zone measures to avoid, remedy or mitigate the impacts of development schemes in the Central London Area."

Guidance

Planning Practice Guidance, 2014

2.21. The Government's online Planning Practice Guidance (PPG)[16] states that air quality concerns are more likely to arise where development is proposed within an area of existing poor air quality, or where it would adversely impact upon the implementation of air quality strategies and / or action plans.

2.22. The PPG notes that when deciding whether air quality is relevant to a planning application, considerations would include whether the development would lead to:

- significant effects on traffic, such as volume, congestion, vehicle speed, or composition;
- the introduction of new point sources of air pollution, such as furnaces, centralised boilers and Combined Heat and Power (CHP) plant; and
- exposing occupants of any new developments to existing sources of air pollutants and areas with poor air quality.

The Mayor's Air Quality Strategy 'Clearing the Air', 2010

2.23. The Greater London Authority (GLA) Act 1999[17] required the GLA to produce an Air Quality Strategy (AQS) for Greater London that sets out air quality objectives (to be no less than national objectives) and present measures the Mayor, GLA and London Boroughs will take towards meeting these objectives. The Mayor's AQS[18] aims to improve air quality within London by targeting the reduction of emissions related to transport and construction. Some of the initiatives proposed as follows:

- targeted measures for areas with poor air quality; and
- use of the planning system for reducing emissions from new developments.

Sustainable Design and Construction - Supplementary Planning Guidance, 2014

2.24. The Sustainable Design and Construction Supplementary Planning Guidance[19] (SPG) provides guidance to support the implementation of the London Plan.

2.25. Section 4.3 of the SPG focusses on air pollution and the effects from the construction and operation of new developments to ensure that they are 'air quality neutral'. Emission benchmarks are provided within the SPG for:

- Emissions from buildings; and
- Transport emissions.

2.26. Section 4.3.17 and Appendix 5 of the SPG note that Building Emission Benchmarks (BEBs) have been defined for a series of land-use classes, both for nitrogen oxides (NO_x) and PM_{10}. Section 4.3.18 and Appendix 6 of the SPG note that the design of a development should encourage and

[16] DCLG (2014), 'Planning Practice Guidance: Air Quality (ID 32)' (06 March 2014).
[17] Greater London Authority (GLA), 'The Mayor's Air Quality Strategy: Cleaning London's Air', London, 2002.
[18] Greater London Authority (2010), 'Clearing the air – The Mayor's Air Quality Strategy', GLA, London.
[19] Greater London Authority (2014), 'Sustainable Design and Construction - Supplementary Planning Guidance', Greater London Authority, London.

facilitate walking, cycling and the use of public transport, thereby minimising the generation of air pollutants. Whilst not an impact assessment per se, for information, **Appendix B** provides the calculations undertaken to determine whether the Development would be air quality neutral. However, it should be noted that these calculations are purely a policy requirement and do not form part of the assessment of likely significant effects.

Mayor of London: 'The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance', 2014

2.27. The SPG on Control of Dust and Emissions during Construction and Demolition[20] , published by the GLA in 2014, seeks to reduce emissions of dust, PM_{10} and $PM_{2.5}$ from construction and demolition activities in London. It also aims to manage emissions of NO_x from construction and demolition machinery by means of a new non-road mobile machinery Ultra-Low Emissions Zone. The SPG provides guidance on the implementation of London Plan policy 7.14 - Improving Air Quality, as well as a range of policies that deal with environmental sustainability, health and quality of life.

London Borough of Camden Air Quality Action Plan, 2013

2.28. The LBC Air Quality Action Plan (AQAP), Camden's Clean Air Action Plan 2013-2015 (updated in 2013)[21] sets out a number of measures to deliver improvements to air quality within the Borough. The Plan comprises four themes which are:

- "*Reducing transport emissions;*
- *Reducing emissions associated with new development;*
- *Reducing emissions from gas boilers and industrial processes; and*
- *Air quality awareness-raising initiatives."*

2.29. Within each of these themes are a number of objectives and actions LBC will take to reduce emissions within the Borough.

London Borough of Camden Guide for Contractors Working in Camden, 2008

2.30. LBC have produced a guide[22] to reduce disturbances due to dust and smoke arising from demolition and construction work on all building sites within the Borough. The document sets out Best Practice Means to mitigate dust emissions from construction sites.

Central London Air Quality Cluster Group, Cost Effective Actions to Cut Central London Air Pollution, 2012

2.31. The Central London Air Quality Cluster Group consists of the amalgamation of eight central London Boroughs, including LBC, to improve air quality within central London. The Cost Effective Actions to Cut Central London Air Pollution guidance[23] provides action measures that London Boroughs can implement to improve air quality. Such measures range from business engagement, car clubs, encouraging cycling, to energy efficiency in buildings and ultra-low NO_x boilers. The following measures are applicable to the proposed Development:

[20] Mayor of London (2014) The Control of Dust and Emissions During Construction and Demolition Supplementary Planning Guidance
[21] LBC, 2013, 'Camden's Clean Air Action Plan 2013-2015'
[22] LBC, 2008, 'Guide for Contractors Working in Camden'
[23] Central London Air Quality Cluster Group, 2012, 'Cost Effective Actions to Cut Central London Air Pollution'

- New buildings to be air quality neutral;
- New buildings to include a CSH or BREEAM Level 4 assessment; and
- Boilers are replaced by ultra-low NO_x models instead of Class 4 or 5.

Local Air Quality Management Policy Guidance LAQM PG(09), 2009

2.32. The Local Air Quality Management (LAQM) Policy Guidance PG(09)[24] provides additional guidance on the links between transport and air quality. LAQM.PG(09) describes how road transport contributes to local air pollution and how transport measures may bring improvements in air quality. Key transport-related Government initiatives are set out, including regulatory measures and standards to reduce vehicle emissions and improve fuels, tax-based measures and the development of an integrated transport strategy.

2.33. LAQM.PG(09) also provides guidance on the links between air quality and the land use planning system. The guidance advises that air quality considerations should be integrated within the planning process at the earliest stage, and is intended to aid local authorities in developing action plans to deal with specific air quality issues and create strategies to improve air quality. LAQM.PG(09) summarises the means in which the land use planning system can help deliver compliance with the air quality objectives.

Institute of Air Quality Management: Construction Dust Guidance, 2012

2.34. The Institute of Air Quality Management (IAQM) Construction Dust Guidance[25] provides guidance to consultants and EHOs on how to assess air quality effects from construction related activities. The Construction Dust Guidance provides a method for classifying the significance of effects from construction activities on air quality based on 'dust classes' (small, medium or large) and considering the proximity of the site to the closest sensitive receptor. Although the guidance provides criteria for the classification of dust classes, it also notes the importance of professional judgement, as it is acknowledged that each construction site will be unique and a purely prescriptive approach to risk assessment will not be appropriate. The guidance recommends that once the significance of effects from construction-related activities is identified, the appropriate mitigation measures are implemented.

[24] Defra (2009), 'Local Air Quality Management Policy guidance PG(09)', DEFRA, London.
[25] Institute of Air Quality Management (2012), 'Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance', UK.

3. Assessment Methodology and Significance Criteria

Assessment Methodology

3.1. This air quality assessment was undertaken using a variety of information and procedures as follows:

- a review of LBC's air quality Review and Assessment statutory reports published as part of the LAQM regime in order to determine baseline conditions in the area of the Site;
- review of the local area to identify potentially sensitive receptor locations that could be affected by changes in air quality that may result from the Development;
- review and use of relevant traffic flow data from the Applicant's transport consultant (Arup);
- dispersion modelling of pollutant emissions using the ADMS-Roads model[26] to predict the likely pollutant concentrations at the Site. The latest NO_2 from NO_x Calculator available from the LAQM Support website[27] has been applied to derive the road-related NO_2 emissions from the NO_x outputs;
- comparison of the predicted air pollutant concentrations with monitored concentrations and adjustment of modelled results where necessary (model verification details are provided in **Appendix A**);
- comparison of the predicted air pollutant concentrations with the AQS objectives;
- determination of the likely significant effects of construction works and activities, and consideration of the environmental management controls likely to be employed during the works; and
- identification of mitigation measures, where appropriate.

3.2. The UK AQS identifies the pollutants associated with road traffic emissions and local air quality as:

- nitrogen oxides (NO_x);
- particulate matter (as PM_{10} (particles with a diameter up to 10µm) and $PM_{2.5}$ (particles with a diameter up to 2.5µm));
- carbon monoxide (CO);
- 1, 3-butadiene (C_4H_6); and
- benzene (C_6H_6).

3.3. Emissions of total NO_x from motor vehicle exhausts comprise nitric oxide (NO) and NO_2. NO oxidises in the atmosphere to form NO_2.

3.4. The most significant pollutants associated with road traffic emissions, in relation to human health, are NO_2 and PM_{10}. LBC has declared an AQMA for the entire Borough for annual mean NO_2 and 24-hour mean PM_{10}, attributable to road traffic emissions (referred to later in this Report). This assessment therefore focuses on NO_2 and particulate matter (PM_{10} and $PM_{2.5}$).

[26] Cambridge Environmental Research Consultants Ltd, ADMS-Roads, 2015, Version 3.4.
[27] AEA, NO_x to NO_2 Calculator, http://laqm1.defra.gov.uk/review/tools/monitoring/calculator.php Version 4.1, June 2014.

Construction Assessment Methodology

Dust Emissions

3.5. In line with the Mayor of London SPG the assessment of the effects of the construction activities in relation to dust has been based on the guidance published by the IAQM (2014) and the following:

- Consideration of planned construction activities and their phasing; and
- A review of the sensitive uses in the area immediately surrounding the Site in relation to their distance from the Site.

3.6. Following the IAQM guidance, construction activities can be divided into the following four distinct activities:

- Demolition – any activity involved in the removal of an existing building;
- Earthworks – the excavation, haulage, tipping and stockpiling of material, but may also involve levelling the site and landscaping;
- Construction – any activity involved with the provision of a new structure; and
- Trackout – the movement of vehicles from unpaved ground on a site, where they can accumulate mud and dirt, onto the public road network where dust might be deposited.

3.7. The IAQM guidance considers three separate dust effects, with the proximity of sensitive receptors being taken into consideration for:

- Annoyance due to dust soiling;
- The risk to health effects due to significant increase in exposure to PM_{10}; and
- Harm to ecological receptors.

3.8. A summary of the four step process which has been undertaken for the dust assessment of construction activities as set out in the IAQM guidance is presented in **Table 2**. As no demolition will be taking place as part of the Development, this activity has not been considered further.

Table 2: Summary of the IAQM Guidance for Undertaking a Construction Dust Assessment

Step		Description
1	Screen the Need for a Detailed Assessment	Simple distance based criteria are used to determine the requirement for a detailed dust assessment. An assessment will normally be required where there is: A 'human receptors' within: • 350m of the boundary of the site; or • 50m of the route(s) used by construction vehicles on public highway, up to 500m from the site entrance(s). An 'ecological receptors' within: • 50m of the boundary of the site; or • 50m of the route(s) used by construction vehicles on public highway, up to 500m from the site entrance(s).
2	Assess the Risk of Dust Effects	The risk of dust arising in sufficient quantities to cause annoyance and/or health or ecological effects should be determined using three risk categories: low, medium and high based on the following two factors: • the scale and nature of the works, which determines the risk of dust arising (i.e. the magnitude of potential dust emissions) classed as small, medium or large. The relevant criteria are summarised in **Table A14** in **Appendix A**; and • the sensitivity of the area to dust effects, considered separately for ecological and human receptors (i.e. the potential for effects) defined as low, medium or high. The relevant criteria are summarised in **Tables A15-A18** in **Appendix A**. These two factors are combined to determine the risk of dust impacts with no mitigation applied.
3	Site Specific Mitigation	Determine the site-specific measures to be adopted at the site based on the risk categories determined in Step 2 for the four activities. For the cases where the risk is 'negligible' no mitigation measures beyond those required by legislation are required. Where a local authority has issued guidance on measures to be adopted these should be taken into account.
4	Determine Significant Effects	Following Steps 2 and 3, the significance of the potential dust effects should be determined, using professional judgement, taking into account the factors that define the sensitivity of the surrounding area and the overall pattern of potential risks. Experience shows that through the implementation of appropriate mitigation measures to effectively control dust effects the residual effects would normally be 'not significant'

Vehicle Exhaust Emissions

3.9. The IAQM guidance on assessing construction impacts states that "*Experience of assessing the exhaust emissions from on-site plant and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed*".

3.10. Given the size of the Development and the duration of the construction phase, in accordance with the IAQM guidance, it is considered that a quantitative assessment of the exhaust emissions from construction plant and traffic is not required, and a qualitative assessment is appropriate.

Completed Development Assessment Methodology

3.11. There would be no parking spaces within the Development and as a result the Development would not generate any significant traffic. Therefore, effects on local air quality from traffic movements generated from the completed Development have not been assessed. However, the Development would introduce sensitive residential uses into an area of poor air quality. Therefore, the potential exposure of these future occupants to poor air quality was assessed using the advanced atmospheric dispersion model, ADMS-Roads, as agreed with the EHO at LBC. **Appendix A** presents the details of the dispersion modelling.

3.12. For the purposes of modelling, traffic data for the relevant local road network has been provided by the Applicant's transport consultant (Arup). Further details are provided in **Appendix A**. The baseline year of 2013 has been assessed together with the year 2017, which is the anticipated year of completion of the Development.

3.13. The ADMS-Roads dispersion model predicts how emissions from roads and small scale industrial sources combine with local background pollution levels, taking account of meteorological conditions, to affect local air quality. The model has been run for the completion year of 2017, and therefore used background data and vehicle emission rates for 2017 as inputs. For the verification assessment (referred to later in this Report), background data and vehicle emission rates for 2013 have been used, which would be higher than the 2017 data. Pollutant concentrations have been modelled at a number of locations representative of nearby sensitive receptors.

3.14. Full details of the dispersion modelling study, including the road traffic data used in the assessment, are presented within **Appendix A**.

Model Uncertainty

3.15. Analyses of historical monitoring data by Defra[28] have identified a disparity between actual measured NO_x and NO_2 concentrations and the expected decline associated with emission forecasts which form the basis of air quality modelling as described above. The precise reason for the disparity is not fully understood but is thought to be related to the on-road performance of certain vehicles compared to calculations based on Euro emission standards which inform emission forecasts. It is thought that there may be reduction in NO_x and NO_2 concentrations post 2015 when the Euro 6 emission standards begin to take effect.

3.16. A note on Projecting NO_2 Concentrations[29] published by Defra provides a number of alternative approaches that can be followed in air quality assessments, in relation to the modelling of future NO_2 concentrations, considering that future NO_x/NO_2 road-traffic emissions and background concentrations may not reduce as previously expected. This includes the use of revised background pollution maps, alternative projection factors and revised vehicle emission factors. However, the Defra note does not form part of statutory guidance and no prescriptive method is recommended for use in an air quality assessment.

3.17. This air quality assessment has been based on current guidance, i.e. using existing forecast emission rates and background concentrations to the completion year of 2017, which assumes a progressive reduction compared to the baseline year 2013. However, in addition, a sensitivity analysis has been undertaken on the basis of no future NO_x and NO_2 reductions by 2017 (i.e. considering the likely significant effect of the Development against the current baseline 2013 conditions, assuming no reduction in background concentrations or road-traffic emissions rates between 2013 and 2017). The sensitivity approach presented in this air quality assessment is now typically agreed and accepted by local authorities as being robust, and provides a clear method to account for the uncertainty in future NO_X and NO_2 concentrations in air quality assessments. The

[28] http://laqm.defra.gov.uk/faqs/faqs5.html.
[29] Defra, 2012, Local Air Quality Management: Note on Projecting NO_2 Concentrations.

results of this sensitivity analysis, which represent a more conservative assessment scenario, are presented in **Appendix A**.

Background Pollutant Concentrations

3.18. To estimate the total concentrations due to the contribution of any other nearby sources of pollution, background pollutant concentrations need to be added to the modelled concentrations. Full details of the background pollution data used within the air quality assessment are included in **Appendix A**.

Model Verification

3.19. Model verification is the process of comparing monitored and modelled pollutant concentrations and, if necessary, adjusting the modelled results to reflect actual measured concentrations, in order to improve the accuracy of the modelling results. The model has been verified by comparing the predicted annual mean NO_2 concentrations for the baseline 2013, with the monitoring undertaken by LBC at their diffusion tube located on Camden Road as agreed with LBC's EHO. Modelled concentrations have then been adjusted accordingly. The verification and adjustment process is described in detail in **Appendix A**.

Potentially Sensitive Receptors

3.20. The approach adopted by the UK AQS is to focus on areas at locations at, and close to, ground level where members of the public (in a non-workplace area) are likely to be exposed over the averaging time of the objective in question (i.e. over 1-hour, 24-hour or annual periods). Objective exceedences principally relate to annual mean NO_2 and PM_{10}, and 24-hour mean PM_{10} concentrations, so that associated potentially sensitive locations relate mainly to residential properties and other sensitive locations (such as schools) where the public may be exposed for prolonged periods.

3.21. **Table 3** presents locations which are representative of sensitive uses proposed within the Development. These represent areas of the proposed Development that are likely to be exposed to the worst case air quality conditions, i.e. the lowest levels of the Development, where residential receptors are present, that would be the nearest to road traffic. Receptor locations are presented in **Figure 1**.

Table 3: Selected Receptor Locations

Receptor ID	Address of Receptor	OS Grid Reference	Height Above Ground (m)
1	**Proposed**: Kentish Town Road Façade 1st Floor	528939, 184171	4.0
2	**Proposed**: Kentish Town Road Façade 2nd Floor	528939, 184171	7.0
3	**Proposed**: Kentish Town Road Façade 3rd Floor	528939, 184171	10.0
4	**Proposed**: Kentish Town Road Façade 4th Floor	528939, 184171	13.1
5	**Proposed**: Kentish Town Road Façade 5th Floor	528939, 184171	16.2
6	**Proposed**: Rear Façade 1st Floor	528912, 184171	4.0
7	**Proposed**: Rear Façade 2nd Floor	528912, 184171	7.0
8	**Proposed**: Rear Façade 3rd Floor	528912, 184171	10.0
9	**Proposed**: Rear Façade 4th Floor	528912, 184171	13.1
10	**Proposed**: Rear Façade 5th Floor	528912, 184171	16.2

Effect Significance

Construction

3.22. The significance of effects of construction activities on air quality have been assessed based on professional judgement and with reference to the criteria set out in the IAQM guidance. Appropriate site-specific mitigation measures that would need to be implemented to minimise any adverse effect have also been considered. Details of the assessors experience and competence to undertake the dust assessment is provided in **Appendix A**.

3.23. The assessment of the risk of dust effects arising from each of the construction activities, as identified by the IAQM guidance, is based on the magnitude of potential dust emission and the sensitivity of the area. The risk category matrix for each of the construction activity types, taken from the IAQM guidance, is presented in **Table 4** to **Table 7**. Note that the risk associated to demolition activities is not relevant for this assessment, as none would be required as part of the Development. Examples of the magnitude of potential dust emissions for each construction activity and factors defining the sensitivity of an area are provided in **Table A15** to **Table A18** in **Appendix A**.

Table 4: Risk Category from Demolition Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 5: Risk Category from Earthworks Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Insignificant

Table 6: Risk Category from Construction Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 7: Risk Category from Trackout Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

3.24. The risk category determined for each of the construction activity types is used to define the appropriate, site specific, mitigation measures that should be applied. The IAQM guidance recommends that significance is only assigned to the effect after considering mitigation. The guidance assumes that all actions to avoid or reduce the environmental effects are an inherent part of the proposed development, and that in the case of demolition/construction mitigation (secured through planning conditions, legal requirements or required by regulations), this will ensure that potential significant adverse effects will not occur. Experience of implementing mitigation measures for construction activities shows that this is normally possible, the IAQM guidance recommends that significance of effects of construction activities should only be considered post mitigation where the residual effects will normally be 'not significant' and therefore no significance for construction effects pre-mitigation are presented in this assessment.

Completed Development

3.25. The Development would not have an impact on traffic flows around the Site, therefore only the potential exposure of future occupants of the Development against the relevant air quality objectives have been considered in this assessment. This approach has been agreed with the EHO at LBC. Therefore, there are no significance criteria in relation to the potential effect of the completed Development.

4. Baseline Conditions

London Borough of Camden Review and Assessment Process

4.1. Between 1998 and 2001 LBC undertook the first Round of Review and Assessment of air quality[30] which concluded that it was necessary to declare the whole Borough as an AQMA for the annual mean objective for NO_2 and the 24-hour mean objective for PM_{10}.

4.2. The Updating and Screening Assessments (USAs) completed in August 2003[31], 2006[32] and 2009[33] concluded that the LBC AQMA designation should remain and no further Detailed Assessment for air quality were required.

4.3. The fourth Round of Review and Assessment[34] identified that Camden no longer exceeded the 24-hour mean objective for PM_{10} at three of their automatic monitoring sites. However, LBC attributed this to the change in the methodology used to measure PM_{10} concentrations rather than improvements in emissions, and therefore, the AQMA order remained unchanged.

4.4. The fourth Round of Review and Assessment additionally indicated that a number of diffusion tube sites and one automatic site at roadside locations exceeded the 1-hour mean NO_2 AQS objective. LBC undertook further modelling work to understand the spatial distribution of PM_{10} and NO_2 exceedances across the Borough. The modelling revealed that a number of roads in Camden, which experience high volumes of traffic and a large proportion of HGV vehicles, exceeded both short and long term NO_2 and PM_{10} AQS objectives.

4.5. The latest air quality report published by LBC as part of the Fifth Round of Review and Assessment[35] confirmed that the NO_2 annual mean AQS objective was still exceeding at all the Council's automatic monitoring sites and the vast majority of the NO_2 diffusion tube sites. Although the report confirmed that PM_{10} concentrations now meet the AQS objectives at all monitoring sites, no amendment to the AQMA order has been suggested.

London Borough of Camden Local Monitoring

4.6. LBC currently undertakes air quality monitoring at four locations within the Borough using automatic monitors and fourteen locations using NO_2 diffusion tubes. The automatic monitors are located on:

- Euston Road approximately 1.7km
- Swiss Cottage approximately 2.3km
- Bloomsbury approximately 2.4km
- Shaftesbury Avenue approximately 3.0km

4.7. The results for the Euston Road monitoring location, the closest to the Site and classified as a roadside location, are presented in **Table 8** below.

[30] LBC, June 1998, 'Statutory Review and Assessment of Air Quality in the London Borough of Camden Stages 1 and 2'
[31] LBC, August 2003, 'Second Round of Review and Assessment of Air Quality: Updating and Screening Assessment'
[32] LBC, August 2006, 'Third Round of Review and Assessment of Air Quality: Updating and Screening Assessment'
[33] LBC, August 2009, '2009 Air Quality Updating and Screening Assessment for London Borough of Camden'
[34] LBC, June 2010, '2009 Progress Report for London Borough of Camden'
[35] LBC, July 2013, '2013 Air Quality Progress Report for the London Borough of Camden'

Table 8: Measured Concentrations at the LBC Roadside Euston Road Automatic Monitor

Pollutant	Averaging Period	AQS Objective	2011	2012	2013
NO_2	Annual Mean (µg/m^3)	40µg/m^3	**122**	**106**	**106**
	1-Hour Mean (No. of Hours)	200µg/m^3 not to be exceeded more than 18 times a year	**726**	**295**	**296**

Note: Data obtained from LBC Progress Report 2014
Exceedences of the AQS Objectives shown in **bold** text.

4.8. The monitoring results in **Table 8** indicate that the annual mean and the 1-hour mean NO_2 concentrations largely exceeded the objectives at the Euston Road monitor in all years. **Table 9** presents the most recent monitoring data for the diffusion tubes located within 2km to the Site.

Table 9: LBC Diffusion Tube Annual Mean NO_2 Concentrations (µg/m^3)

Site Location	Classification	Approximate Distance to Centre of Site (km)	2011	2012	2013
Camden Road	Roadside	0.3	**72.2**	**67.4**	**77.9**
Kentish Town Road	Roadside	0.9	**57.2**	**59.0**	**65.3**
Brill Place	Roadside	1.4	**50.8**	**50.0**	**49.4**
Euston Road	Roadside	1.8	**93.1**	**82.1**	**107.8**
Chetwynd Road	Roadside	1.8	**44.1**	**43.7**	**47.8**
Tavistock Gardens	Urban Background	2.0	**47.6**	**40.1**	**49.4**

Note: Data obtained from LBC Progress Report 2014
Exceedences of the AQS Objectives shown in **bold** text.

4.9. The NO_2 results summarised in **Table 9** indicate that the annual mean objective (40µg/m^3) was exceeded at all monitoring locations. This is consistent with LBC declaring the entire Borough an AQMA for annual mean NO_2.

5. Construction Phase Effects

Nuisance Dust

5.1. Construction activities in relation to the Development have the potential to affect local air quality through Demolition, Earthworks, Construction and Trackout activities. As no demolition will be taking place as part of the Development, this activity has not required further consideration.

5.2. The Site is located in a residential and commercial area. The permitted Camden Lock Village/Hawley Wharf Masterplan development is located immediately north of the Site. Camden Gardens, an area of public open space and residential properties is located to the east of the Site beyond Kentish Town Road. Immediately south of the Site is the Regent's Canal and its towpath, together with Hawley Wharf, Hawley Lock and Kentish Town Lock. Kentish Town Bridge crosses the Canal adjacent to the Site's southern boundary. The MTV Studios are also located approximately 70m to the south of the Site beyond the Regent's Canal.

5.3. Beyond the Regent's Canal on the southern bank, land uses are predominantly commercial and comprise two storey buildings. Beyond the Site's southwestern boundary is Camden Lock Market. This comprises open retail market areas at ground level, and a large three to four storey building comprising predominately retail units referred to as the 'Market Hall'.

5.4. The construction of the Development is anticipated to be completed in 2017.

5.5. As there are existing receptors within 350m of the boundary of the Site and within 50m of the routes that would be used by construction vehicles on the public highway, it is therefore considered that a detailed assessment is required to determine the likely dust impacts, as recommended by the IAQM guidance on construction dust. Results of this assessment are provided for each main activity (Earthworks, Construction and Trackout) below.

5.6. The sensitivity of the area to each main activity has been assessed based on the number and distance of the nearest sensitive receptors to the activity, and the sensitivity of these receptors to dust soiling, human health and ecological effects. Based on the criteria set out in **Table A10** to **Table A12** in **Appendix A**, **Table 10** presents the sensitivity of the area.

Table 10: Summary of the Sensitivity of the Area

Potential Impact	Sensitivity of the Surrounding Area		
	Earthworks	Construction	Trackout
Dust Soiling	High	High	High
Human Health	High	High	High
Ecological	Low	Low	Low

Earthworks

5.7. The area of the Site is slightly less than 0.1ha (981m^2). Based on this, and considering the criteria in **Table A8** in **Appendix A**, the potential dust emissions during earthworks activities would be of **small** magnitude.

Construction

5.8. The estimate for the total volume of buildings to be constructed (including the basement) is approximately 12,000m^3. Based on this, and considering the criteria in **Table A8** in **Appendix A**, the potential dust emissions during construction activities would be of **small** magnitude.

Trackout

5.9. Although data relating to anticipated construction vehicle movements are not available at this stage, given the size of the Site, it is likely that HDV movements would be less than 25 trips in any one day.

5.10. Based on this, and considering the criteria in **Table A8** in **Appendix A**, the potential for dust emissions due to trackout activities would be of **small** magnitude.

5.11. The dust risk categories, based on the potential magnitude of dust emissions and the sensitivity of the area to dust, are presented in **Table 11**.

Table 11: Summary of Dust Risk

Potential Impact	Risk		
	Earthworks	Construction	Trackout
Dust Soiling	Low	Low	Low
Human Health	Low	Low	Low
Ecological	Negligible	Negligible	Negligible

5.12. The Site is considered to be a **low risk** site, in particular to dust soiling and human health effects. Mitigation measures would be required to ensure that there are no adverse effects from demolition and construction.

Construction Vehicle and Plant Emissions

5.13. Plant operating on the Site and demolition and construction related vehicles entering and egressing the Site from / to the local road network would have the potential to increase local air pollutant concentrations, particularly in respect of NO_2 and particulate matter (both PM_{10} and $PM_{2.5}$).

5.14. Although data relating to anticipated construction vehicle movements are not available at this stage, it is anticipated that the effect of construction traffic on local air quality is likely to **negligible** in context of local high background concentrations and high existing vehicles emissions.

5.15. Any emissions from plant operating on the Site would be very small in comparison to the emissions from traffic movements on the roads adjacent to the Site. It is therefore is considered that even in the absence of mitigation, their likely effect on local air quality would be **negligible**.

6. Operational Phase Effects

Conditions within the Development

6.1. The results of the air quality modelling of traffic (based on current guidance, i.e. with reduced emission rates and background concentration to the completion year of 2017) are presented in **Table 12**.

Table 12: Dispersion Modelling Results at Sensitive Receptors

	NO_2 Annual Mean (µg/m^3)	PM_{10} Annual Mean (µg/m^3)	PM_{10} - Number of Days >50 µg/m^3	$PM_{2.5}$ Annual Mean (µg/m^3)
Receptor 1: **Proposed:** Kentish Town Road Façade 1st Floor	**43.0**	24.2	10	16.3
Receptor 2: **Proposed:** Kentish Town Road Façade 2nd Floor	38.3	23.3	8	15.7
Receptor 3: **Proposed:** Kentish Town Road Façade 3rd Floor	36.3	23.0	8	15.5
Receptor 4: **Proposed:** Kentish Town Road Façade 4th Floor	35.3	22.8	7	15.4
Receptor 5: **Proposed:** Kentish Town Road Façade 5th Floor	34.5	22.7	7	15.3
Receptor 6: **Proposed:** Rear Façade 1st Floor	37.8	23.2	8	15.6
Receptor 7: **Proposed:** Rear Façade 2nd Floor	37.1	23.1	8	15.5
Receptor 8: **Proposed:** Rear Façade 3rd Floor	36.2	22.9	7	15.4
Receptor 9: **Proposed:** Rear Façade 4th Floor	35.3	22.8	7	15.4
Receptor 10: **Proposed:** Rear Façade 5th Floor	34.6	22.7	7	15.3

Note: Exceedences of the AQS Objective shown in **Bold**

Conditions at the Development

6.2. It is recognised that along with much of the London, the air quality in the area of the Borough where the Site is located is relatively poor. The results in **Table 12** indicate that for 2017, exceedances are predicted in relation to the annual mean NO_2 objective at the first floor level of the façade fronting onto Kentish Town Road. There would be no exceedences at other floor levels facing Kentish Road, although results show that the NO_2 annual mean on the 2nd floor of the Kentish Town Road façade would be below but very close to the AQS objective. Finally, no exceedences are predicted for receptors on the rear façade.

6.3. As discussed in **Appendix A**, the hourly mean objective for NO_2 is unlikely to be exceeded at a roadside location where the annual-mean NO_2 concentration is less than 60µg/m^3. As shown in **Table 12**, the predicted concentrations in 2017 are below 60µg/m^3 at all of the proposed receptor locations as such it is unlikely that the hourly objective would be exceeded at these locations.

6.4. The annual and daily mean concentrations of PM_{10} are predicted to be well below the objective values in 2017 at all proposed receptor locations. The results in **Table 12** also indicate that the annual mean $PM_{2.5}$ objective of 25µg/m^3 is predicted to be met in 2017.

Sensitivity Analysis

6.5. The results of the sensitivity analysis (i.e. considering the potential effect of the Development against the current baseline, 2013, conditions, assuming no reduction in background concentrations or road traffic emission factors between 2013 and 2017) are presented in **Table A7** in **Appendix A**. The overall predicted concentrations are higher than those presented above for 2017 due to higher background concentrations and vehicles emissions rates in 2013 than 2017.

6.6. The results in **Table A7** in **Appendix A** illustrates that the annual mean NO_2 objective would exceed up to the 3rd floor of the façade fronting Kentish Town Road and up to the 2nd floor of the rear façade of the Development. All other receptors are predicted to be below the NO_2 annual mean objective. The maximum predicted concentration is 46.5µg/m^3 at Receptor 1.

6.7. All existing receptors would still be below the annual mean NO_2 concentration of 60µg/m^3 and as such the 1-hour mean AQS objective would still be likely to be met.

7. Mitigation Measures

Demolition and Construction

7.1. This section presents the mitigation measures that should be implemented onsite, based on the findings of the 'Construction Phase Effects' section.

Nuisance Dust

7.2. A range of environmental management controls would be developed with reference to the IAQM guidance for low risk sites and the London Borough of Camden Guide for Contractors Working in Camden. Such measures would prevent the release of dust entering the atmosphere and/or being deposited on nearby receptors. The measures would include:

- Routine dust monitoring at sensitive residential locations with the results used to inform the most appropriate mitigation controls, the effectiveness of which would be monitored and reviewed through a Dust Management Plan;
- Damping down surfaces during dry windy weather;
- Direction of appropriate hoarding and/or fencing to reduce dust dispersion and restrict public access, and sheeting of chutes, skips and vehicles removing construction wastes;
- Appropriate handling and storage of materials;
- Loading and unloading would only be permitted in designated areas;
- Effective vehicle washing facilities will be provided for vehicles leaving the Site;
- Fitting all equipment (e.g. for cutting, grinding, crushing) with dust control measures such as water sprays wherever possible;
- Prevention of dust-contaminated run-off water from the Site;
- Use of low emission alternative fuelled plant where feasible, and ensuring that all plant and vehicles are well maintained so that exhaust emissions do not breach statutory emission limits;
- Switching off of all plant when not in use;
- Effectively screening dusty activities, such as stone cutting and grinding;
- Banning fires on the Site;
- Ensuring that cleaning equipment is available to clean mud from hard standing roads and footpaths; and
- Close liaison with surrounding sensitive properties during periods that may generate dust as a result of the combination of activities and particular wind conditions (speed and direction).

7.3. In addition, the following could be undertaken:

- recording of any exceptional incidents that cause dust and air quality pollutant emissions, either on or off-Site, and the action taken to resolve the situation by the Project Environmental Manager; and
- using low emission alternative fuelled plant where feasible, and ensuring that all plant and vehicles are well maintained so that exhaust emissions comply with the London LEZ and the London Non-Road Mobile Machinery standards.

7.4. Such measures are routinely and successfully applied to construction projects throughout the UK and are capable of significantly reducing the potential for adverse nuisance dust effects associated with the various stages of construction work. Therefore, the residual dust effects associated with construction activities are considered to be **negligible**.

Vehicle Emissions

7.5. Detailed mitigation measures to control construction traffic would be discussed and agreed with LBC to establish the most suitable access and haul routes for Site traffic. The most effective mitigation would be achieved by ensuring that construction traffic does not pass along sensitive roads (residential roads, congested roads, via unsuitable junctions, etc.) where possible. The timing of large-scale vehicle movements to avoid peak hours on the local road network would also be beneficial.

7.6. The likely residual effects of plant operating on the Site would be **negligible** in the context of local background concentrations or existing adjacent road traffic emissions. The residual effects of construction vehicles entering and leaving the Site would be **negligible**.

Completed Development

7.7. As discussed above, when taking into account the uncertainty in future NO_x and NO_2 reductions, annual mean NO_2 concentrations are predicted to be above the objective of 40µg/m^3 up to the 3rd floor of the Development. To ensure that future users of the Development are provided with clean air, residential units up to the third floor would be provided within mechanical ventilation, with clean air being brought in from above the third floor. This would ensure that internal air quality conditions are suitable for the future residential users. Following the implementation of the mechanical ventilation, the likely residual effects of introducing residential uses to the Site would be **negligible**.

8. Summary and Conclusions

8.1. An assessment of the exposure of future occupants of the Development has been undertaken using ADMS-Roads.

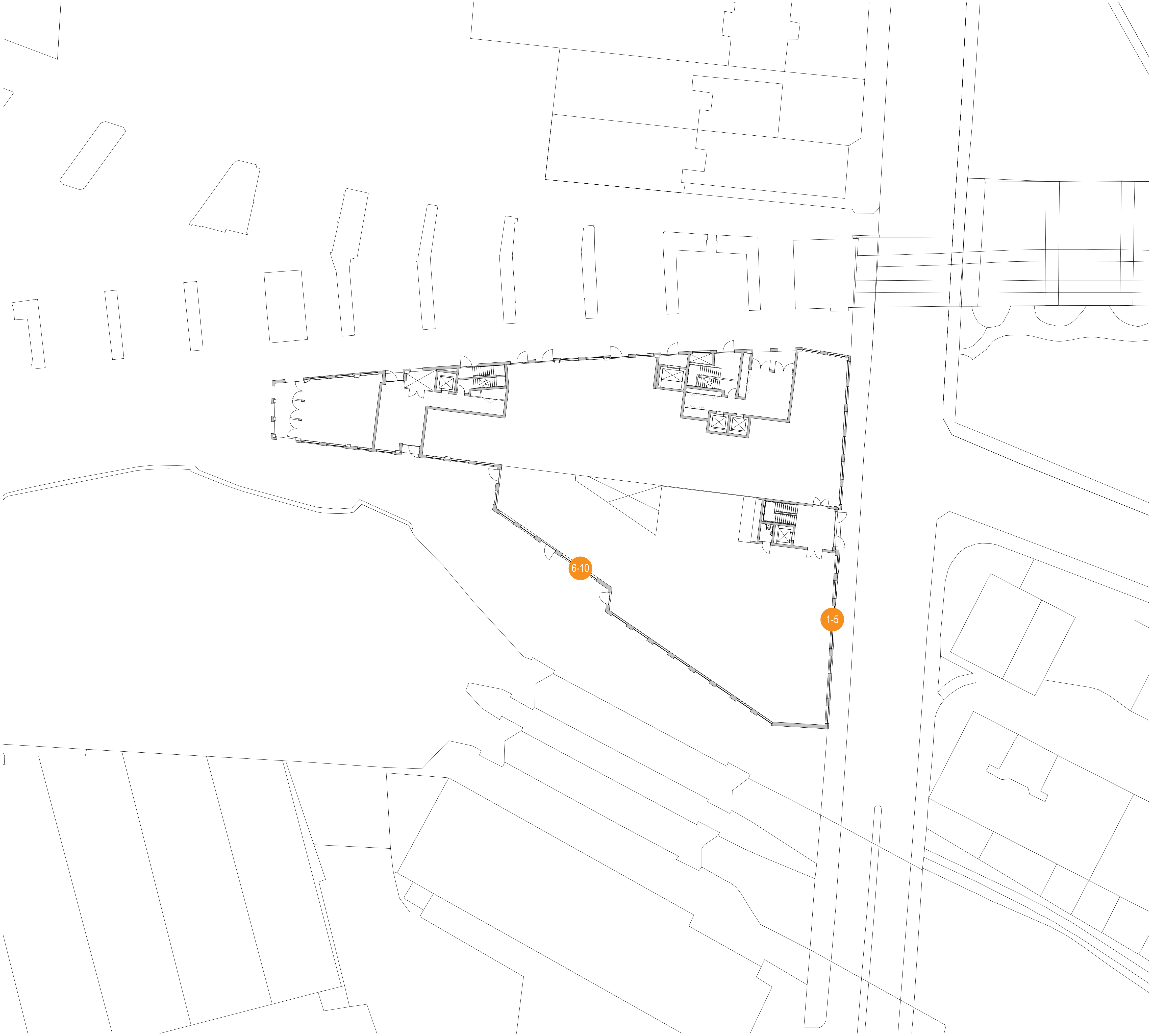
8.2. The construction of the Development would have the potential to generate fugitive dust from construction activities and changes in air quality as a result of exhaust emissions from plant and construction vehicles.

8.3. A range of best practice environmental mitigation measures would be implemented to minimise dust generated during the construction works. With mitigation in place, the occurrence of nuisance dust would be minimised, and it is considered that the significance of effect would be **negligible**.

8.4. It is anticipated that the effect of exhaust emissions from construction vehicles entering and leaving the Site would be **negligible** considering current background pollutant concentrations and local road traffic emissions.

8.5. Exhaust emissions from construction plant operating on the Site would be small in comparison to the emissions from the road traffic movements on the roads adjacent to the site and therefore it is considered that their effect on air quality would be **negligible**.

8.6. It is anticipated that, when taking into account the uncertainty of NO_x and NO_2, with the provision of mechanical ventilation for the residential units up to the third floor of the Development, the effect of introducing residential uses to the Site is considered to be **negligible**. In addition predicted PM_{10} and $PM_{2.5}$ concentrations are below the respective objectives at all modelled receptors onsite and therefore the effect of introducing residential uses would be **negligible**.



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Receptor Locations

Project Details	EED15184-100: Camden Lock Village, Area E
Figure Title	Figure 1: Site Plan and Receptor Locations
Figure Ref	EED15184-100_GR_AQ_1A
Date	March 2015
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APPENDICES

Appendix A Air Quality Modelling Study

Appendix A: Air Quality Modelling Study

1.1 The air quality assessment is based on the technical information presented in this Appendix.

Model

1.2 In urban areas, pollutant concentrations are primarily determined by the balance between pollutant emissions that increase concentrations, and the ability of the atmosphere to reduce and remove pollutants by dispersion, advection, reaction and deposition. An atmospheric dispersion model is used as a practical way to simulate these complex processes; which requires a range of input data, which can include pollutant emissions rates, meteorological data and local topographical information.

1.3 The effect of the Development on local air quality was assessed using the advanced atmospheric dispersion model ADMS-Roads, taking into account the contribution of emissions from forecast road-traffic on the local road network by the completion year.

1.4 The ADMS-Roads model is a comprehensive tool for investigating air pollution in relation to road networks. On review of the Site, and its surroundings, ADMS-Roads was considered appropriate for the assessment of the long and short term effects of the proposals on air quality. The model uses advanced algorithms for the height-dependence of wind speed, turbulence and stability to produce improved predictions of air pollutant concentrations. It can predict long-term and short-term concentrations, including percentile concentrations. The air quality Environment Health Officer (EHO) at the London Borough of Camden (LBC) agreed the use of the ADMS-Roads model.

1.5 ADMS-Roads model is a formally validated model, developed in the United Kingdom (UK) by CERC (Cambridge Environmental Research Consultants). This includes comparisons with data from the UK's air quality Automatic Urban and Rural Network (AURN) and specific verification exercises using standard field, laboratory and numerical data sets. CERC is also involved in European programmes on model harmonisation, and their models were compared favourably against other EU and U.S. EPA systems. Further information in relation to this is available from the CERC web site at www.cerc.co.uk.

Model Scenarios

1.6 The Development is anticipated to be complete in 2017 and therefore this is the year in which the future scenario was modelled. The year 2013 was modelled to establish the existing baseline situation as this was the latest year for which monitoring data is available from LBC against which the air quality model is verified (discussed further below). Base year traffic data and meteorological data for 2013 were also used to be consistent with the verification year.

1.7 Taking into account recent analyses by Defra[1] showing that historical NO_x and NO_2 concentrations are not declining in line with emission forecasts. As outlined in main report, a sensitivity analysis has been undertaken on the basis of no future reductions in NO_x/NO_2 concentrations (i.e. considering the potential effects of the Development against the current baseline 2013 conditions by applying the 2017 road traffic data to 2013 background concentrations and road traffic emission rates).

Traffic Data

1.8 The model uses traffic flow data comprising Annual Average Daily Traffic (AADT) flows, traffic composition (percentage HDVs – Heavy-Duty Vehicles) and speeds (in kph) as provided by

Arup for the surrounding road network. Table A1 presents the traffic data used within the air quality assessment.

Table A1: 24 hour AADT Data Used within the Assessment

Link Name	Speed (kph)	Base 2013		Future 2017	
		AADT	%HDV	AADT	%HDV
Castlehaven Road	48	12,120	13.1	12,521	12.6
Hawley Road	48	11,964	12.4	12,275	12.2
Leybourne Road	48	506	6.4	363	13.6
Kentish Town Road	48	14,714	4.1	14,758	4.1
Hawley Crescent	48	4,646	11.7	4,686	11.4
Camden High Street	48	12,277	17.9	12,351	17.8
Chalk Farm Road	48	17,116	9.1	17,392	9.1
Camden Road	48	29,407	8.4	29,701	8.4

Vehicle Speeds

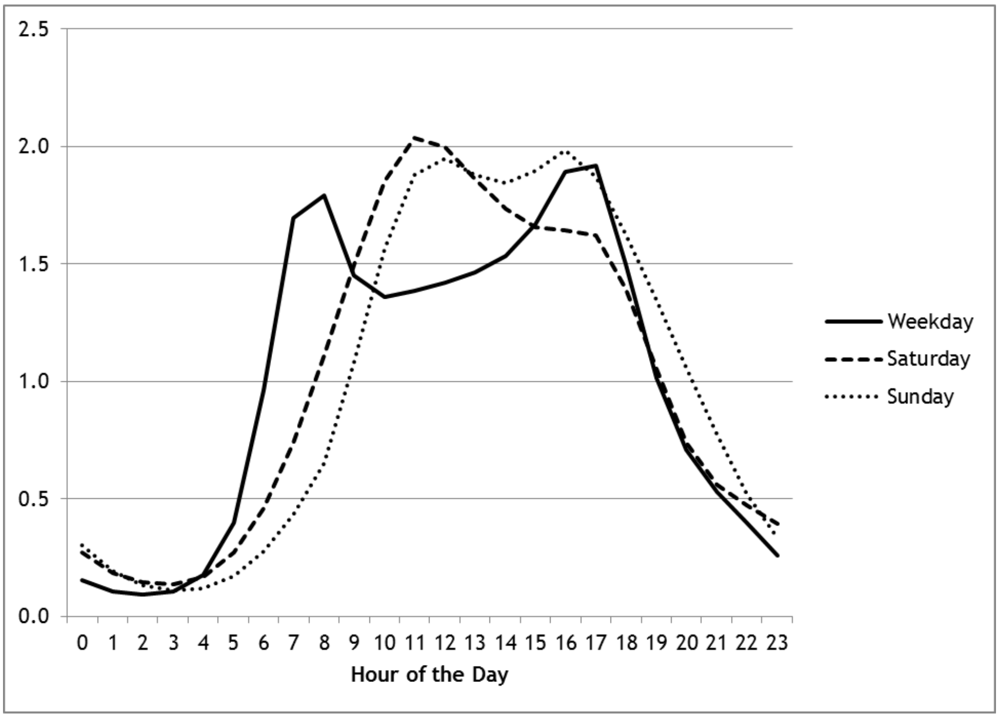
1.9 To take into account the presence of slow moving traffic near junctions and at roundabouts, the speed on each road was reduced using the following criteria recommended within LAQM.TG(09)[2]:

- For a busy junction, an average of 20kph was applied; and
- For other junctions (non-motorway) and roundabouts, where some slowing of traffic occurs, the speed was reduced by 10kph compared to the speed limit.

Diurnal Profile

1.10 The ADMS-Roads model uses an hourly traffic flow based on the AADT flows. Traffic flows follow a diurnal variation throughout the day and week. Therefore, a diurnal profile was used in the model to replicate how the average hourly traffic flow would vary throughout the day and the week. This was based on data collated by Waterman from the Department for Transport (DfT) statistics Table *TRA0307: Traffic distribution by time of day on all roads in Great Britain, 2013*[3]. Figure A1 presents the diurnal variation in traffic flows that has been used within the model.

Figure A1: Diurnal Traffic Variation



Street Canyon Effect

1.11 Narrow streets with tall buildings on either side have the potential to create a confined space, which can interfere with the dispersion of traffic pollutants and may result in pollutant emissions accumulating in these streets. In an air quality model these narrow streets are described as street canyons.

1.12 ADMS-Roads includes a street canyon model to take account of the additional turbulent flow patterns occurring inside such a narrow street with relatively tall buildings on both sides. LAQM.TG(09) identifies a street canyon *"as narrow streets where the height of buildings on both sides of the road is greater than the road width."*

1.13 Following a review of the road network to be included within the model, it was considered that modelled roads are relatively wide and the majority of existing buildings along these roads are not considered to be tall. The proposed building within the Site would not cause any canyons to be created. Therefore, no street canyons were included within the model for any of the scenarios considered.

Road Traffic Emission Factors

1.14 ADMS-Roads version 3.4.2 (January 2015) has been used, using the latest UK road traffic emission factor datasets built in the dispersion model, and based on the UK Emission Factor Toolkit (EFT) version 6.0.1 published July 2014.

1.15 Road traffic emissions are calculated using traffic flow, HDV%, speed and road type information as input data. Emissions arecalculated in g/km/s for each road link, for the selected pollutants.

Background Pollutant Concentrations

1.16 Background pollutant concentration data (i.e. concentrations due to the contribution of pollution sources not directly taken into account in the dispersion modelling) have been added to contributions from the modelled pollution sources, for each year of assessment.

1.17 Background pollution monitoring is undertaken within LBC using one automatic analyser, located at Bloomsbury approximately 2.4km southeast of the Site.

1.18 Table A2 shows the 2013 concentrations measured at the Bloomsbury automatic monitor.

Table A2: Annual Mean Concentrations at the Bloomsbury Urban Background Automatic Monitor

Pollutant	AQS Objective	2013
NO_x	-	89.2
NO_2	Annual Mean (40µg/m^3)	50.4
PM_{10}	Annual Mean (40µg/m^3)	18.0
$PM_{2.5}$	Annual Mean (25µg/m^3)	11.7

Source: www.londonair.org.uk

1.19 Table A2 shows that the Bloomsbury automatic monitor annual mean NO_2 concentration is above the objective, whilst the annual mean PM_{10} and $PM_{2.5}$ are below the objectives.

1.20 In addition to the monitoring data at Bloomsbury, forecast UK background concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ are available from the Defra LAQM Support website[4] for 1x1km grid squares for assessment years between 2011 and 2030. Table A3 presents the Defra background concentrations for the year 2013, for the grid square the Site is located within (528500, 184500).

Table A3: Defra Background Maps in 2013 for the Grid Square at the Site

Pollutant	Annual Mean Concentration (µg/m^3)
NO_x	56.8
NO_2	34.4
PM_{10}	23.3
$PM_{2.5}$	16.0

1.21 The data in Tables A2 and A3 show that the 2013 monitored urban background NO_2 concentration at the Bloomsbury automatic monitor (50.4µg/m^3) is higher than the concentration from the Defra background maps (34.4µg/m^3).

1.22 Similarly, the data show that the 2013 monitored urban background NO_x concentration at the Bloomsbury (89.2µg/m^3) automatic monitor is higher than the total Defra background map (56.8µg/m^3). The 2013 monitored urban background PM_{10} concentrations at the Bloomsbury automatic monitor (18.0µg/m^3) is lower than the concentration from the Defra background map (23.3µg/m^3). The 2013 monitored urban background $PM_{2.5}$ concentrations at the Bloomsbury automatic monitor (11.7µg/m^3) is lower than the concentration from the Defra background map (16.0µg/m^3).

1.23 However, given the distance of the monitor from the Site and its location close to the A4200, it is not considered to be representative of concentrations at the Site. The concentrations from the Defra background map have been used in the assessment as agreed with the EHO at LBC. Table A4 presents the background concentration data used within the assessment.

Table A4: Background Concentrations (µg/m³) Used within the Assessment

Pollutant	Source	2013	2017
NO_x	Defra background maps	56.8	49.2
NO_2	Defra background maps	34.4	30.5
PM_{10}	Defra background maps	23.3	22.2
$PM_{2.5}$	Defra background maps	16.0	14.9

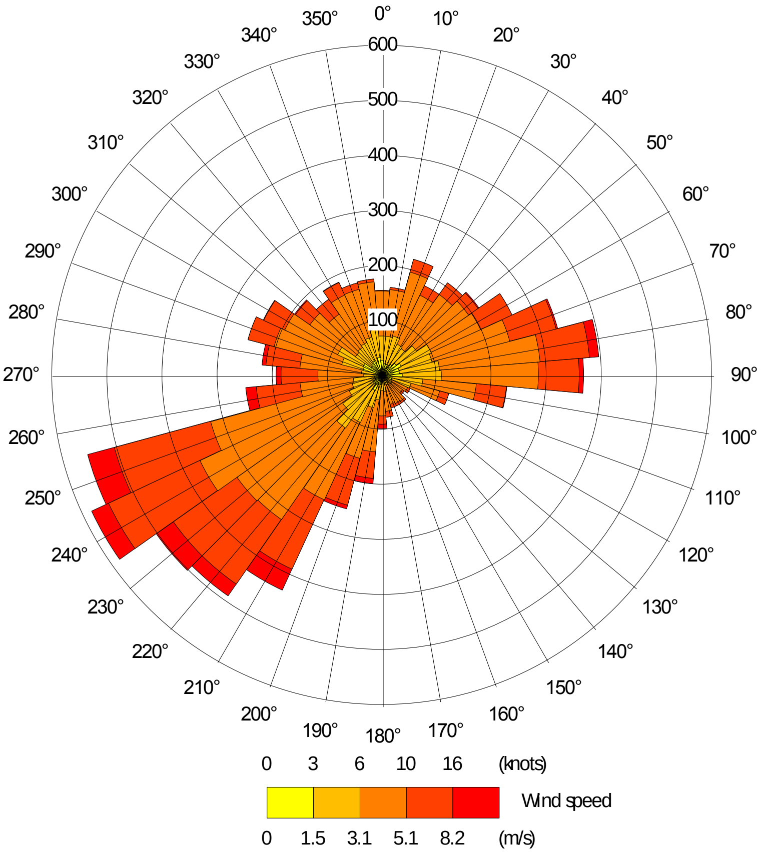
Meteorological Data

1.24 Local meteorological conditions strongly influence the dispersal of pollutants. Key meteorological data for dispersion modelling include hourly sequential data for wind direction, wind speed, temperature, precipitation and the extent of cloud cover for each hour of a given year. As a minimum ADMS-Roads requires wind speed, wind direction, and cloud cover.

1.25 Meteorological data to input into the model were obtained from the London City Airport Meteorological Station, which is the closest to the Site and considered to be the most representative. The assessment uses 2013 data to be consistent with the base traffic year and model verification year. It was also used for the 2017 scenario for the air quality assessment. Figure A2 presents the wind rose for the meteorological data.

1.26 Most dispersion models do not use meteorological data if they relate to calm wind conditions, as dispersion of air pollutants is more difficult to calculate in these circumstances. ADMS-Roads treats calm wind conditions by setting the minimum wind speed to 0.75 m/s. It is recommended in Technical Guidance LAQM.TG(09) that the meteorological data file be tested within a dispersion model and the relevant output log file checked, to confirm the number of missing hours and calm hours that cannot be used by the dispersion model. This is important when considering predictions of high percentiles and the number of exceedences. Technical Guidance LAQM.TG(09) recommends that meteorological data should only be used if the percentage of usable hours is greater than 75%, and preferably 90%. 2013 meteorological data from London City Airport include 8,638 lines of usable hourly data out of the total 8,760 for the year, i.e. 98.6% of usable data. This is above the 75% threshold, and is therefore adequate for the dispersion modelling.

Figure A2: 2013 Wind Rose for the London City Airport Meteorological Site



Model Data Processing

1.27 The modelling results were processed to calculate the averaging periods required for comparison with the AQS objectives.

1.28 NO_x emissions from combustion sources (including vehicle exhausts) comprise principally nitric oxide (NO) and nitrogen dioxide (NO_2). The emitted nitric oxide reacts with oxidants in the air (mainly ozone (O_3)) to form more NO_2. Since only NO_2 is associated with effects on human health, the air quality standards for the protection of human health are based on NO_2 and not total NO_x or NO.

1.29 ADMS-Roads was run without the Chemistry Reaction option to allow verification (see below). Therefore, a suitable NO_X:NO_2 conversion needed to be applied to the modelled NO_X concentrations. There are a variety of different approaches to dealing with NO_X:NO_2 relationships, a number of which are widely recognised as being acceptable. However, the current approach was developed for roadside sites, and is detailed within Technical Guidance LAQM.TG(09).

1.30 The LAQM Support website provides a spreadsheet calculator[5] to allow the calculation of NO_2 from NO_x concentrations, accounting for the difference between primary emissions of NO_x and background NO_x, the concentration of O_3, and the different proportions of primary NO_2 emissions, in different years. This approach is only applicable to annual mean concentrations.

1.31 Research[6] undertaken in support of LAQM.TG(09) has indicated that the 1-hour mean AQS objective for NO_2 is unlikely to be exceeded at a roadside location where the annual-mean NO_2 concentration is less than 60µg/m³. The 1-hour mean objective is, therefore, not considered further within this assessment where the annual mean NO_2 concentration is predicted to be less than 60µg/m³.

1.32 In order to calculate the number of PM_{10} 24-hour means exceeding 50µg/m³ the relationship between the number of 24-hour mean exceedences and the annual mean PM_{10} concentration from LAQM.TG (09)[1] was applied as follows:

$$\textbf{Number of Exceedances} = -18.5 + 0.00145 \times (\text{annual mean}^3) + \frac{206}{\text{annual mean.}}$$

Other Model Parameters

1.33 There are a number of other parameters that are used within the ADMS-Roads model which are described here for completeness and transparency:

- The model requires a surface roughness value to be inputted. A value of 1.5 was used, which is representative of large urban areas such as London;
- The model requires the Monin-Obukhov length (a measure of the stability of the atmosphere) to be inputted. A value of 100m (representative of large conurbations >1,000,000 inhabitants) was used for the modelling; and
- The model requires the Road Type to be inputted. *'London [Inner]'* was selected and used for the modelling.

Model Verification

1.34 Model verification is the process of comparing monitored and modelled pollutant concentrations for the same year, at the same locations, and adjusting modelled concentrations if necessary to be consistent with monitoring data. This increases the robustness of modelling results.

1.35 Discrepancies between modelled and measured concentrations can arise for a number of reasons, for example:

- Traffic data uncertainties;
- Background concentration estimates;
- Meteorological data uncertainties;
- Sources not explicitly included within the model (e.g. car parks and bus stops);
- Overall model limitations (e.g. treatment of roughness and meteorological data, treatment of speeds); and
- Uncertainty in monitoring data, particularly diffusion tubes.

1.36 Verification is the process by which uncertainties such as those described above are investigated and minimised. Disparities between modelling and monitoring results are likely to arise as result of a combination of all of these aspects.

Nitrogen Dioxide

1.37 The dispersion model was run to predict annual mean NO_x concentrations at the LBC diffusion tube located on Camden Road. As highlighted above, the NO_2 concentrations are a function of NO_x concentrations. Therefore, the roadside NO_x concentration predicted by the model was converted to NO_2 using the NO_x to NO_2 calculator provided by Defra on the air quality archive. The background data for 2013, as presented in Table A4 were used.

1.38 The modelled and equivalent measured roadside NO_2 concentrations at the diffusion tube sites were compared as shown in Table A5 below.

Table A5: 2013 Annual Mean NO_2 Modelled and Monitored Concentrations

Site ID	Monitored Annual Mean NO_2 ($\mu g/m^3$)	Modelled Total Annual Mean NO_2 ($\mu g/m^3$)	% Difference (modelled – monitored)
Camden Road	77.9	47.6	-38.8

1.39 Table A5 indicates that the model under predicts annual mean NO_2 concentrations at the Camden Road diffusion tube location. Technical Guidance LAQM.TG(09) suggests that where there is disparity between modelled and monitored results, particularly if this is by more than 25%, appropriate adjustment should be undertaken.

1.40 LAQM.TG(09) presents a number of methods for approaching model verification and adjustment. Example 2, of Annex 3 in the LAQM.TG(09) guidance document, indicates a method based on adjusting NO_2 road contribution and calculating a single adjustment factor. This method refers to modelling based on road traffic sources and can be applied to either a single diffusion tube location, or where numerous diffusion tube monitoring locations are sited within the modelled area. This requires the roadside NOx contribution to be calculated. In addition, monitored NOx concentrations are required, which have been calculated from the annual mean NO_2 concentration at the diffusion tube sites using the NOx to NO_2 spreadsheet as described above. The steps involved in the adjustment process are presented in Table A6.

Table A6: Model Verification Result for Adjustment NO_x Emissions ($\mu g/m^3$)

Site ID	Monitored NO_2	Monitored NO_x	Monitored Road NO_2	Monitored Road NO_x	Modelled Road NO_x	Ratio of Monitored Road Contribution NO_x/Modelled Road Contribution NO_x
Camden Road	77.9	188.7	43.4	131.9	31.9	4.139

1.41 Consequently the adjustment factor (4.139) obtained from Table A6 is applied to the modelled NO_x Roadside concentrations to obtain improved agreement between monitored and modelled annual mean NO_x. This has been converted to annual mean NO_2 using the NO_x:NO_2 spreadsheet calculator.

1.42 The NO_x adjustment process was subsequently applied to all of roadside NO_x modelling for 2013 and 2017 at the specific receptors locations assessed before the predicted concentrations were converted to NO_2.

Particulate Matter (PM_{10} and $PM_{2.5}$)

1.43 No PM_{10} or $PM_{2.5}$ monitoring data is available to compare to the model output. Therefore, the NO_x adjustment factor (4.139) calculated in Table A6 was subsequently applied to all the roadside modelling results for PM_{10} and $PM_{2.5}$, before the addition of the appropriate background concentrations.

NO_2 Sensitivity Test

1.44 Whilst this air quality assessment was based on current guidance, i.e., with reduced emission rates and background concentration for the completion year of 2017, to take into account the trend that NO_x and NO_2 concentrations are not declining as expected[1]. A sensitivity test has been carried out based on no future reductions in road traffic emission rates and background concentrations (i.e. considering the Development against the current (2013) baseline conditions). Table A7 presents the modelled results of this additional scenario.

Table A7: Results of the ADMS-Roads Modelling at Sensitive Receptors, Assuming No Improvement in NO_x and NO_2

	NO_2 Annual Mean (µg/m^3)
Receptor 1: **Proposed**: Kentish Town Road Façade 1st Floor	**46.5**
Receptor 2: **Proposed**: Kentish Town Road Façade 2nd Floor	**42.0**
Receptor 3: **Proposed**: Kentish Town Road Façade 3rd Floor	**40.1**
Receptor 4: **Proposed**: Kentish Town Road Façade 4th Floor	39.0
Receptor 5: **Proposed**: Kentish Town Road Façade 5th Floor	38.3
Receptor 6: **Proposed**: Rear Façade 1st Floor	**41.5**
Receptor 7: **Proposed**: Rear Façade 2nd Floor	**40.8**
Receptor 8: **Proposed**: Rear Façade 3rd Floor	39.9
Receptor 9: **Proposed**: Rear Façade 4th Floor	39.1
Receptor 10: **Proposed**: Rear Façade 5th Floor	38.4

Note: Exceedences of the AQS Objective highlighted in **Bold**

Construction Phase Dust Assessment

1.45 Table A8 provides examples of the potential dust emissions classes for each of the construction activities, as provided in the IAQM guidance on the assessment of construction dust. It should be noted that not all the criteria need to be met for a particular class. Once the class has been determined the risk category can be determined from the matrices presented in Tables 4 to 7 of the main report.

Table A8 Criteria for the Potential Dust Emissions Class

Activity	Class	Example Criteria
Demolition	Large	Total Building volume >50,000m^3, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >20m above ground level.
	Medium	Total Building volume 20,000-50,000m^3, potentially dusty construction material, demolition activities 10-20m above ground level.
	Small	Total Building volume <20,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.
Earthworks	Large	Total site area >10,000m^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 >8m in height, total material moved >100,000 tonnes.
	Medium	Total site area 2,500m^2 – 10,000m2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4m – 8m in height, total material moved 20,000 tonnes – 100,000 tonnes.
	Small	Total site area <2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <10,000 tonnes, earthworks during wetter months.
Construction	Large	Total Building volume >100,000m^3, on site concrete batching, sand blasting.
	Medium	Total building volume 25,000 m^3 - 100,000m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching.
	Small	Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).
Trackout	Large	>100 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m.
	Medium	25-100 HDV (>3.5t) trips in any one day, moderately dusty surface material, unpaved road length 50-100m.
	Small	<25 HDV (>3.5t) trips in any one day, surface material low potential for dust release, unpaved road length <50m.

1.46 Once the risk category has been defined, the significance of the likely dust impacts can be determined, taking into account the factors that define the sensitivity of the surrounding area. Examples of the factors defining the sensitivity of the area as set out in the IAQM guidance are presented in Table A9.

Table A9: Examples of Factors Defining Sensitivity of the Area

Type of Effect	Sensitivity of Receptor	Examples
Sensitivities of People to Dust Soiling Effects	High	Users can reasonably expect[1] a 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[1] 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[2] and car showrooms.
	Medium	Users would expect[1] to enjoy a reasonable level of amenity, but would not reasonably expect[1] 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[1] 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	The enjoyment of amenity would not reasonably be expected[1]; or property would not reasonably be expected[1] 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[2] and roads.
Sensitivities of People to Health Effects of PM_{10}	High	Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, relevant location would be one where individuals may be exposed for eight hours or more in a day).[3] 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.
	Medium	Locations where the people exposed are workers[4], and exposure is over a time period relevant to the air quality objective 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 office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.
	Low	Locations where human exposure is transient.[5] Indicative examples include public footpaths, playing fields, parks and shopping streets.
Sensitivities of Receptors to Ecological Effects	High	Locations with an international or national designation and the designated features may be affected by dust soiling; or Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain[6]

Type of Effect	Sensitivity of Receptor	Examples
		Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
	Medium	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or Locations with a national designation where the features may be affected by dust deposition. Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
	Low	Locations with a local designation where the features may be affected by dust deposition. Indicative example is a local Nature Reserve with dust sensitive features.

1 People's expectations will vary depending on the existing dust deposition in the area.

2 Car parks can have a range of sensitivities depending on the duration and frequency that people would be expected to park their cars there, and the level of amenity they could reasonably expect whilst doing so. Car parks associated with work place or residential parking might have a high level of sensitivity compared to car parks used less frequently and for shorter durations, such as those associated with shopping. Cases should be examined on their own merits.

3 This follows Defra guidance as set out in LAQM.TG(09).

4 Notwithstanding the fact that the air quality objectives and limit values do not apply to people in the workplace, such people can be affected to exposure of PM10. However, they are considered to be less sensitive than the general public as a whole because those most sensitive to the effects of air pollution, such as young children are not normally workers. For this reason workers have been included in the medium sensitivity category.

5 There are no standards that apply to short-term exposure, e.g. one or two hours, but there is still a risk of health impacts, albeit less certain.

6 Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.

1.47 Tables A10 to A12 show how the sensitivity of the area may be determined for effects related to dust soiling (nuisance), human health and ecosystem respectively. When using these tables it should be noted that distances are to the dust source and so a different area may be affected by the on-site works than by trackout (i.e. along the routes used to access the site). The IAQM guidance advises that the highest level of sensitivity from each table should be recorded.

Table A10: Sensitivity of the Area to Dust Soiling Effects on People and Property

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

Table A11: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32µg/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32µg/m³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table A12: Sensitivity of the Area to Ecological Impacts

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

Assessor Experience

Name: Christopher Brownlie

Years of Experience: 8

Qualifications:

- BSc (Hons)
- MSc
- AIEMA (Associate Member of the Institute of Environmental Management and Assessment)
- MIAQM (Member of the Institute of Air Quality Management)

Chris has over eight years of experience in the assessment of air quality and odour for a variety of environmental impact assessment projects. Chris has knowledge and extensive experience of designing and undertaking ambient air quality monitoring programmes using real time equipment and passive diffusion tubes. This includes devising monitoring programs for dust deposition, typically to monitor levels of dust generated during construction activities in populated areas where there is the potential for nuisance to be caused.

Chris has been responsible for the technical delivery of a wide range of air quality projects for a variety of clients in both the public and private sector. These projects include consideration of emissions from both transportation and industrial sources, through both monitoring and modelling, and therefore he has an in depth understanding of the regulatory requirements for these sources and the published technical guidance for their assessment.

References

1 http://laqm.defra.gov.uk/faqs/faqs.html: Measured nitrogen oxides (NO_x) and/or nitrogen dioxide (NO_2) concentrations in my local authority area do not appear to be declining in line with national forecasts.

2 Defra, 2009, Local Air Quality Management Technical Guidance LAQM.TG(09)

3 Department for Transport (DfT) Statistics, www.dft.gov.uk/statistics/series/traffic

4 http://laqm.defra.gov.uk/

5 AEA, NO_X to NO_2 Calculator, http://laqm1.defra.gov.uk/review/tools/monitoring/calculator.php Version 4.1, 19 June 2014

6 AEA, 'Analysis of the relationship between annual-mean nitrogen dioxide concentration and exceedences of the 1-hour mean AQS Objective', 2008.

Appendix B Air Quality Neutral Assessment

Waterman

Appendix B: Air Quality Neutral Assessment

Introduction

In April 2014 the Greater London Authority (GLA) adopted "The Mayor's Supplementary Planning Guidance - Sustainable Design and Construction"[1] (hereafter referred to as the 'SPG'), to supplement the London Plan[2]. The SPG requires all new Major Developments located within Greater London to demonstrate that they will be at least "air quality neutral".

Major Developments are defined in the London Plan as:

- For dwellings: where 10 or more are to be constructed (or if number not given, area is more than 0.5 hectares);
- For all other uses: where the floor space is 1000 square metres or more (or the site area is 1 hectare or more).

Based on these criteria, the Development is considered a "Major Development", and as such Waterman Energy, Environment & Design Ltd ('Waterman') has undertaken an Air Quality Neutral Assessment. The purpose of the report is to provide an assessment of the Development against the 'air quality neutral' benchmarks as detailed within the SPG.

Description of the Development

The Development would provide residential (Use Class C3) and flexible employment and gym space (Use Class B1a/B1c/D2). The Development will provide 24 residential units and is located within Inner London.

The total amount of floorspace within the Development is set out below in **Table B1**.

Table B1: 'Air Quality Neutral' Emissions Benchmarks for Buildings

Land Use (Use Class)	Proposed Floorspace Areas (GEA) (m^2)	Proposed Floorspace Areas (GIA) (m^2)
Residential (C3)	2,652	2,462
Office (B1)	1,412	1,294
Total	**4,064**	**3,756**

Planning Policy

The Mayor's Supplementary Planning Guidance – Sustainable Design and Construction, 2014

The Sustainable Design and Guidance – Supplementary Planning Guidance (SPG) provides updated guidance to support the implementation of the London Plan.

Further to Policy 7.14 of the London Plan, Section 4.3 of the SPG focusses on air pollution and the effects from the operation of new developments within Greater London. The SPG requires all new developments to be at least 'air quality neutral'.

Paragraph 4.3.15 of the SPG states:

"This policy applies to all major developments in Greater London. Developers will have to calculate the NO_x and / or PM_{10} emissions from the buildings and transport elements of their developments and compare them to the benchmarks set out in Appendix 5 and 6."

The SPG presents emission benchmarks for buildings (associated with emissions from combustion plant introduced as part of a development to provide heating and power) and transport (associated with vehicle trips related to the operation of the development). It is considered that where a development does not exceed these benchmarks, then it is considered to be 'air quality neutral' and would not increase NO_x (oxides of nitrogen) and PM_{10} (particulate matter of 10µm diameter or less) emissions across London as a whole. A discussion on the Building Emission Benchmarks (BEBs) and the Transport Emission Benchmarks (TEBs) as set out within the SPG is presented below.

In addition to the BEBs and TEBs, the SPG provides emissions standards for any proposed combustion plant (individual / communal gas boilers, solid biomass or Combined Heat and Power (CHP) plant) to be introduced as part of a development. These emissions standard must be complied with.

Building Emissions Benchmarks (BEBs)

Paragraph 4.3.17 and Appendix 5 of the SPG note that BEBs have been defined for a series of land-use classes for both NO_x and PM_{10}. The BEBs are presented in **Table B2**.

Table B2: 'Air Quality Neutral' Emissions Benchmarks for Buildings

Land Use Class	NOx (g/m^2)	PM_{10} (g/m^2)
Class A1	22.6	1.29
Class A3 – A5	75.2	4.32
Class A2 and Class B1	30.8	1.77
Class C1	70.9	4.07
Class C3	26.2	2.28
Class D1 (a)	43.0	2.47
Class D1 (b)	75.0	4.30
Class D1 (c – h)	31.0	1.78
Class D2 (a – d)	90.3	5.18
Class D2 (e)	284	16.3

It is noted that whilst the BEBs have been provided for PM_{10}, these only apply for developments which would introduce heating plants likely to produce significant PM_{10} emissions. This would typically include heating plant operated by oil or solid fuel (including all biomass appliances). All other plant would not result in an increase in PM_{10}; therefore an assessment against the PM_{10} BEBs would not be required.

Transport Emissions Benchmarks (TEBs)

Paragraph 4.3.18 and Appendix 6 of the SPG sets out the TEBs defined by a series of land-use class for both NO_x and PM_{10}. The TEBs are presented in **Table B3**.

Table B3: 'Air Quality Neutral' Emissions Benchmarks for Transport

Land Use	London Central Activity Zone	Inner	Outer
NO_x (g/m^2/annum)			
Retail (A1)	169	219	249
Office (B1)	1.27	11.4	68.5
NO_x (g/dwelling/annum)			
Residential (C3)	234	558	1553
PM_{10} (g/m^2/annum)			
Retail (A1)	29.3	39.3	42.9
Office (B1)	0.22	2.05	11.8
PM_{10} (g/dwelling/annum)			
Residential (C3, C4)	40.7	100	267

Section 4.3.18 of the SPG notes that the design of a development should encourage and facilitate walking, cycling and the use of public transport, thereby minimising the generation of air pollutants.

As well as providing benchmarks the SPG also recommends emission standards for combustion plant to comply with, in addition to meeting the overall 'air quality neutral' benchmark.

Air Quality Neutral Planning Support: GLA 80371, April 2014

The Air Quality Neutral Assessment required by the SPG is supported by a technical report 'Air Quality Neutral Planning Support', published by the GLA in April 2014[3], which sets out the approach for the assessment of new developments. This technical report provides the method to determine whether a development is air quality neutral by comparing the building and transport emissions likely to be generated by a development against the BEBs and TEBs set out within the SPG. It notes that the building and transport emissions should be calculated separately and not combined. Where developments do not meet these benchmarks, the report suggests that further on-site mitigation measures or off-setting of emissions off-site should be required.

Calculation of the Emissions Benchmarks

The Air Quality Neutral Assessment of the Development has been based on the approach and methodology detailed within the Air Quality Neutral Planning Support Document. The calculations are presented below.

Building Emissions

The total benchmarked building emissions for the Development are presented in **Table B4**. These are calculated by multiplying the floor area for each land use category (as presented in **Table B1**) with the relevant BEB (as presented in **Table B2**) set out within the SPG.

Table B4: Calculation of the Benchmarked Building Emissions for each Land-Use Category

Land Use	GEA	Building Emissions Benchmark (gNO_x/m^2/annum)	Benchmarked Emissions ($kgNO_x$/annum)
Residential (C3)	2,652	26.2	69.5
Office (B1)	1,412	30.8	43.5
Total Benchmarked Building Emissions (NO_x)			**113.0**

Based on the BEBs the calculated total benchmarked building emission for the Development would be 113kgNO_x/annum.

The Development will connect to the heating plant contained within the adjacent Camden Lock Village/Hawley Wharf Masterplan and therefore the Development does not generate any building emissions.

Transport Emissions

The Benchmarked Transport Emissions for the residential element of the Development are calculated by multiplying the number of residential units within the Development (24 units) with the TEBs (as presented in **Table B3**).

The Benchmarked Transport Emissions for the office and retail elements of the Development are calculated by multiplying the relevant gross floor area (m^2) with the TEBs (as presented in **Table B3**).

The total benchmarked transport emissions for the Development are presented in **Table B5**.

Table A5: Calculation of the Benchmarked Transport Emissions for each Land-Use Category

Land Use	Number of units	GEA (m^2)	Transport Emissions Benchmark (g/m^2/annum)		Benchmarked Emissions (kg/annum)	
			NO_x	PM_{10}	NO_x	PM_{10}
Residential (C3)	24	-	558	100	13.4	2.4
Office (B1)	-	1,412	11.4	2.05	16.1	2.9
Total Benchmarked Transport Emissions					**29.5**	**5.3**

As shown in **Table B5**, based on the TEBs, the calculated total benchmarked transport emissions for the Development are 29.5kgNO_x/annum and 5.3kgPM_{10}/annum.

There would be no parking spaces within the Development. As a result the Development would not generate any significant traffic. As a worst-case assumption, it is assumed that the Development would generate additional trips. Details of the trip generation per day for each land-use class have been provided by Arup (the Transport Consultant for the Development). The calculation of the total transport emissions for the residential and commercial components of the Development, as set out within the Air Quality Neutral planning support document, are presented in **Table B6**.

Table B6: Calculation of the Transport Emissions for each Land-Use Category

Land Use	Trips per day	Trips per annum	Average Distance per trip[(a)]	Distance travelled km/annum	Emission Factors (g/vehicle-km)[(b)]	Transport Emission (kg/annum)	
						NO_x	PM_{10}
Residential (C3)	4	1,460	3.7	5,402	NO_x: 0.370 PM_{10}: 0.0665	2.0	0.4
Office (B1)	16	5,840	7.7	44,968		16.6	3.0
Total Transport Emissions						**18.6**	**3.4**

Note: (a) Average distance travelled by car per trip for sites within Inner London.
(b) Emissions factors used as presented in Table 10 of the Air Quality Neutral Planning Support Document

The total Transport Emissions for NO_x (18.6kgNOx/annum) are lower than the Transport Benchmark NO_x Emissions (29.5kgNO_x/annum). Similarly, the Total Transport Emissions for PM_{10} (3.4kgPM_{10}/annum) are lower than the Transport Benchmark PM_{10} Emissions (as 5.3kgPM_{10}/annum). Therefore, the Development is considered to be 'Air Quality Neutral' in relation to transport emissions, and no further mitigation measures would be required.

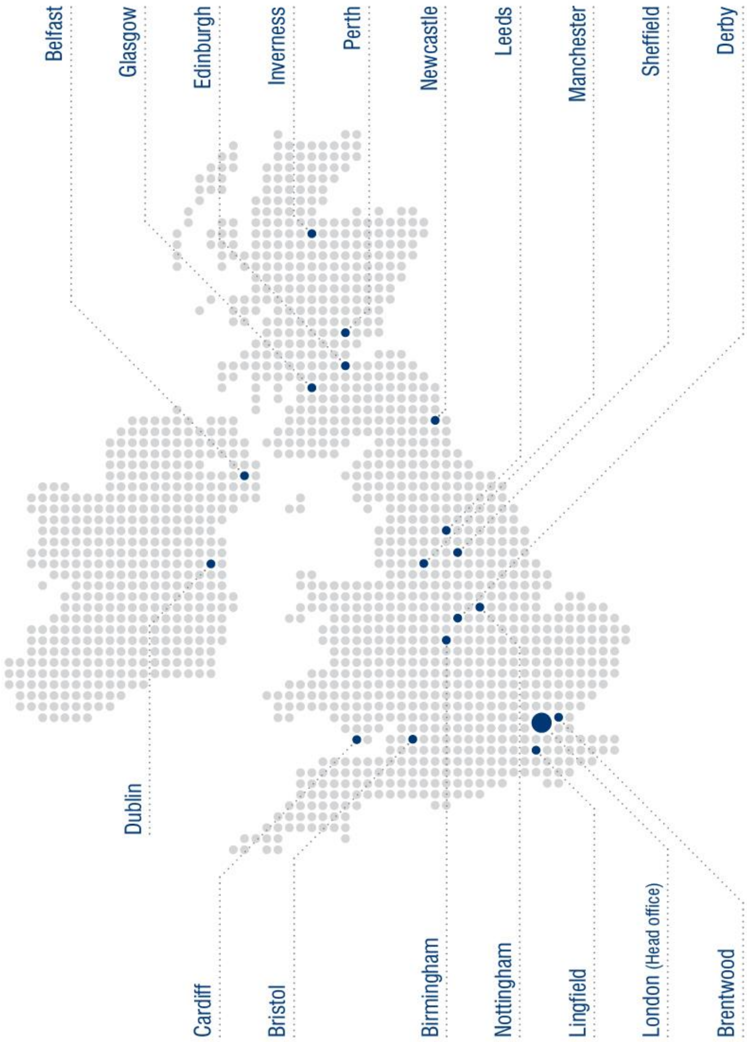
Conclusion

The air quality neutral assessment has identified that the Development is considered to be 'Air Quality Neutral' in relation to transport emissions. The Development will connect to the heating plant contained within the adjacent Camden Lock Village/Hawley Wharf Masterplan and therefore the Development does not generate any building emissions and is considered to be 'Air Quality Neutral'.

References

1 Greater London Authority, 2014, 'Sustainable Design and Construction - Supplementary Planning Guidance', Greater London Authority, London.
2 GLA, 2011; 'The London Plan, Spatial Development Strategy for Greater London'
3 Air Quality Consultants and Environ, 2014, 'Air Quality Neutral Planning Support Update: GLA 80371'

UK and Ireland Office Locations



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