LabTech

Buck Street Market

Air Quality Assessment

Issue | 24 July 2018

Job number 236388-03

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Contents

Tables

Figures

Appendices

Appendix A

Camden air quality planning checklist

Appendix B

Construction dust assessment methodology – supporting material

1 Introduction

Ove Arup & Partners Limited (Arup) has been commissioned by LabTech to undertake an air quality assessment for the proposed development at Buck Street in Camden, London.

This air quality appraisal report includes: a summary of relevant air quality and odour policy and legislation; describes the existing air quality conditions in the vicinity of the site; the methods used to assess likely significant effects; an assessment of the potential impact; and recommended mitigation.

1.1 Description of the Development

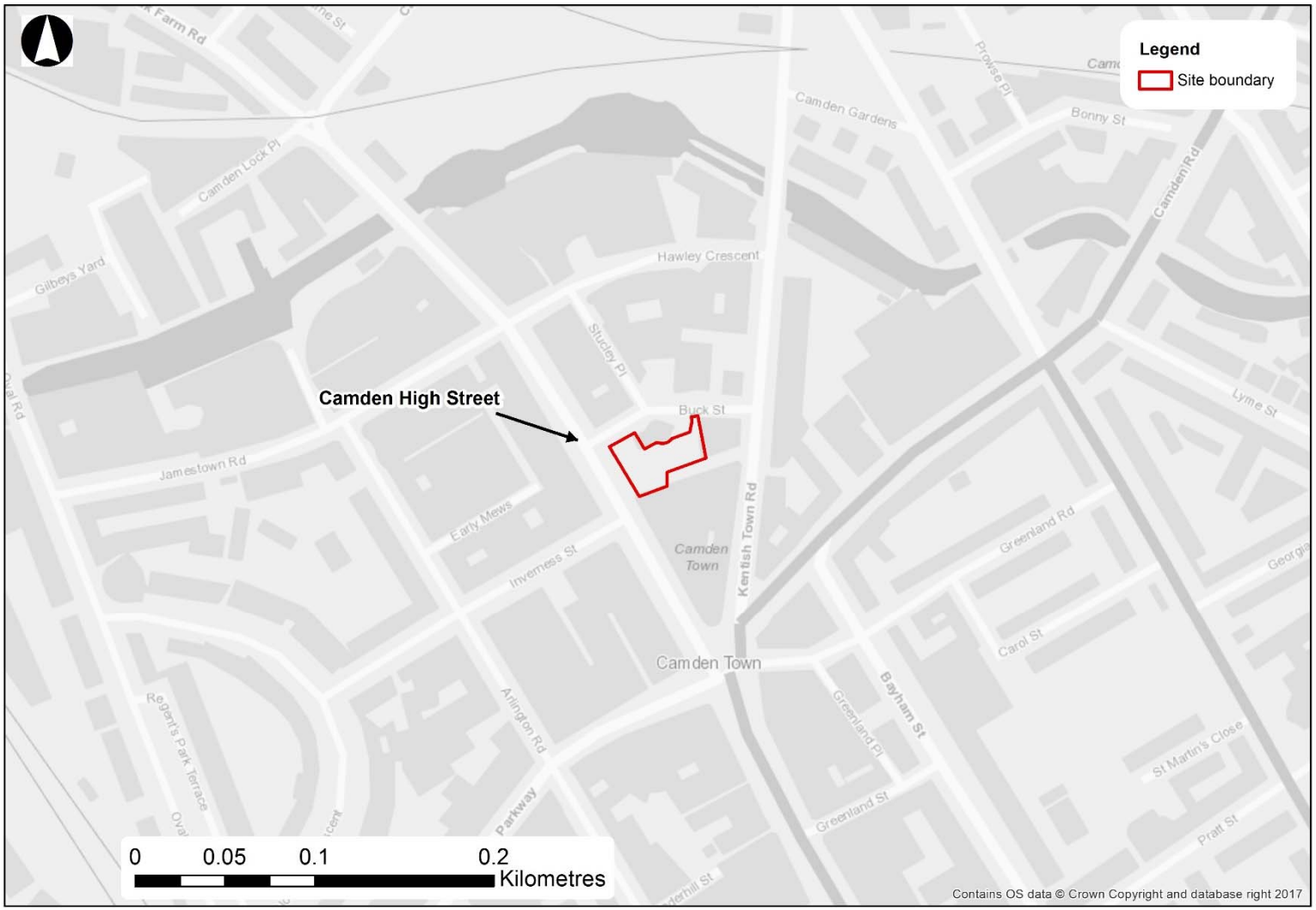
The Union Street Market currently exists as a temporary market, with permission due to expire in 2022. The development proposal is for a temporary scheme to activate the site prior to a permanent scheme being considered.

The proposed development will replace the existing temporary market with an improved temporary market, utilising shipping containers, a solution that provides flexibility given the on-going discussions with Transport for London to create a new Camden Town London Underground station entrance opposite the market on the north side of Buck Street.

The market is situated in a prominent location on Camden High Street and is located near other Camden markets (Camden Lock Market, The Stables Market) and the Hawley Wharf development, currently being constructed.

The proposed development will include retail and food and beverage units. The location of the proposed development is shown in Figure 1.

Figure 1: Location of the proposed development site



2 Air Quality Legislation

2.1 European Air Quality Management

In 1996 the European Commission published the Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC)[1]. This Directive defined the policy framework for 12 air pollutants, including NO_2, known to have harmful effects on human health and the environment. Limit values (pollutant concentrations not to be exceeded by a certain date) for each specified pollutant were set through a series of Daughter Directives, including Directive 1999/30/EC (the 1st Daughter Directive)[2], which sets limit values for nitrogen dioxide (NO_2) and particulate matter (amongst other pollutants) in ambient air.

In May 2008, the Directive 2008/50/EC[3] on ambient air quality and cleaner air for Europe came into force. This Directive consolidates the above (apart from the 4th Daughter Directive) and makes provision for extended compliance deadlines for NO_2 and PM_{10}.

The Directive has been transposed into national legislation in England by the Air Quality Standards Regulations 2010[4]. The Secretary of State for the Environment, Food and Rural Affairs has the duty of ensuring compliance with the air quality limit values.

2.2 Environment Act 1995

Part IV of the Environment Act 1995[5] places a duty on the Secretary of State for the Environment to develop, implement and maintain an air quality strategy with the aim of reducing atmospheric emissions and improving air quality. The national air quality strategy (NAQS) for England, Scotland, Wales and Northern Ireland provides the framework for ensuring compliance with air quality limit values based on a combination of international, national and local measures to reduce emissions and improve air quality. This includes the statutory duty, also under Part IV of the Environment Act 1995, for local authorities to undergo a process of local air quality management and declare Air Quality Management Areas (AQMAs) where necessary.

2.3 Air Quality Objectives and Limit Values

Air quality limit values and objectives are quality standards for clean air. Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment (i.e. effects

[1] Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management
[2] Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air
[3] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
[4] The Air Quality Standards Regulations 2010, SI 2010/1001
[5] Environment Act 1995, Chapter 25, Part IV Air Quality

occur (long-term) after a prolonged period of exposure to elevated concentrations) and others have standards expressed as 24-hour, 1-hour or 15-minute average concentrations (short-term) due to the acute way in which they affect health or the natural environment (i.e. after a relatively short period of exposure). Some pollutants have standards expressed in terms of both long-term and short-term concentrations. Table 1 sets out these EU air quality limit values and national air quality objectives for the pollutants relevant to this study (NO_2 and PM_{10}).

In the majority of cases, the air quality limit values and air quality objectives have the same pollutant concentration threshold and date for compliance. The key difference is that the Secretary of State for the Environment is required under European Law to ensure compliance with the air quality limit values whereas local authorities are only obliged under national legislation to undertake best efforts to comply with the air quality objectives. To assist local authorities in demonstrating best efforts, the Environment Act 1995 requires that when carrying out their local air quality management functions, local authorities shall have regard to guidance issued by the Secretary of State.

Table 1: UK and EU Air quality standards and guidelines

Pollutant	Averaging period	Limit value/objective
Nitrogen dioxide (NO_2)	1 hour mean	200 µg/m^3, not to be exceeded more than 18 times a year (99.79th percentile)
	Annual mean	40 µg/m^3
Particulate matter (PM_{10})	Daily mean	50 µg/m^3, not to be exceeded more than 35 times a year (90.4th percentile)
	Annual mean	40 µg/m^3
Fine particulate matter ($PM_{2.5}$)	Annual mean	25 µg/m^3

2.3.1 Dust Nuisance

Dust is the generic term that the British Standard document BS 6069 (Part Two) used to describe particulate matter in the size range 1 – 75 µm (micrometers) in diameter. Dust nuisance is the result of the perception of the soiling of surfaces by excessive rates of dust deposition. Under provisions in the Environmental Protection Act 1990, dust nuisance is defined as a statutory nuisance.

There are currently no standards or guidelines for dust nuisance in the UK, nor are formal dust deposition standards specified. This reflects the uncertainties in dust monitoring technology, and the highly subjective relationship between deposition events, surface soiling and the perception of such events as a nuisance. In law, complaints about excessive dust deposition would have to be investigated by the local authority and any complaint upheld for a statutory nuisance to occur. However, dust deposition is generally managed by suitable on-site practices and mitigation rather than by the determination of statutory nuisance and/or prosecution or enforcement notice(s).

3 Policy and Guidance

3.1 National Policy and Guidance

The land-use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality consideration that relates to land-use and its development can be a material planning consideration in the determination of planning applications, dependent on the details of the proposed development.

3.1.1 National Planning Policy Framework (2012)

The National Planning Policy Framework[6] (NPPF) was published in March 2012 with the purpose of planning to achieve sustainable development. Paragraph 124 of the NPPF on air quality states that:

> *"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."*

In addition, paragraph 120 states that:

> *"To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area of proposed development to adverse effects from pollution, should be taken into account."*

3.1.2 Planning Practice Guidance (2014)

As part of the NPPF, Planning Practice Guidance (PPG) on various topics was recently published[7]. In relation to air quality, the guidance refers to the significance of air quality assessments to determine the impacts of proposed developments in the area and describes the role of local and neighbourhood plans with regard to air quality. It also provides a flowchart method to assist local authorities to determine how considerations of air quality fit into the development management process.

[6] Department for Communities and Local Government (2012) National Planning Policy Framework
[7] Department for Communities and Local Government (2014) Planning Practice Guidance: Air Quality

3.1.3 Local Air Quality Management Policy and Technical Guidance

Policy guidance note LAQM.PG(16)[8] provides additional guidance on the links between transport and air quality. LAQM.PG(16) 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.

LAQM.PG(16) 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 problems and create strategies to improve air quality. It summarises the main ways in which the land use planning system can help deliver compliance with the air quality objectives.

LAQM.TG(16)[9] provides guidance to local authorities and air quality practitioners on all levels of air quality modelling and assessment. Where relevant, this guidance has been taken into account.

3.2 Regional Policy and Guidance

3.2.1 The London Plan

The London Plan, consolidated with alterations in 2016[10], forms part of the development strategy for the Greater London Authority (GLA) until 2036 and integrates all economic, environmental, transport and social frameworks. This has been amended to be consistent with the NPPF. Specifically, for new development proposals the London Plan looks at air quality by proposing the following measures:

- minimise increased exposure to existing poor air quality and make provisions to address local problems of air quality, through means such as design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans;
- promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following best practice guidance;
- developments should be at least ‘air quality neutral’ and not lead to further deterioration of existing poor air quality (such as areas designated as AQMAs);

[8] Defra (2016) Local Air Quality Management Policy Guidance PG(16).
[9] Defra (2016) Local Air Quality Management Technical Guidance TG(16).
[10] Greater London Authority (2016) The London Plan: The Spatial Development Strategy for London Consolidated With Alterations Since 2011

- ensure that where provision is needed to reduce emissions from a development, this is usually made on-site; and
- where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations.

These policies have been considered throughout this air quality assessment.

3.2.2 Sustainable Design and Construction Supplementary Planning Guidance

Supplementary Planning Guidance (SPG) for Sustainable Design and Construction[11] was published in April 2014 by the GLA. Section 4.3 of the SPG focuses on air pollution and provides guidance on when assessments should be undertaken and how intelligent design can help to minimise the effect of a development on local air quality. The primary way in which the guidance aims to minimise air quality impacts is by setting an 'air quality neutral' policy for buildings, as well as emissions standards for combustion plants. The air quality neutral policy sets benchmarks against which the annual emissions of nitrogen oxides (NOx) and PM_{10} from combustion plant of a proposed development should be assessed.

Emission standards for combustion plants are also outlined in the SPG for individual and/or communal gas boilers and for biomass boilers and CHP plants with a thermal input greater than $50kW_{th}$.

The GLA SPG guidance states that:

"Where individual and/or communal gas boilers are installed in commercial and domestic buildings they should achieve a NOx rating of <40 mgNOx/kWh."

3.2.3 London Local Air Quality Management Technical Guidance

The London Local Air Quality Management technical guidance (LLAQM.TG(16))[12] applies only to London's 32 boroughs (and the City of London), whilst LAQM.TG(16) applies to all other UK local authorities. Although the LLAQM.TG(16) technical guidance is largely based on the updated national guidance LAQM.TG(16), it does incorporate London-specific elements of the LAQM system.

This guidance is designed to support London authorities in carrying out their duties to review and assess air quality in their area. Where relevant, this guidance has been taken into account.

[11] Greater London Authority (2014) Sustainable Design and Construction Supplementary Planning Guidance
[12] Greater London Authority (2016) London Local Air Quality Management Technical Guidance TG (16).

3.3 Local Policy and Guidance

3.3.1 The London Borough of Camden

The London Borough of Camden (LBC)'s 2016 Local Plan[13], adopted in 2017, discussed air quality in several policies:

Policy A1 Managing the impact of development

"The Council will seek to protect the quality of life of occupiers and neighbours. We will grant permission for development unless this causes unacceptable harm to amenity."… "The factors we will consider include:" "… odour, fumes and dust;"

Policy CC4 Air Quality

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

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

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

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

The LBC also provides further details on their website of when an AQA is deemed necessary and the information that is expected to be included. For a basic AQA, this includes:

- a review of air quality around the development site using existing air quality monitoring and/or modelling data;
- an assessment of the impact on air quality during the construction phase and detailed mitigation methods for controlling dust and pollution emissions associated with plant and vehicles;
- an indication of the number of receptors that will be exposed to poor air quality as a result of the development, with the locations shown on a map;

[13] Camden Local Plan (2017) adopted 2017, https://www.camden.gov.uk/ccm/cms-service/stream/asset/?asset_id=3655163& [accessed June 2018]

- the significance of air pollution exposure should be quantified in accordance with the "Air Quality Impact Significance Criteria – New Exposure" outlined in the NSCA Guidance Note;
- an outline and justification of mitigation measures associated with the design, location and operation of the development in order to reduce air pollution and exposure to poor air quality. Where a proposed development is in an area of poor air quality it is essential to demonstrate that from the earliest stages, the building has been designed to reduce occupant exposure. This includes consideration of orientation, elevation of residences, and the use of green infrastructure such as green walls, screens and trees.

In addition, for a detailed AQA, the following should be included:

- air quality dispersion modelling data carried out in accordance with the London Councils Air Quality and Planning Guidance[14];
- an indication of the number of receptors that will be exposed to poor air quality as a result of the development, with their locations shown on a map;
- the significance of air pollution exposure should be quantified in accordance with the "Air Quality Impact Significance Criteria – New Exposure" outlined in the NSCA Guidance Note;
- an outline and justification of mitigation measures associated with the design, location and operation of the development in order to reduce air pollution and exposure to poor air quality. Where a proposed development is in an area of poor air quality it is essential to demonstrate that from the earliest stages, the building has been designed to reduce occupant exposure. This includes consideration of orientation, elevation of residences, and the use of green infrastructure such as green walls, screens and trees.

In addition, an air quality planning checklist is provided by LBC, which is shown in Appendix A.

3.4 Other Relevant Policy and Guidance

3.4.1 Institute of Air Quality Management Dust Guidance

The Institute of Air Quality Management (IAQM) guidance[15] provides guidance to development consultants and environmental health officers on how to assess air quality impacts from construction. The IAQM guidance provides a method for classifying the significance of effect from construction activities based on the 'dust magnitude' (high, medium or low) and proximity of the proposed development to the closest receptors. The guidance recommends that once the significance of effect from construction is identified, the appropriate mitigation measures are implemented. Experience has shown that once the appropriate

[14] London Councils, 2007. Air Quality and Planning Guidance. Accessed: June 2018. Available at: https://www.londoncouncils.gov.uk/our-key-themes/environment/air-quality/london-councils-air-quality-and-planning-guidance

[15] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction (Version 1.1)

mitigation measures are applied, in most cases the resulting dust impacts can be reduced to negligible levels.

The method outlined for dust assessment is the same as in the GLA Control of Dust and Emissions during Construction and Demolition SPG[10] and therefore the IAQM methodology has been considered in this assessment.

3.4.2 EPUK/IAQM Land-use Planning and Development Control

The 2017 Land-Use Planning & Development Control guidance document[16] produced by Environmental Protection UK (EPUK) and the IAQM provides a framework for professionals operating within the planning system to provide a means of reaching sound decisions, with regard to the air quality implications of development proposals.

The document provides guidance on when air quality assessments are required by providing screening criteria regarding the size of a development, changes to traffic flows/composition energy facilities or combustion processes associated with the development.

3.5 Odour Regulation and Guidance

3.5.1 Regulation

Generally, kitchen vents are not regulated under environmental legislation. At the planning stage the arrangements for ventilation will be examined to ensure compliance with building regulations. In addition, at planning, it is likely that the local environmental health officer would wish to be satisfied that a new vent would not give rise to a statutory nuisance under the Environmental Protection Act.

Kitchen ventilation systems are regulated under Health and Safety and Food Hygiene legislation and generally require that kitchens are provided with sufficient air to maintain a safe working environment. As a result, many kitchens have automatic systems that shut down the cooking appliances if the ventilation system fails.

3.5.2 Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems

The Department of Environment, Food and Rural Affairs (Defra) has published various guidance on odours but withdrew all of these documents in September 2017. However, Defra has not replaced any of these with new guidance and there is no indication if any of the guidance will be replaced. Some of this guidance remains useful to making an assessment and is discussed below.

[16] EPUK/IAQM, (2017) Land-Use Planning & Development Control: Planning for Air Quality

Defra produced guidance on the Control on Odour and Noise from Commercial Kitchen Exhaust Systems in January 2005[17]. This guidance notes that odour is the response of our brains to chemicals in the atmosphere that we breathe. The human nose is very sensitive to odour and can detect the presence of some chemicals at very low concentrations that would be difficult for instruments to measure. The environment is rarely "odour free", even in places that are perceived to be clean such as rural areas or by the sea. Our response to odours depends on four interlinked (sensory) characteristics:

- Hedonic tone: this is a judgement of the relative pleasantness or unpleasantness of an odour made by assessors in an odour panel;
- Quality/Characteristics: this is a qualitative attribute which is expressed in terms of "descriptors", e.g. "fruity", "almond", "fishy". This can be of use when establishing an odour source from complainants' descriptions;
- Concentration: the "amount" of odour present in a sample of air. It can be expressed in terms of parts per million, parts per billion or in mg/m^3 of air for a single odorous compound. More usually a mixture of compounds is present and the concentration of the mixture can be expressed in odour units per cubic metre (ou_E/m^3) (see definition below); and
- Intensity: is the magnitude (strength) of perception of an odour (from faint to strong). Intensity increases as concentration increases but the relationship is logarithmic. Increases or decreases in concentration of an odour do not always produce a corresponding proportional change in the odour strength as perceived by the human nose.

The most commonly used attribute is the concentration of odours; this is measured in European odour units (ou_E/m^3). The concentration is measured by olfactometry, which involves using a device known as an olfactometer where a sample of odour is presented at different dilutions to a trained panel. The panel is asked whether they are able to detect the odour at various concentrations. Once only 50% of the panel can detect the odour it is considered to be at its "Detection Threshold". The odour concentration at the Detection Threshold is defined to be 1 ou_E/m^3. For instance, if an odour sample has been diluted in an olfactometer by a factor of 10,000 to reach the detection threshold, then the concentration of the original sample is 10,000 ou_E/m^3.

Defra noted in recent general guidance[18] that 5 ou_E/m^3 would be a 'faint' odour whilst 10 ou_E/m^3 would be considered a 'distinct' odour. Generally, an average person would be able to recognise the source of an odour at about 3 ou_E/m^3 although this can depend on the relative offensiveness of the odour. Background odour levels can be 5-60 ou_E/m^3 or more.

This guidance notes that the main issue with odour is its ability to result in an effect that is "objectionable". The guidance notes that an offensive odour can occur at concentrations of compounds that are far below the level that would result in an effect on the physical health of humans.

[17] Defra, Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems, January 2005 (withdrawn September 2017).
[18] Defra, Odour Guidance for Local Authorities, March 2010 (withdrawn September 2017).

The Defra kitchen guidance[17] notes that there are three factors that influence the production of odour from a commercial kitchen:

- Size of the facility – This influences the volume of ventilation air handled and the intensity of the odour;
- Type of food prepared – This affects the chemical constituents in the ventilation air; and
- Type of cooking appliances used – This dictates the level of fat, water and the temperature of the ventilation air.

In general, the amount of odour released depends on the amount of oil/grease in the vented air and the quantities of spices used in the cooking. Hence deep fat frying and open grills and the cooking of more highly spiced food result in the highest odour releases.

The guidance notes that existing premises should have systems designed to comply with the principles of Best Practical Means and these should be achieved with an adequate level of odour control and stack dispersion. It notes that the discharge stack should ideally be located at least 1m above the roof ridge or not less than 1m above the roof eaves (in the latter case, additional odour control measures may be required). Where this cannot be achieved, then odours need to be reduced by control equipment and the guidance details how different levels of mitigation can be achieved to allow a low level ventilation system to work successfully.

The general guidance on odour issued by Defra also contains information on odour assessment but, whilst this contains useful background information and guidance, it refers back to the Kitchen Ventilation guidance[17] in the case of restaurant odour.

3.5.3 IAQM Odour Guidance

The Institute of Air Quality Management (IAQM) produced guidance in 2014[19] with the specific intention to provide advice for "assessing odour impacts for planning purposes". It recommends various assessment techniques including the use of a Source, Pathway, Receptor (SPR) model.

[19] Bull M, IAQM, Guidance on the assessment of odour for planning, May 2014.

4 Methodology of Assessment

4.1 Scope of Assessment

The overall approach to the air quality assessment comprises:

- A review of the existing air quality conditions at, and in the vicinity of, the proposed development;
- An assessment of the potential changes in air quality arising from the construction and operation of the proposed development;
- Air quality neutral assessment as required by the GLA SPG;
- Formulation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised; and
- Completion of the Camden air quality assessment checklist (Appendix A).

4.2 Methodology of Baseline Assessment

Existing or baseline ambient air quality refers to the concentration of relevant substances that are already present in the environment. These are present from various sources, such as industrial processes, commercial and domestic activities, traffic and natural sources.

A desk-based review of the following data sources has been undertaken to determine baseline conditions of air quality in this assessment:

- Local authority review and assessment reports and local air quality monitoring data[20],[21] ;
- London Air website[22];
- The Defra Local Air Quality Management website[23];
- The UK Air Information Resource website[24]; and
- The Environment Agency website[25].

This review identified the main sources of air pollution within 2km of the proposed development, the local air quality monitoring data for recent years and local background pollutant concentrations.

[20] London Borough of Camden, 2016. Annual Status Report.
[21] Camden Council. https://opendata.camden.gov.uk/Environment/Air-Quality-Monitoring-Diffusion-Tube/gy6e-i4w6/data [Accessed June 2018]
[22] LondonAir website, https://www.londonair.org.uk/LondonAir/Default.aspx; [Accessed: June 2018]
[23] Defra Local Air Quality Management website; http://laqm.defra.gov.uk/; [Accessed: June 2018]
[24] Defra, http://uk-air.defra.gov.uk, [Accessed June 2018]
[25] Environment Agency website; https://environment.data.gov.uk/public-register/view/search-industrial-installations ; [Accessed: June 2018]

4.3 Methodology of Construction Phase Assessment

The development will include construction but no demolition. The IAQM[15] and GLA dust guidance[11] has been used to assess the impacts from dust on local sensitive receptors.

Construction related traffic has the potential to impact local concentrations of pollutants. Therefore, construction traffic has been screened using EPUK criteria[9] to determine an appropriate level of assessment.

The assessment will focus on changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations resulting from the proposed development during construction. These are the relevant pollutants for which air quality objectives and EU limit values are set in legislation.

4.3.1 Construction Dust Assessment

The effects from construction have been assessed using the qualitative approach described in the latest guidance by the IAQM[15] and GLA[11].

An 'impact' is described as a change in pollutant concentrations or dust deposition, while an 'effect' is described as the consequence of an impact. The main impacts that may arise during construction of the proposed development are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes; and
- Elevated PM_{10} concentrations as a result of dust generating activities on site.

The IAQM guidance considers the potential for dust emissions from dust-generating activities, such as demolition of existing structures, earthworks, construction of new buildings and trackout. Earthworks refer to the processes of soil stripping, ground levelling, excavation and land capping, while trackout is the transport of dust and dirt from the site onto the public road network where it may be deposited and then re-suspended by vehicles using the network. This arises when vehicles leave the site with dusty materials, which may then spill onto the road, or when they travel over muddy ground on site and then transfer dust and dirt onto the public road network.

For each of these dust-generating activities, the guidance considers three separate effects:

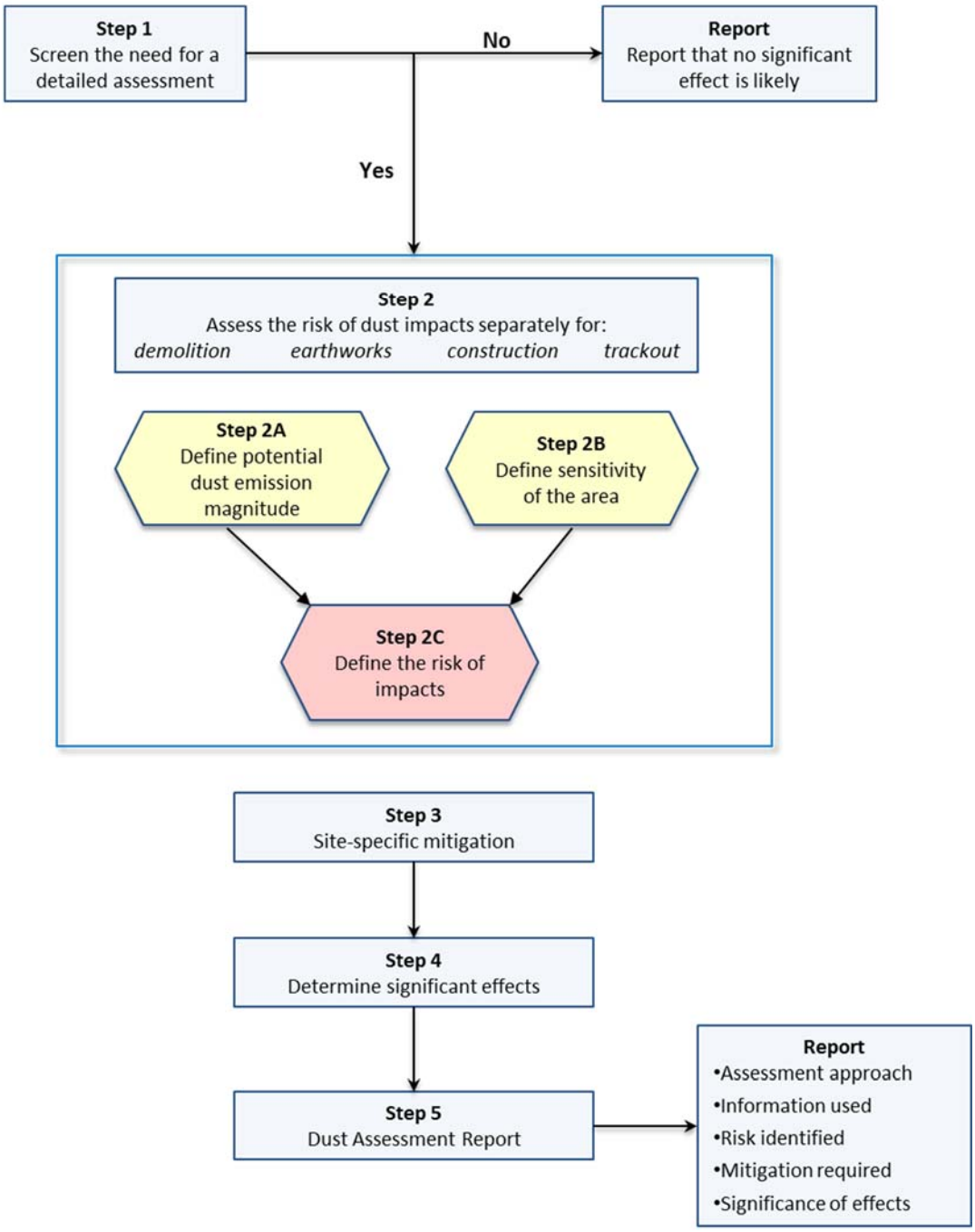
- Annoyance due to dust soiling;
- Harm to receptors; and
- The risk of health effects due to a significant increase in PM_{10} exposure.

The receptors can be human or ecological and are selected based on their sensitivity to dust soiling and PM_{10} exposure. Sensitive receptors are defined as those properties/schools/hospitals that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction of the proposed development.

The methodology takes into account the scale to which the above effects are likely to be generated (classed as small, medium or large), along with the levels of background PM_{10} concentrations and the distance to the closest receptor, in order to determine the sensitivity of the area. This is then taken into consideration when deriving the overall risk for the site. Suitable mitigation measures are also proposed to reduce the risk of impacts from the site.

There are five steps in the assessment process described in the IAQM guidance. These are summarised in Figure 2 and further description is provided in the following paragraphs.

Figure 2: IAQM dust assessment methodology



Step 1: Need for Assessment

The first step is the initial screening for the need for a detailed assessment. According to the IAQM guidance, an assessment is required where there are sensitive receptors within 350m of the site boundary (*for ecological receptors this is 50m*) and/or within 50m of the route(s) used by the construction vehicles on the public highway and up to 500m from the site entrance(s).

Step 2: Assess the Risk of Dust Impacts

This step is split into three sections as follows:

- 2A. Define the potential dust emission magnitude;
- 2B. Define the sensitivity of the area; and
- 2C. Define the risk of impacts.

Each of the dust-generating activities is given a dust emission magnitude depending on the scale and nature of the works (step 2A) based on the criteria shown in Table 24 (Appendix B1).

The sensitivity of the surrounding area is then determined (step 2B) for each dust effect from the above dust-generating activities, based on the proximity and number of receptors, their sensitivity to dust, the local PM_{10} background concentrations and any other site-specific factors. Table 25- Table 27 (Appendix B2-Appendix B4) show the criteria for defining the sensitivity of the area to different dust effects.

The overall risk of the impacts for each activity is then determined (step 2C) prior to the application of any mitigation measures (Table 28, Appendix B5) and an overall risk for the site derived.

Step 3: Determine the Site-Specific Mitigation

Once each of the activities is assigned a risk rating, appropriate mitigation measures are identified. Where the risk is negligible, no mitigation measures beyond those required by legislation are necessary.

Step 4: Determine any Significant Residual Effects

Once the risk of dust impacts has been determined and the appropriate dust mitigation measures identified, the final step is to determine whether there are any residual significant effects. The IAQM guidance notes that it is anticipated that with the implementation of effective site-specific mitigation measures, the environmental effect will not be significant in most cases.

Step 5: Prepare a Dust Assessment Report

The last step of the assessment is the preparation of a dust assessment report. This forms part of this report (see Section 6).

4.3.2 Construction Traffic

A screening assessment has been undertaken using the indicative criteria contained in the EPUK/IAQM land-use guidance[9] to determine the potential local air quality effects associated with the potential trip generation as a result of the operational phase on the proposed development.

As the proposed development lies in an AQMA, the following criteria have been used to determine whether a detailed air quality assessment is likely to be considered necessary for construction traffic:

- A change of Light Duty Vehicle (LDV) flows of more than 100 Annual Average Daily Traffic (AADT) movements; and

- A change of Heavy Duty Vehicle (HDV) flows of more than 25 AADT movements.

Meeting either of the criteria would indicate that detailed dispersion modelling of the road traffic emissions would be necessary.

Information provided by Arup transport consultants in the Servicing Management Plan (SMP)[26] indicates that there will not be a significant construction traffic component to the construction phase of the proposed development. It is understood from Arup transport consultants that the volume of construction traffic would not exceed the EPUK/IAQM criteria outlined above.

4.4 Method of Operational Phase Assessment

Operational air quality impacts from the proposed development could arise because of traffic changes along the local road network.

4.4.1 Operational Traffic Emissions

The roads surrounding the proposed development have the potential to impact air quality as a result of operational traffic exhaust emissions of NOx and fine particulate matter. A screening assessment has been undertaken using the EPUK/IAQM land-use guidance[9] criteria outlined above in section 4.3.2, to determine the potential local air quality effects associated with the potential trip generation as a result of the operational phase on the proposed development.

The screening criteria are detailed above in section 4.3.2.

The trip generation for the proposed development was provided by Arup transport consultants and is detailed in the SMP[26]. The estimated number of daily deliveries for the container scheme is 14 deliveries, which equates to 28 trips a day. As these deliveries would be undertaken in a range of vehicles comprising a mix of LDVs and HGVs, this change in traffic does not exceed the criteria outlined in section 4.3.2 so an assessment of operational traffic emissions has been scoped out of the assessment.

4.4.2 Combustion Emissions

Within the current design of the proposed development, there are no gas boilers or CHPs. Therefore an assessment of combustion emissions has been scoped out of this assessment. Should any gas boilers or CHPs be proposed at later stages of the design, then an assessment would be required.

4.5 Significance Criteria

The 2017 EPUK/IAQM guidance note ‘Land-Use Planning & Development Control’ provides an approach to determining the air quality impacts resulting

[26]Arup, 2018. Servicing Management Plan (SMP).

from a proposed development and the overall significance of local air quality effects arising from a proposed development.

Firstly, impact descriptors are determined based on the magnitude of incremental change as a proportion of the relevant assessment level, in this instance the annual mean NO_2, PM_{10}, and $PM_{2.5}$ objectives. The change is then examined in relation to the predicted total pollutant concentrations in the assessment year and its relationship with the annual mean NO_2, PM_{10}, and $PM_{2.5}$ objectives.

The assessment framework for determining impact descriptors at each of the assessed receptors is shown in Table 2.

Table 2 Impact descriptors

Annual average concentrations at receptor in the assessment year	**% Change in concentrations relative to annual mean NO_2 and PM_{10} objectives**			
	1	**2-5**	**6-10**	**>10**
75% or less of objective	Negligible	Negligible	Slight	Moderate
76-94% of objective	Negligible	Slight	Moderate	Moderate
95-102% of objective	Slight	Moderate	Moderate	Substantial
103-109% of objective	Moderate	Moderate	Substantial	Substantial
110% of more of objective	Moderate	Substantial	Substantial	Substantial
Note: Changes in pollutant concentrations of less than 0% i.e. <0.5% would be described as negligible				

The guidance also provides advice for determining the magnitude of change for hourly mean NO_2 concentrations, which is shown in Table 3. The impact descriptor is determined by considering the process contribution only. However, in assessing the significance, consideration is also given to total pollutant concentrations, including background concentrations, and comparison of these with the hourly mean NO_2 objective.

Table 3 Magnitude of change for hourly mean NO_2 concentrations

Change in hourly mean concentrations at receptor in the assessment year	**Magnitude of Change**	**Impact Descriptor**
<10% of hourly mean NO_2 threshold	Imperceptible	Negligible
10-20% of hourly mean NO_2 threshold	Small	Slight
20-50% of hourly mean NO_2 threshold	Medium	Moderate
>50% of hourly mean NO_2 threshold	Large	Substantial

The impact descriptors at each of the assessed receptors can then be used as a starting point to making a judgement on the overall significance of effect of a proposed development, however other influences would also need to be taken into account, such as:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and

- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

Professional judgement should be used to determine the overall significance of effects of the proposed development, however in circumstances where the proposed development can be judged in isolation, it is likely that a 'moderate' or 'substantial' impact will give rise to a significant effect and a 'negligible' or 'slight' impact will not result in a significant effect.

4.6 Methodology of the Air Quality Neutral Assessment

An Air Quality Neutral Assessment has been undertaken as required by the Sustainable Design and Construction SPG[11].

Transport Emission Benchmarks (TEBs) and Building Emission Benchmarks (BEBs) have been set for NO_x according to the land-use classes of the proposed development. These are presented in Table 4. The proposed development is located in the Central Activities Zone (CAZ), benchmarks for the CAZ are included in Table 4**.**

In order to calculate the emissions from the proposed development and apply the TEBs and BEBs, the following information is required:

- Gross floor area (GFA) (m^2);
- Proposed development trip rates (trips/dwelling/annum); and
- Annual NO_x emission rates from plant included in the proposed development.

NO_x and PM_{10} emissions (kg/annum) for each land-use class in a development need to be calculated and summed to give the total transport and building emissions. The TEBs and BEBs for the development are then subtracted from the total transport emissions and total building emissions for the development. Should the outcome be negative, this indicates that the transport and building emissions from the development are within the benchmark, and no mitigation or offsetting would be required.

Retail land use classes A3 to A5 have benchmarks in trip rates rather than a TEB. Land use class A5 does not have a trip rate benchmark for the CAZ.

Table 4: Air quality neutral emissions benchmarks

Land-use class	Transport (CAZ)		Building
	NOx (g/m²/annum)	Trip rates (trips/m²/annum)	NOx (g/m²/annum)
A1 Retail	169	-	22.6
A3 Retail	-	153	75.2
A5 Retail	-	-	75.2
	PM_{10} (g/m²/annum)		PM_{10} (g/m²/annum)
A1 Retail	29.3		1.29
A3-A5 Retail	-		4.3

4.7 Kitchen Ventilation

Annex C of the Defra odour guidance[17] provides a risk assessment framework for odour (see Table 5 below). This examines four factors - the location of the exhaust vent, the proximity of sensitive receptors, the size of the kitchen and the type of food cooked and allocates a score to give an overall risk rating from three possible levels Low to Medium, High and Very High.

Table 5: Defra guidance risk assessment framework

Criteria	Score	Score	Details
Dispersion	Very poor	20	Low level discharge, discharge into courtyard or restriction on stack
	Poor	15	Not low level but below eaves, or discharge at below 10 m/s
	Moderate	10	Discharging 1m above eaves at 10-15 m/s
	Good	5	Discharging 1m above ridge at 15 m/s
Proximity of receptors	Close	10	Closest sensitive receptor less than 20m from kitchen discharge
	Medium	5	Closest sensitive receptor between 20 and 100m from kitchen discharge
	Far	1	Closest sensitive receptor more than 100m from kitchen discharge
Size of kitchen	Large	5	More than 100 covers or large take away
	Medium	3	Between 30-100 Covers or medium takeaway
	Small	1	Less than 30 covers or small take away
Cooking type (odour and grease loading)	Very high	10	Pub (high level of fried food), fried chicken, burgers or fish and chips.
	High	7	Kebab, Vietnamese, Thai or Indian
	Medium	4	Cantonese, Japanese or Chinese
	Low	1	Most pubs, Italian, French, Pizza or Steakhouse

Each of the four factors is scored according to the criteria above and a total "significance score" obtained. This score is used to assess the level of odour control required for the particular situation as shown in Table 6.

Table 6: Risk assessment framework significance

Impact risk	Odour control requirement	Significance score
Low to Medium	Low level odour control	Less than 20
High	High level odour control	20-35
Very High	Very high level odour control	More than 35

4.7.1.1 IAQM Guidance

The Institute of Air Quality Management (IAQM) odour guidance[19] recommends various assessment techniques including the use of a 'Source, Pathway, Receptor' (SPR) model. The risk of an adverse odour impact is determined by examining the source characteristics, how effectively the odours can travel from the Source to a receptor (i.e. the Pathway) and examining the sensitivity of the Receptor. Example risk factors are shown in Table 7. This method has been applied to the Proposed Development.

Table 7 IAQM source pathway receptor approach

Source Odour Potential	Pathway Effectiveness	Receptor
Factors affecting the source odour potential include: • The magnitude of the odour release • How inherently odorous the compounds are • The unpleasantness of the odour	Factors affecting the odour flux to the receptor are: • Distance from source to receptor • The frequency of winds from source to receptor • The effectiveness of any mitigation in reducing flux to the receptor • The effectiveness of dispersion/dilution in reducing the odour flux to the receptor • Topography and terrain	Use professional judgement based on the expectation of the users at the receptor location.

5 Baseline Assessment

5.1 Sources of Air Pollution

5.1.1 Industrial Processes

Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met, and ensuring that any releases to the environment are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A or Part B processes, and are regulated through the Pollution Prevention and Control (PPC) system[27,28]. The larger, more polluting processes are regulated by the Environment Agency (EA), and the smaller less polluting ones by the local authorities. Local authorities focus on regulation for emissions to air, whereas the EA regulates emissions to air, water and land.

There are no regulated Part A processes with releases to air relevant to this assessment within 3km of the proposed development listed on the EA website[25]. Any impact of emissions from Part B processes and Part A processes further away from the site are assumed to be represented in the background concentrations used, and therefore have been taken into account in the assessment.

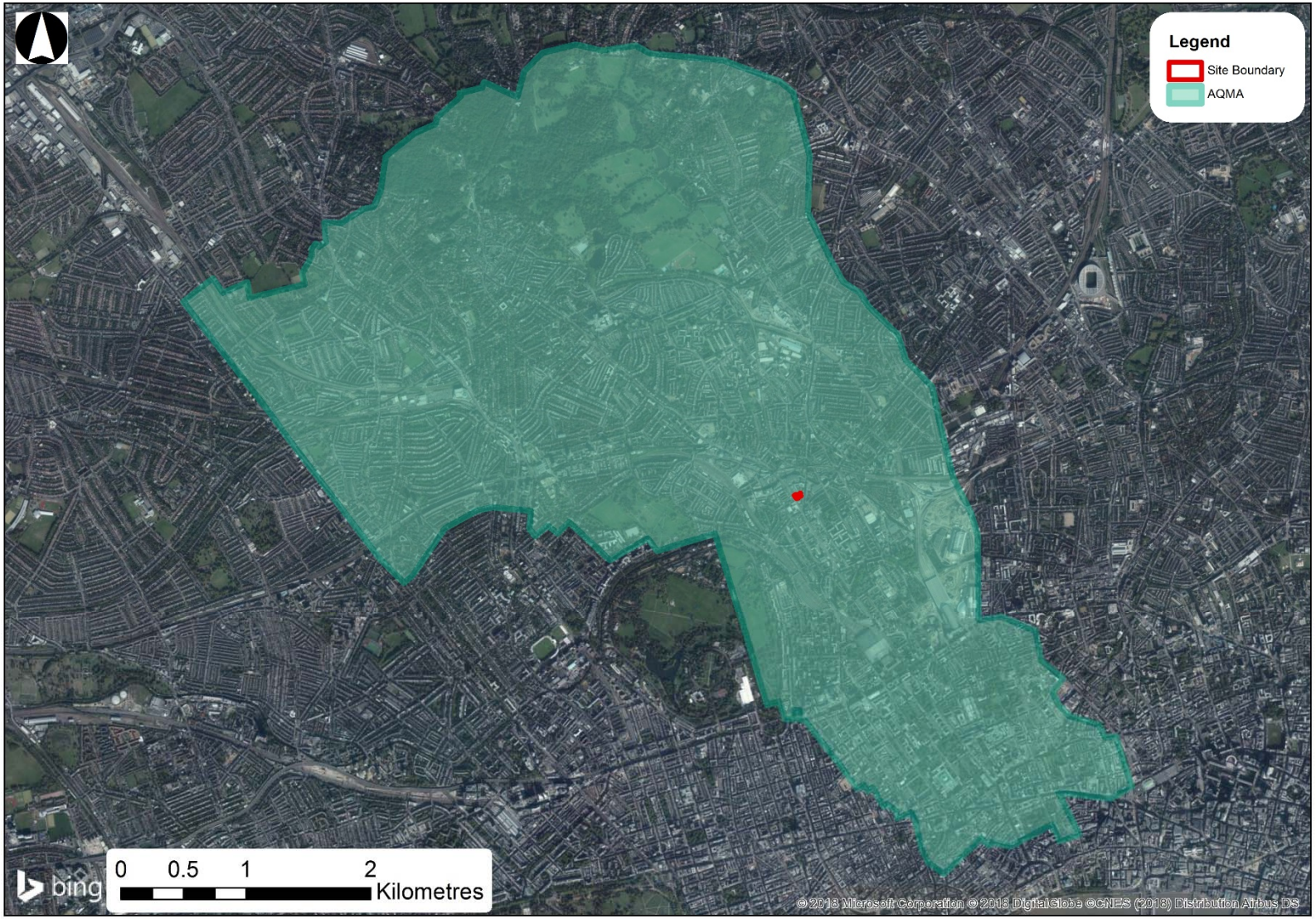
5.2 Local Air Quality

The Environment Act 1995 requires local authorities to review and assess air quality with respect to the air quality objectives for the pollutants specified in the National Air Quality Strategy. Local authorities are required to carry out an Annual Status Report (ASR) of their area every three years. If the ASR identifies potential hotspot areas likely to exceed air quality objectives, then a detailed assessment of those areas is required. Where objectives are not predicted to be met, local authorities must declare the area as an Air Quality Management Area (AQMA). In addition, local authorities are required to produce an Air Quality Action Plan (AQAP) that includes measures to improve air quality within the AQMA.

As part of the review and assessment process, LBC declared the whole borough an AQMA in 2000 due to exceedances of the annual mean objective for NO_2 and the daily mean objective for PM_{10}. Figure 3 shows the declared LBC AQMA.

[27] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)
[28] The Environmental Permitting (England and Wales) (Amendment) Regulations 2013, SI 2013/390

Figure 3: LBC AQMA



5.3 Local Monitoring

LBC undertake both automatic and passive monitoring. All monitoring within a 2km radius of the proposed development is described in the following paragraphs. This includes monitoring in LBC and the London Borough of Islington (LBI).

5.3.1 Automatic Monitoring

Automatic or continuous monitoring involves continuously drawing air in through an analyser to obtain near real-time pollutant concentration data. A review of the relevant ASRs[20,21] and of the London Air website[22] showed that within 2km of the proposed development there is one continuous monitor, which is Euston Road (CD9), a roadside site. In addition, London Bloomsbury (LB) is an urban background site within 2.3km of the proposed development and is included in this assessment to provide an automatic monitoring background concentration. The details of these automatic monitoring sites are presented in Table 8, and their locations are shown in Figure 4. There are no automatic monitoring sites in LBI within 2km of the proposed development.

Recent NO_2 monitoring results from 2014 to 2016 are shown in Table 9. Both LB and CD9 exceeded annual mean objectives for NO_2 each year from 2014 to 2016, with CD9 recording over double the annual mean objective (88.0µg/m^3) in 2016. In 2015 and 2016, a decreasing trend is evident at both sites.

There were no exceedances of the NO_2 1 hour mean objective (exceeding 200µg/m^3 more than 18 times a year) at the LB site. However, at the CD9 site there were 170, 54 and 39 exceedances in 2014, 2015 and 2016 respectively.

Table 8: Details of automatic monitoring sites within ~ 2km of the proposed development

Site ID	Site location	OS grid reference		Site type	Distance to kerb of nearest road (m)
		X	Y		
LB	London Bloomsbury	530120	182034	Urban background	27
CD9	Euston Road	529878	182648	Roadside	0.5

Table 9: Automatic annual mean NO_2 monitoring results 2014 - 2016

Site ID	Site location	NO_2 annual mean concentration ($\mu g/m^3$)			NO_2 1-hour mean exceedances		
		2014	2015	2016	2014	2015	2016
LB	London Bloomsbury	**45.0**	**48.0**	**42.0**	0	0	0
CD9	Euston Road	**98.0**	**91.0**	**88.0**	**170**	**54**	**39**
Air quality objective		40 $\mu g/m^3$			200 $\mu g/m^3$, not to be exceeded more than 18 times a year (99.79th percentile)		
Note: Exceedances are highlighted in bold.							

Table 10 presents the recent PM_{10} monitoring results from 2014 to 2016. There were no exceedances of the PM_{10} annual mean air quality objective or the 24 hour objective at sites LB or CD9.

Table 10: Automatic annual mean PM_{10} monitoring results 2014 - 2016

Site ID	Site location	PM_{10} annual mean concentration ($\mu g/m^3$)			PM_{10} 24-hour mean exceedances		
		2014	2015	2016	2014	2015	2016
LB	London Bloomsbury	20	19	20	11	6	9
CD9	Euston Road	22	28	24	5 (44*)	18	10
Air quality objective		40 $\mu g/m^3$			50 $\mu g/m^3$, not to be exceeded more than 35 times a year (90.4th percentile)		
Note: * if data capture is less than 90%, the 90th percentile of the 24-hour mean is included in brackets							

Table 11 presents the recent $PM_{2.5}$ monitoring results from 2014 to 2016. There were no exceedances of the $PM_{2.5}$ annual mean air quality objective at either of the sites LB or CD9.

Table 11: Automatic annual mean $PM_{2.5}$ monitoring results 2014 - 2016

Site ID	Site location	$PM_{2.5}$ annual mean concentration ($\mu g/m^3$)		
		2014	2015	2016
LB	London Bloomsbury	15	11	12
CD9	Euston Road	21	17	17
Air quality objective		25 $\mu g/m^3$		

Neither automatic monitoring site (LB or CD9) are considered as being representative of the proposed development site in terms of air quality. However, there are diffusion tubes (outlined in section 5.3.2 below) that are more representative and closer to the proposed development site.

5.3.2 Diffusion Tube Monitoring

LBC and LBI both monitor annual mean NO_2 with diffusion tubes, eight of which are within 2km of the proposed development. Details of these diffusion tubes are provided in Table 12.

Table 12: Details of diffusion tube sites within 2km of the proposed development

Site ID	Site location	OS grid reference		Site type	Distance to kerb of nearest road (m)
		X	Y		
London Borough of Camden					
CA4	Euston Road	530110	182795	Roadside	5
CA10	Tavistock Gardens	529880	182334	Urban background	25
CA16	Kentish Town Road	529013	185102	Roadside	1
CA20	Brill Place	529914	183147	Roadside	<5
CA23	Camden Road	529173	184129	Roadside	<1
CA24	Chetwynd Road	528722	185950	Roadside	1
London Borough of Islington					
BIS005/03	Caledonian Road	530721	183584	Roadside	0
BIS005/12	Lady Margaret Rd	529325	185813	Urban Background	1

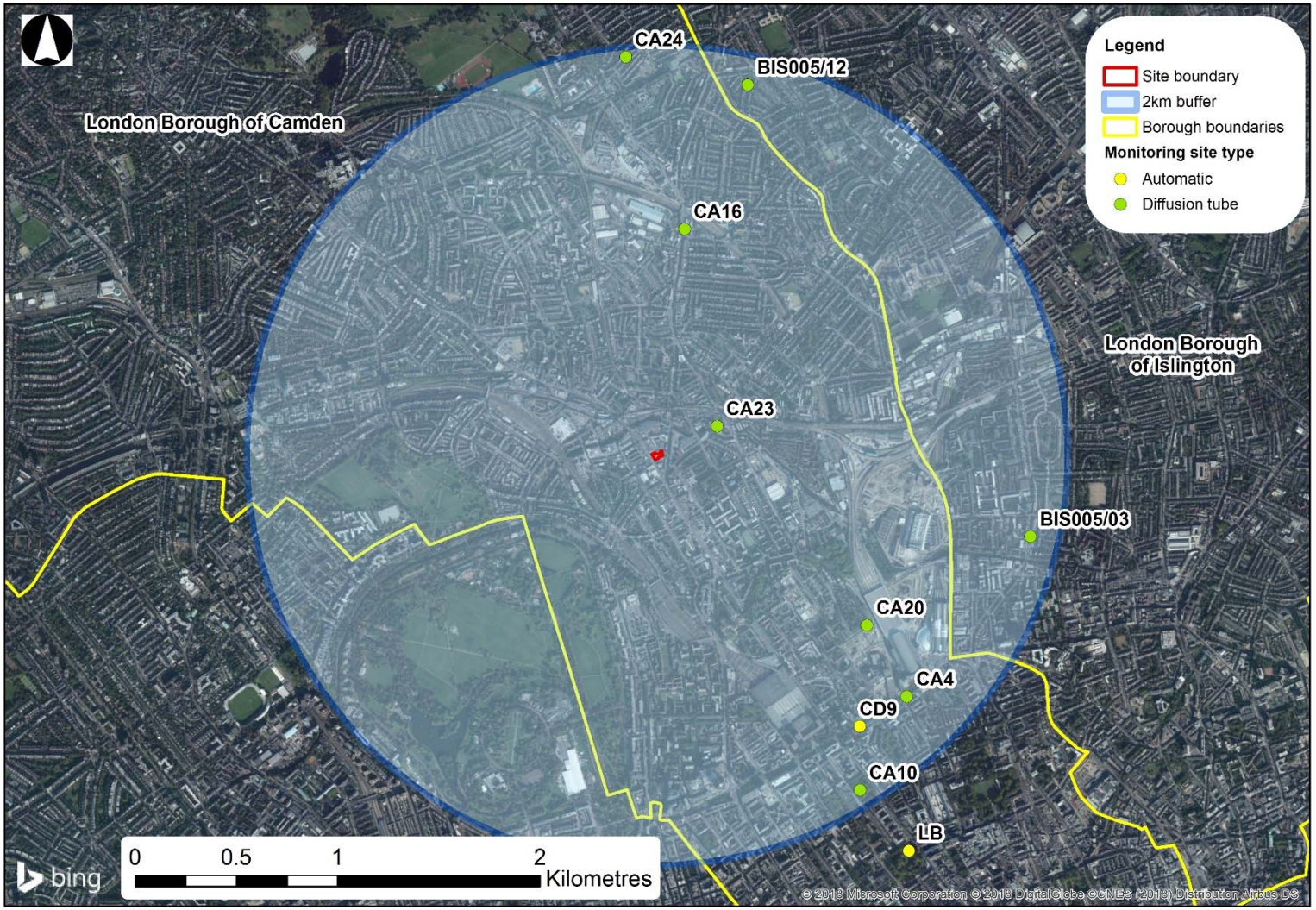
Monitored NO_2 concentrations from 2014 to 2016 are reported below in Table 13. Exceedances of the NO_2 annual mean objective were recorded at seven of these sites between 2014 and 2016, with the maximum concentration in 2016 recorded at CA4 on Euston Road (75.6µg/m^3), a roadside site. The urban background site Lady Margaret Rd (BIS005/12) recorded concentrations below the annual mean objective, however the urban background site Tavistock Gardens (CA10) recorded a concentration of 39.7µg/m^3 in 2016, which is close to exceeding the annual mean NO_2 objective.

Table 13: Passive annual mean NO_2 monitoring results 2014-2016

Site ID	Site location	NO_2 annual mean concentration ($\mu g/m^3$)		
		2014	2015	2016
CA4	Euston Road	**89.7**	**80.9**	**75.6**
CA10	Tavistock Gardens	**46.5**	**41.5**	39.7
CA16	Kentish Town Road	**57.8**	**61.8**	**58.7**
CA20	Brill Place	**52.3**	**48.0**	**50.5**
CA23	Camden Road	**72.2**	**64.4**	**65.4**
CA24	Chetwynd Road	**44.8**	**46.5**	**42.0**
BIS005/03	Caledonian Road	**51.0**	**58.0**	**53.0**
BIS005/12	Lady Margaret Rd	33.0	35.0	36.0

The results of the monitoring within 2km of the proposed development indicate that concentrations of NO_2 are high at roadside locations in LBC and LBI. Existing concentrations of NO_2 at and near the site are likely to be just below or above the air quality objective for annual mean NO_2. The highest concentrations of NO_2 were recorded in Camden and the site closest to the proposed development is CA23, which exceeds the annual mean objective for annual mean NO_2 each year from 2014 to 2016.

Figure 4: Monitoring sites within approximately 2km of the proposed development site



5.4 Background Concentrations

The Defra website includes estimated background concentrations for NO_2, NO_x, PM_{10} and $PM_{2.5}$ for each 1km by 1km OS grid square. Table 14 shows the estimated Defra background concentrations for the OS grid squares containing the proposed development (528500, 184500 and 528500, 183500) and the OS grid square containing the closest urban background automatic monitor (LB) to the proposed development (530500, 182500) in 2016.

The estimated Defra background concentrations are below the air quality objectives for annual mean NO_2, PM_{10} (40µg/m^3) and for $PM_{2.5}$ (25µg/m^3).

The 2016 monitored NO_2 concentrations measured at the LB monitoring site was 42.0 µg/m^3, which is lower than the estimated Defra background concentration for the same grid square (45 µg/m^3). The percentage difference between the monitored concentrations and the Defra background concentrations is provided in Table 15 below. The Defra background concentrations will be used in this assessment since they are more conservative.

Table 14: Defra's estimated 2016 background pollutant concentrations

Location	OS grid square		Annual Mean Concentrations (µg/m^3)			
	X	Y	NO_2	NOx	PM_{10}	$PM_{2.5}$
Proposed development	528500	184500	31.7	50.9	19.0	12.0
	528500	183500	33.0	53.5	19.0	12.0

Table 15: Comparison between monitored NO_2 and Defra background concentrations

Pollutant	Estimated Defra background concentration (µg/m^3)	Measured concentration at LB (µg/m^3)	Difference	Difference (%)
NO_2	45.0	42.0	3.0	7%

6 Construction Dust Assessment

This section provides the results of the assessment of construction-related activities on air quality.

The proposed development will require small amounts of construction and earthworks, with associated trackout. No demolition is required for the proposed development, so this component of the construction dust assessment is not considered further.

6.1 Sensitive Receptors

Sensitive receptors are defined as those residential properties/schools/hospitals that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction and operation of the proposed scheme.

A worst case scenario is considered in which construction works are assumed to occur across the whole scheme area at the same time. There would be 1-10 sensitive receptors within 20m of the scheme boundary (construction dust buffers are shown in Figure 5), including the Hawley Infant and Nursery School.

There are no ecological designated sites sensitive to dust soiling and PM_{10} exposure within 50m of the proposed scheme. Impacts on ecological receptors have therefore not been considered further in this assessment.

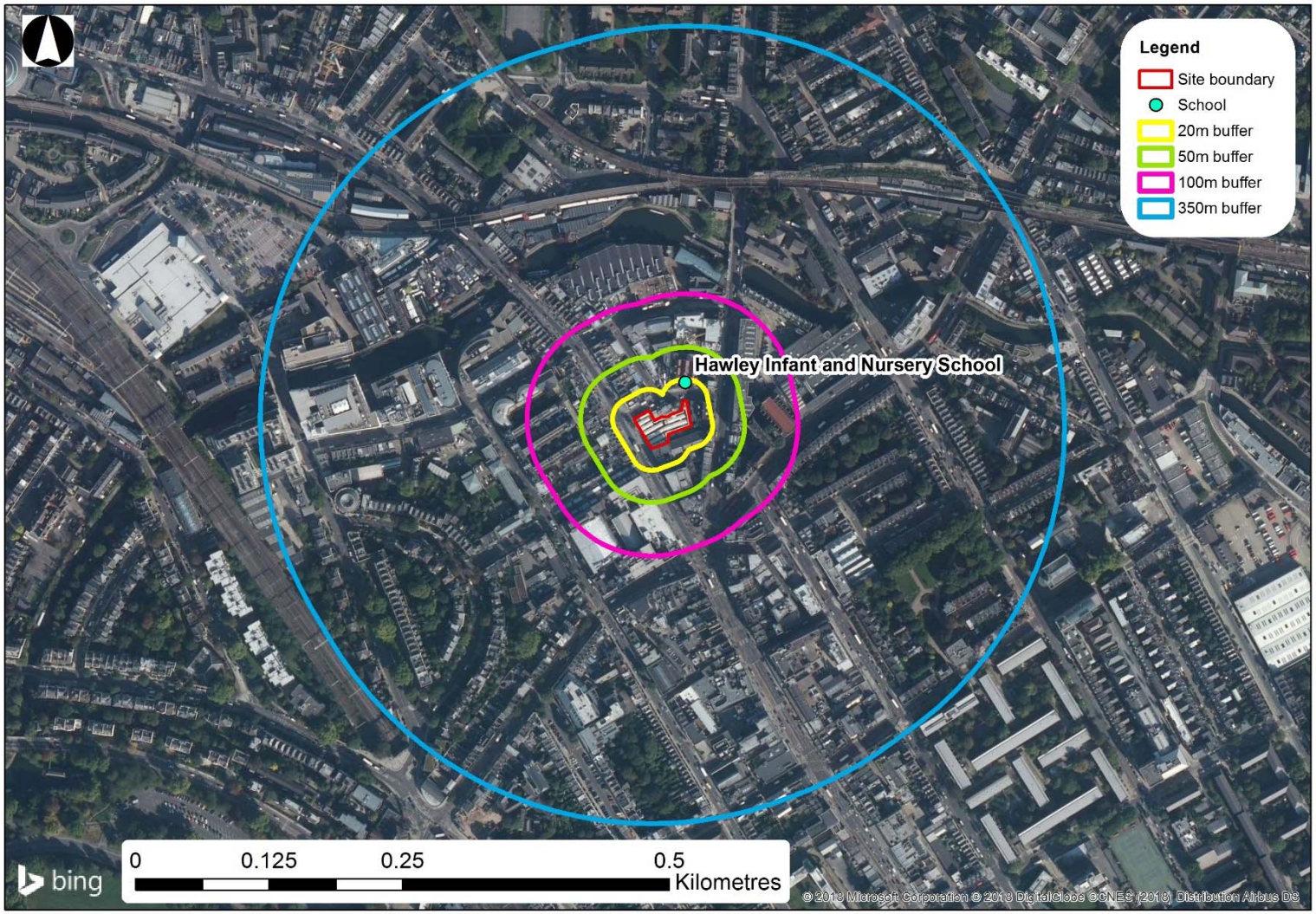
6.2 Dust Emission Magnitude

Following the methodology outlined in Section 4.3, each dust-generating activity has been assigned a dust emission magnitude as shown in Table 16. In regards to earthworks, it has been assumed that these will occur in the whole scheme area as a worst case assumption. The number of construction vehicle movements per day has been assumed based on the volume of earthworks as no data was available regarding HDV movements for construction.

Table 16: Dust emission magnitude for all activities

Activity	Dust emission magnitude	Reasoning
Earthworks	Small	Total site area < 2,500m^2.
Construction	Small	Total building volume < 25,000 m^3, low potential for dusty construction material.
Trackout	Small	< 10 HDV (>3.5t) outward movements in any one day.

Figure 5: Construction dust buffers



6.3 Sensitivity of the Area

There will be 1-10 high sensitivity receptors (residential dwellings) within 20m of the scheme boundary. As such, the areas sensitivity to dust soiling has been classified as *Medium* in accordance with the IAQM guidance.

The average Defra PM_{10} background concentration in the grid squares where the scheme is located (OS Grid Ref.: 528500, 184500 and 528500, 183500) is 19.0µg/m^3, which falls below the 24µg/m^3 threshold. The sensitivity of the area to human health has therefore been assigned as *Low* as there are 1-10 receptors within 20m of the proposed scheme boundary.

6.4 Risk of Impacts

Taking into consideration the dust emission magnitude and the sensitivity of the area, the scheme has been classified as *Low* risk to dust soiling and *Negligible* risk to human health impacts from earthworks, construction and trackout (Table 17). Specific mitigation to minimise the risk of dust soiling and human health impacts of the proposed scheme is described in Section 8.

Table 17: Summary dust risk table prior to mitigation

Activity	Dust soiling	Human health
Earthworks	Low risk	Negligible
Construction	Low risk	Negligible
Trackout	Negligible	Negligible

Following the implementation of appropriate mitigation for low risk sites the effects of dust soiling and on human health should be negligible and the impacts would therefore be not significant.

7 Operational Assessment

7.1 Odour Risk Assessment

The proposed development contains approximately 25 food and beverage units that would be located across all floors of the proposed development. The specific nature of these units will be determined at later stages of design. For this assessment, the container market as a whole has been treated as a potential odour source and assumptions have been made regarding the discharge of odours (no information is currently available on the kitchen exhausts) or the cooking type.

Following the Defra odour risk assessment framework[17], the proposed development scores as detailed in Table 18.

Table 18: Defra Odour Risk Assessment Results

Criterion	Score	Justification
Dispersion	15	Poor – it is assumed that there is no stack above roof level and that there are vents below the eaves.
Proximity of receptors	10	Close - sensitive receptors less than 20m from possible kitchen discharge points.
Size of kitchen	5	Large – 25 small scale food and beverage units listed on current plans.
Cooking type	7	High – Potential for large variety of food types.

The total score is 37, and therefore the proposed development would require a "Very high" level of odour control.

As the dispersion and cooking types criteria have been assumed, it is recommended that once details are known about these components the score should be reviewed to avoid installing unnecessary and costly mitigation measures.

7.1.1 IAQM SPR Assessment

The SPR approach is detailed in the IAQM Odour Guidance[19], which is described in section 3.5.3 of this report. There is one main source type to be included in the assessment as the container market is to be assessed as once source to include all possible kitchen units. This source has been included in an odour risk assessment following the SPR approach shown in Table 19.

Table 19: IAQM SPR assessment results

Source	Source odour potential	Pathway effectiveness	Receptor	Odour risk and justification
Vents are assumed to be below the eaves.	Mix of cooking types, some deep fat frying likely. Moderate levels of odour could be released.	Vents discharge below eave height. Any vents on the north side of the market could be within 20m of receptors. This could be considered as a moderately effective pathway where the receptor is local to the source and dispersion could be compromised by close proximity of nearby buildings.	Receptors consist of residential dwellings and a school. The nearest receptors are located approximately 20m away from the container market on Buck Street.	The odour risk is considered to be *low risk* if odours are mitigated at source at a 'Very high' level of odour control.

7.2 Air Quality Neutral (AQN) Assessment

The following sections describe the calculation of the benchmarks discussed in the air quality neutral assessment method. The calculation of emissions from the proposed development are then compared to these benchmark values.

7.2.1 Building Emissions

There are currently no boilers or CHPs planned for the proposed development so no air quality neutral assessment of building emissions is considered here.

7.2.2 Transport Emissions

The Transport Emissions Benchmark (TEB) and benchmark trip rates depends on the location of the site; the proposed development is located in the Central Activities Zone (CAZ). CAZ emission rates for retail units (A1, A3 and A5) are shown in Table 20.

Table 20: Transport emission rates for retail units

Land-use	NO_x	PM_{10}
Retail (A1 - A5) (kg/annum)	40	7

The daily trip generations have been provided from Arup transport consultants. The number of trips that would be generated by each of the land-uses are given in Table 21.

Table 21: Daily and annual trip generation rates for the proposed development

Land-use	Daily trips (trips/day)	Annual trip generation rate (trips/m^2/annum)
Retail	28	11

Total Transport Emissions (TTE) have been calculated from the daily trip rates and compared against Transport Emission Benchmarks (TEB). The results are given in Table 22.

Table 22: Comparison based on benchmarks

Pollutant	TTE	TEB	Difference (trips/m^2/annum)	Outcome
NO_x	40	152	-112	No offsetting required
PM_{10}	7	26	-19	No offsetting required

The results in Table 22 demonstrate that the development is air quality neutral for transport emissions and no mitigation or offsetting is required.

7.2.3 Summary of AQN

There are no CHPs or boilers proposed for the development, so no building emissions are calculated for the AQN assessment.

The Air Quality Neutral benchmarks for the development have been calculated and compared with the planned emissions. Table 22 compares the transport benchmark trip rates with the calculated development trip rates. The TTE, for NO_x and PM_{10}, are below the benchmarks. Mitigation/offsetting is not required for transport emissions of NO_x.

8 Mitigation

8.1 Construction Mitigation

8.1.1 Construction Traffic

The change in traffic associated with the construction of the proposed development does not exceed the criteria outlined in section 4.3.2 so no mitigation is required for construction traffic emissions.

8.1.2 Construction Dust

The dust emitting activities assessed can be greatly reduced or eliminated by applying the site specific mitigation measures for the site according to the IAQM guidance.

The guidance notes that it is anticipated that with the implementation of effective site-specific mitigation measures, the environmental effect will not be significant in most cases. The following measures from the guidance are relevant for low risk sites and should be included in the Construction Management Plan for the site.

General

- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager;
- Display the head or regional office contact information; and
- Adhere to the GLA requirement regarding non-road mobile machinery (NRMM) not in the Central Activities Zone (CAZ). NRMM on sites in London are required to meet the Stage IIIA of the EU Directive 97/68/EC and its subsequent amendments.

Site management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- Make the complaints log available to the local authority when asked; and
- Record any exceptional incidents that cause dust and/or air emissions, either on or off-site and the action taken to resolve the situation in the log book.

Monitoring

- Carry out regular site inspections to monitor compliance with the Dust Management Plan, record inspection results and make an inspection log available to the local authority, when asked; and

- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Site maintenance

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site; and
- Avoid site runoff of water or mud.

Operating Vehicle/Machinery and Sustainable Travel

- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable;
- Ensure all vehicles switch off engines when stationary – no idling vehicles; and
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques, such as water sprays or local extraction;
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips; and
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use the fine water sprays on such equipment wherever appropriate.

Waste management

- Avoid bonfires or burning of waste materials.

8.2 Operational Mitigation

8.2.1 Traffic Emissions

The change in traffic associated with the operation of the proposed development does not exceed the criteria outlined in section 4.3.2 so no mitigation is required for operational traffic emissions.

8.2.2 AQN Mitigation

There are no emissions from buildings for the AQN assessment.

The total emissions for transport, for nitrogen oxides (NOx), are below the benchmarks and therefore do not require mitigation.

8.2.3 Odour Mitigation

The Defra guidance[17] provides advice on the relative effectiveness of odour mitigation for a well maintained kitchen ventilation system. This is summarised below in Table 23 and provides guidance on what constitutes a "Very high" level of odour control.

It is recommended that abatements that would afford a very high level of odour reduction are included in the design of the kitchen extract to mitigate the odour risk identified in this assessment.

As discussed in section 7.1, assumptions have been made regarding the dispersion and cooking types, so it is recommended that once details are known about these components, the necessary level of odour abatement should be reviewed.

Table 23: Effectiveness of odour abatement measures

Abatement type	Level of odour abatement
Panel and Bag Filters	None
Panel and Bag and HEPA (High Efficiency Particulate Air Filters)	None
Pre and Fine Filtration and Carbon Filter	High
Panel, Bag, HEPA and Carbon Filter	High to Very High
Electrostatic Precipitator (ESP) and Carbon Filter	High to Very High
ESP and Counteractant	Medium to High
ESP and UV/Ozone	High

It is recommended that gas cookers are not used within the Buck Street market to avoid additional NO_x emissions from the operation of the proposed development, due to the existing high NO_2 concentrations in the area. Induction/electric cookers would be a suitable mitigation.

9 Conclusions

An assessment of likely air quality effects arising as a result of the construction and operation of the proposed container market has been undertaken.

A review of current legislation and planning policy and a baseline assessment describing the current air quality conditions in the vicinity of the proposed development were also carried out. The proposed development does not contradict policy or legislation relating to air quality.

The proposed development lies within the Camden AQMA designated for exceedances of the annual mean objective for NO_2 and the daily mean objective for PM_{10}, and therefore the development has the potential to impact the AQMA.

Current monitoring undertaken by the London Borough of Camden indicates that the air quality at roadside locations in the area surrounding the proposed development is exceeding the national annual mean NO_2 objective. This means that high concentrations at the proposed development site are likely.

Construction effects have been assessed using the qualitative approach described in the latest IAQM guidance and it was concluded that with the appropriate best practice mitigation measures suitable for low risk sites in place, there is likely to be a negligible effect on existing receptors from the dust-generating activities onsite.

An operational assessment of traffic emissions was scoped out of this assessment as the change in traffic resulting from the development did need exceed the criteria set out in the EPUK/IAQM guidance.

The odour risk assessment of the proposed food and beverage units found that a "Very high" level of odour abatement is required to mitigate the risk. Options for 'Very high' level odour abatement have been outlined in the mitigation section of this report. It is recommended that gas cookers are not used within the Buck Street market to avoid additional NO_x emissions from the operation of the proposed development, due to the existing high NO_2 concentrations in the area. Induction/electric cookers would be a suitable mitigation.

An assessment against the 'air quality neutral' criteria has been undertaken for transport emissions. It is considered that the proposed development will be 'air quality neutral' in relation to transport emissions.

Appendix A

Camden air quality planning checklist

A1 Camden Air Quality Planning Checklist

Air Quality Planning Checklist

This document is to be completed for all developments that are subject to an Air Quality Assessment (AQA).

Travel and Transport

[1] If there will be parking in the development, will electric vehicle charging points be included?

There are no parking facilities at the proposed development.

[2] Will secure cycle storage be provided for users of the building?

There is cycle storage at the proposed development in the north east corner, comprising long and short stay storage.

Energy

[3] If a CHP is to be included, did you ensure that this technology is suitable for the energy requirements of the building? Please see Camden's Boiler Guidance Manual B for more information.

No CHP is to be included in the proposed development at the time of writing. If any CHP is proposed at a later stage, then this will be assessed.

[4] If CHP is to be included, was this included within the air quality modelling in the AQA?

No CHP is to be included in the proposed development at the time of writing. If any CHP is proposed at a later stage, then this will be assessed.

[5] If CHP will be included and the final technology agreed, have you ensured that it is the best in class in terms of NOx emissions?

No CHP is to be included in the proposed development at the time of writing. If any CHP is proposed at a later stage, then this will be assessed.

Exposure

[6] If located in an area of poor air quality and/or next to a busy road or diesel railway line, does the AQA include details of the way in which the building has been designed to reduce the exposure of occupants (e.g. through orientation, greening, placement of residential properties, or, only for developments in areas of very poor air quality, mechanical ventilation?)

A screening assessment was carried out for the traffic associated with the proposed development and it was found that no detailed dispersion

modelling was necessary. The proposed development is not situated next to a diesel railway line.

No CHPs or gas boilers are included in the proposed development, so no dispersion modelling or stack height assessment was necessary.

Construction Dust

[7] Does the project have a Construction Management Plan written in accordance with the recommendations in the Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance, including an assessment of the risk? And, if the risk is High, a real time monitoring proposal?

Yes, the proposed development has a construction dust assessment within the AQA – see section 6.

Camden Planning Checklist November 2013

Appendix B

Construction dust assessment methodology – supporting material

B1 Dust Emission Magnitude

Table 24: Dust emission magnitude

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

B2 Sensitivity of the Area to Dust Soiling Effects

Table 25: Sensitivity of the area to dust soiling effects

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
	< 10	Medium	Low	Low	Low
Medium	> 1	Medium	Low	Low	Low
Low	> 1	Low	Low	Low	Low

B3 Sensitivity of the Area to Human Health Impacts

Table 26: Sensitivity of the area to human health impacts

Background PM_{10} concentrations (annual mean)	Number of receptors	Distance from the source (m)				
		< 20	< 50	< 100	< 200	< 350
High receptor sensitivity						
> 32µg/m^3	> 100	High	High	High	Medium	Low
	10 – 100			Medium	Low	
	< 10		Medium	Low		
28 – 32µg/m^3	> 100	High	High	Medium	Low	Low
	10 – 100		Medium	Low		
	< 10					
24 – 28µg/m^3	> 100	High	Medium	Low	Low	Low
	10 – 100					
	< 10	Medium	Low			
< 24µg/m^3	> 100	Medium	Low	Low	Low	Low

Background PM_{10} concentrations (annual mean)	Number of receptors	Distance from the source (m)				
		< 20	< 50	< 100	< 200	< 350
	10 – 100	Low				
	< 10					
Medium receptor sensitivity						
> 32µg/m^3	> 10	High	Medium	Low	Low	Low
	< 10	Medium	Low			
28 – 32µg/m^3	>10	Medium	Low	Low	Low	Low
	1 -10	Low				
24 – 28µg/m^3	>10	Low	Low	Low	Low	Low
	1 -10					
< 24µg/m^3	>10	Low	Low	Low	Low	Low
	1 -10					
Low receptor sensitivity						
–	> 1	Low	Low	Low	Low	Low

B4 Sensitivity of the Area to Ecological Impacts

Table 27: 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

B5 Risk of Dust Impacts

Table 28: Risk of dust impacts

Sensitivity of area	Dust emission magnitude		
	Large	Medium	Small
Demolition			
High	High risk site	Medium risk site	Medium risk site
Medium	High risk site	Medium risk site	Low risk site
Low	Medium risk site	Low risk site	Negligible
Earthworks			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible
Construction			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible
Trackout			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Low risk site	Negligible
Low	Low risk site	Low risk site	Negligible