Hawkins environmental

Air Quality Assessment:

128-130 Grafton Road, Kentish Town

ETA Bridging Limited

1st July 2015

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1. INTRODUCTION

1.1. Overview

Hawkins Environmental Limited has been instructed by ETA Bridging Limited to undertake an air quality assessment for the proposed redevelopment of 128-130 Grafton Street, situated in the Kentish Town area of the London Borough of Camden.

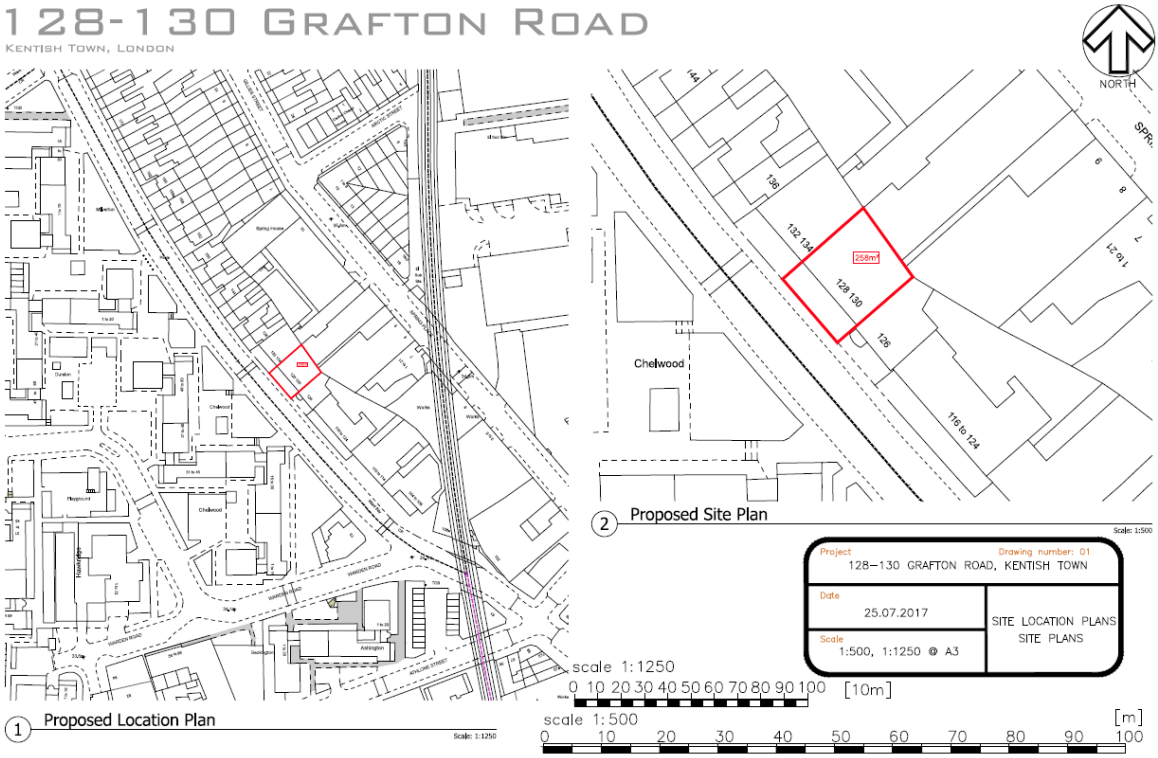
During the planning process, it has been identified that the site may require an air quality assessment to determine whether the site is suitable for residential use and to determine whether the proposed development would have any adverse impact on the surrounding environment. Consequently, this assessment has been completed in order to determine whether the proposed development achieves compliance with the National Air Quality Objectives, as well as national, regional and local planning policy. This assessment has been undertaken in accordance with the Department of Environment, Food and Rural Affairs' (Defra) current *Technical Guidance on Local Air Quality Management (LAQM) (TG16)* and the Institute for Air Quality Management and Environmental Protection UK's *Land-use Planning & Development Control: Planning for Air Quality* (May 2015). The assessment addresses the effects of air pollutant emissions from traffic using the adjacent roads, and emissions associated with the development of the site. In addition, a risk based assessment of the likely impact of construction on the air quality of the local environment has been conducted in accordance with the Institute of Air Quality Management's 2014 edition of the *Guidance on the assessment of dust from demolition and construction.*

This report assesses the overall levels of nitrogen dioxide (NO_2) and particulates (PM_{10} and $PM_{2.5}$) in the vicinity of the site. A glossary of terms is detailed in **Appendix 1.** The constraints which existing air quality may have on the proposed development have been considered and forms part of this assessment. However, the impacts of the development on the air quality of surrounding properties have also been considered.

1.1. Site Description

The proposed development site is currently disused commercial unit on a mainly residential street. The proposed development will see the demolition of existing two-storey industrial building comprising ground floor and a mezzanine floor at 128-130 Grafton Road and erection of a 6-storey (including basement) residential building to comprise 6 x 2-bed and 3 x 3-bed apartments. A location plan of the proposed site can be seen in **Figure 1.1**.

Figure 1.1: Site Location Plan



2. LEGISLATION, PLANNING POLICY & GUIDANCE

2.1. National Legislation

Part IV of the Environment Act (1995), requires the UK government to produce a national Air Quality Strategy which contains standards, objectives and measures for improving ambient air quality. The national Air Quality Strategy sets out National Air Quality Objectives (NAQOs) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale.

The Clean Air for Europe (CAFE) programme revisited the management of Air Quality within the EU and replaced the EU Framework Directive 96/62/EC, its associated Daughter Directives 1999/30/EC, 2000/69/EC, 2002/3/EC, and the Council Decision 97/101/EC, with a single legal act, the Ambient Air Quality and Cleaner Air for Europe Directive 2008/50/EC.

Directive 2008/50/EC is currently transcribed into UK legislation by the Air Quality Standards Regulations 2010, which came into force on 11th June 2010. These limit values are binding on the UK and have been set with the aim of avoiding, preventing or reducing harmful effects on human health and on the environment as a whole. These limit values are basis of the NAQOs

For the purposes of this air quality assessment of the Proposed Development, the National Air Quality Objectives (NAQOs) and their Limit Values will form the basis of the assessment. The NAQOs are based on an assessment of the effects of each pollutant on public health. Therefore, they are a good indicator in assessing whether, under normal circumstances, the air quality in the vicinity of a development is likely to be detrimental to human health. In determining whether air pollutant levels may constrain development, the results of studies are compared against the acceptability criteria. The Air Quality Standards are displayed in Error! Reference source not found..

Table 2.1: Air Quality Standards

Pollutant	Average Period	NAQO Limit Value
Sulphur Dioxide	One Hour	350 µg/m^3 Not to be exceeded more than 24 times per calendar year
	One Day	150 µg/m^3 Not to be exceeded more than 3 times per calendar year
Nitrogen Dioxide	One Hour	200 µg/m^3 Not to be exceeded more than 18 times per calendar year
	Calendar Year	40 µg/m^3

Pollutant	Average Period	NAQO Limit Value
Benzene	Calendar Year	5 µg/m^3
Lead	Calendar Year	0.5 µg/m^3
PM10	One Day	50 µg/m^3 Not to be exceeded more than 35 times per calendar year
	Calendar Year	40 µg/m^3
PM2.5	Calendar Year	25 µg/m^3
Carbon Monoxide	Maximum daily running 8-hour mean	10 mg/m^3

2.2. National Planning Policy Framework (2012)

The National Planning Policy Framework (NPPF) was published on 27th March 2012 and outlines the Government's environmental, economic and social policies for England. The NPPF sets out a presumption in favour of sustainable development which should be delivered with three main dimensions: economic; social and environmental (Paragraphs 7 and 14). The NPPF aims to enable local people and their councils to produce their own distinctive local and neighbourhood plans, which should be interpreted and applied in order to meet the needs and priorities of their communities.

The NPPF includes 12 core planning principles which include (Paragraph 17):

- *"Always seek to secure high quality design and a good standard of amenity for all existing and future occupants of land and buildings;*
- *Take account of the different roles and character of different areas, promoting the vitality of our main urban areas, protecting the Green Belts around them, recognising the intrinsic character and beauty of the countryside; and*
- *Contribute to conserving and enhancing the natural environment and reducing pollution"*

It also states that the planning system *"should contribute to 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 soil, air, water or noise pollution…"* (Paragraph 109) and *"To prevent unacceptable risks from pollution…, planning policies and decisions should ensure that new development is appropriate for its location"* (Paragraph 120).

The NPPF also 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"* (Paragraph 124).

2.3. Planning Practice Guidance (2015)

The Planning Practice Guidance (PPG) was launched on 6th March 2014 and provides additional guidance and interpretation to the Government's strategic policies, outlined within the NPPF, in a web based resource. This is updated regularly.

Matters of relevance to the air quality assessment include:

- The provision of *"guiding principles on how planning can take account of the impact of new development on air quality".* The PPG provides signposts as to how to address air quality in planning applications and highlights the importance of local plans.
- The statement that *"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values"* and *"It is important that the potential impact of new development on air quality is taken into account … where the national assessment indicates that relevant limits have been exceeded or are near the limit"* (Reference ID: 32-001-20140306). The PPG goes on to say that *"Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife)"* (Reference ID: 32-005-20140306)
- The identification of the content of an air quality assessment, stating clearly that *"Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality"* and that *"Mitigation options where necessary, will be locationally specific, will depend on the proposed development and should be proportionate to the likely impact"* (Reference ID: 32-007-20140306).

2.4. The London Plan (2016)

The London Plan – Spatial Development Strategy for London Consolidated with Alterations since 2011 (2016) provides an overall strategic plan for London, and it sets out a fully integrated economic, environmental, transport and social framework for the development of the capital to 2031. The London Plan brings together the Mayor's strategies, including policy on a range on environmental issues, such as climate change, air quality, noise and waste. London Boroughs' local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

Policy 7.14: Improving Air Quality specifically relates to air quality and states:

"Development proposals should:

- *minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by 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 the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition';*
- *be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAs);*
- *ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches;*
- *where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations. Permission should only be granted if no adverse air quality impacts from the biomass boiler are identified."*

Regarding the appropriateness of new developments in areas of poor air quality, the London Plan states that *"increased exposure to existing poor air quality should be minimised by avoiding introduction of potentially new sensitive receptors in locations where they will be affected by existing sources of air pollution (such as road traffic and industrial processes). Particular attention should be paid to development proposals such as housing, homes for elderly people, schools and nurseries." The guidance goes on to state that "where it can be clearly shown that onsite mitigation measures are impractical or inappropriate, and where measures having clearly demonstrated equivalent air quality benefits could be taken elsewhere, local planning authorities should use their planning powers to ensure this."*

2.5. 'Clearing the Air' – The Mayor's Air Quality Strategy (2010)

In December 2010, the Mayor of London's Air Quality Strategy was published by the Greater London Authority (GLA). The strategy sets out a framework for delivering improvements to London's air quality and includes measures aimed at reducing emissions from all types of new development, as well as raising awareness of air quality issues and its impacts on health.

2.6. Housing Supplementary Planning Guidance (2016)

The Housing Supplementary Planning Guidance (SPG), published in March 2016 highlights the elements of the London Plan that are relevant to housing development, and where applicable, provides more detail. The SPG states:

"Air Quality - Standard 5.6.1 (and policy 7.14) – Minimise increased exposure to existing poor air quality and make provision to address local problems of air quality : be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAs).

LP Policy 7.14 seeks to minimise increased exposure to existing poor air quality and to prevent deterioration of existing poor air quality, including by seeking that new developments are 'air quality neutral'. Developers should focus on reducing nitrogen oxides (NOx) and particulates (PM10) from their schemes. During the demolition and construction phase emissions primarily come from the operation of construction vehicles and plant and the

generation of dust. During the occupation of residential schemes emissions includes those from vehicles and boilers. Exposure to poor air quality can result from the materials used within the dwelling and poor ventilation as well as external sources such as busy roads and industrial uses. Further guidance will be provided in a revision to the Sustainable Design & Construction SPG.

Where schemes cannot have openable windows due to poor air quality, careful consideration needs to be given to the location of air intake units and any increased potential for overheating in the summer due to the reduced opportunities for natural ventilation."

2.7. Sustainable Design & Construction Supplementary Planning Guidance (2014)

Published in April 2014, Section 4.3 of the Sustainable Design and Construction SPG provides additional guidance on the application of Policy 7.14 of the London Plan. The SPG identifies that the Mayor's priorities regarding air quality are:

"*Developers are to design their schemes so that they are at least 'air quality neutral'.*

Developments should be designed to minimise the generation of air pollution.

Developments should be designed to minimise and mitigate against increased exposure to poor air quality.

Developers should select plant that meets the standards for emissions from combined heat and power and biomass plants set out in Appendix 7.

Developers and contractors should follow the guidance set out in the emerging Minimising dust and emissions from construction and demolition SPG when constructing their development."

The SPG suggests that the above areas should be addressed in an air quality assessment, which should be provided for all major developments.

Regarding exposure to poor air quality, the SPG states that *"the location and design of a development has a direct influence on exposure to elevated air pollution levels... an air tight building (as required by energy policy – see section 2.4) with any air intakes located away from the main source of air pollution will help minimise increased exposure to poor air quality. It is recommended that developers adhere to European standard EN 13779 to ensure that air filters are fitted and regularly maintained." The SPG goes on to state that "Developers should also consider the location of outside space including gardens, balconies and roof terraces proposed in areas of particular poor air quality. These should be screened where practical with exposure minimised through appropriate positioning and design. The latest evidence suggests that green infrastructure, especially mature trees can have a small but beneficial effect, absorbing air pollution to reduce local concentrations and/or acting as a protective screen. The location of equipment should not result in flues and exhaust vents being in close proximity to recreational areas."*

In order to assess air quality neutrality, emission benchmarks have been produced for both a buildings' operation and its associated transport impacts. Provided a development meets these benchmarks, it will be considered that the development avoids any increases in NO_x or PM emissions across London and, therefore, is considered to be air quality neutral.

The policy of air quality neutrality applies to all major new developments, which the London Plan defines as being 10 or more dwellings, or being greater than 1,000m^2 of floor space for developments other than dwellings.

For major developments, 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 adopted benchmarks. For smaller developments, combustion plant must adhere to emission standards set out in the SPG.

Where developments do not meet the air quality neutral benchmark after appropriate on-site mitigation measures have been incorporated, developers *"will be required to off-set any excess in emissions. The developer should investigate options for providing NO_x and PM abatement measures offsite in the vicinity of the development. This will involve working with the relevant planning authority or nearby property owners to identify suitable mitigation measures. Measures could include:*

- *green planting/walls and screens, with special consideration given to planting that absorbs or suppresses pollutants;*
- *upgrade or abatement work to combustion plant;*
- *retro-fitting abatement technology for vehicles and flues; and*
- *exposure reduction".*

2.8. Control of Dust and Emissions from Construction and Demolition Supplementary Planning Guidance (2014)

Published in July 2014, this SPG provides guidance on preparing an Air Quality Statement for construction and demolition activities, specifically in relation to dust risk assessments and helps identify the potential scale of dust emissions for each stage of work. The SPG also provides best practice methods for controlling dust on-site and preventing 'trackout', as well as recommendations for dust monitoring.

2.9. Land-Use Planning & Development Control: Planning for Air Quality (2015)

Land-Use Planning & Development Control: Planning for Air Quality, jointly published by the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) in May 2015 and updated in January 2017, provides general guidance on air quality and planning. Specifically, the guidance provides details on the scoping of effects, how to assess the impacts in relation to air quality, as well as details on how to assess the significance of impacts.

2.10. London Local Air Quality Management Technical Guidance TG16 - (2016)

Specifically designed to provide technical guidance to Local Planning Authorities (LPAs) in relation to their review and assessment of air quality, TG(16) provides useful guidance in relation to the appropriate methods of air quality modelling and monitoring, which can be as equally useful to the assessment of air quality impacts.

2.11. Guidance on the Assessment of Dust from Demolition and Construction (2014)

Published in 2014, the IAQM's Guidance on the Assessment of Dust from Demolition and Construction provides guidance on preparing an Air Quality Statement for construction and demolition activities, specifically in relation to dust risk assessments, as well as providing details on how best to mitigate the impacts of construction dust. Much of the detail within the IAQM's Guidance was adopted within the Control of Dust and Emissions from Construction and Demolition SPG.

2.12. Air Quality Neutral Planning Support Update: GLA 80371 (2014)

The Air Quality Neutral Planning Support Update document GLA 80371 provides a detailed methodology in support of Policy 7.14 of the London Plan in relation to how to assess air quality neutrality and what constitutes an air quality neutral development.

The document provides useful guidance in relation to the appropriate methods of air quality modelling and monitoring, which can be as equally useful to the environmental impact assessment of air quality.

3. ASSESSMENT METHODOLOGY

3.1. Methodology Overview

The assessment of air quality considered several different areas, specifically:

1. The constraints that the existing air quality has on the Proposed Development;
2. The impact of the changes in road traffic flows on air pollutant concentrations, at nearby sensitive receptors;
3. The impact of emissions from the Proposed Development's plant (such as biomass boilers or combined heat and power (CHP) plants) on air pollutant concentrations at nearby sensitive receptors; and
4. The impact of construction and demolition dust at nearby sensitive receptors.

Land-Use Planning & Development Control: Planning for Air Quality states with respect to the identification of local receptors, they should include *"residential and other properties close to and within the proposed development, as well as alongside roads significantly affected by the development, even if well away from the development site, and especially if within AQMAs. These receptors will represent locations where people are likely to be exposed for the appropriate averaging time (dependent on the air quality objective being assessed against)"*. The last point is critical as this identifies that sensitivity in relation to air quality is directly related to the amount of time one spends in a location. For example, when considering annual mean objectives (such as that of NO_2), any area where one might spend large parts of the year might be considered a sensitive receptor. An example could be a dwelling, where one might expect to spend at least half of their time during one day. Health centres, hospitals, schools and nurseries could all expect to be considered sensitive receptors, partially due to the length of exposure spent in these locations, but also due to vulnerable members of society (e.g. the very young, the very old, or the ill) spending significant amounts of time at these locations. Offices would not normally be considered to be a highly sensitive receptor, since most visitors would be healthy adults and would only spend around 8 hours per day, 5 days per week there (i.e. less than 25% of the year), whereas people could spend over 50% of their time within a dwelling. Hotels would not be considered sensitive receptors in terms of the annual mean, since residents would only normally expect to spend a small number of nights in that location; however, hostels, sheltered accommodation and student accommodation would be considered as sensitive as dwellings, as residents could be expected to stay for several months.

The baseline scenario will considers two separate sets of site conditions, specifically the existing 2014 baseline conditions (the latest date for which data is available) and the future 2019 baseline site conditions, which represents the opening year of the proposed development. The consideration of a future baseline for air quality is important as it takes into account future changes in both traffic flow, but also pollutant concentrations, which could vary.

To determine the baseline conditions, the following was undertaken:

- A review of the most recent progress reports on air quality carried out by the local planning authority, as submitted to the Department for the Environment, Food and Rural Affairs (Defra);

- Determination of whether the site is situated within a designated Air Quality Management Area (AQMA);
- A review local air quality monitoring within the area of the site;
- A review the Environment Agency's register of industrial sites under the EC Integrated Pollution Prevention and Control Directive (IPPC) to determine whether industrial sources of air pollution could be affecting the site;
- Review the list of registered Part A2 and Part B permitted premises under the PPC Regulations to determine whether any other sources of air pollution could be affecting the site;
- Using the methodology described in the Breeze Roads Detailed Dispersion Model (details of which can be seen in **Appendix 2**, utilising data described in **Appendix 3**), predict concentrations of air pollutants on-site within the current baseline year and the future baseline year.

3.2. Methodology for Determining Demolition and Construction Effects

The determination of demolition and construction effects of the Proposed Development was based on the IAQM's Guidance on the Assessment of Dust from Demolition and Construction, which provides a risk based assessment methodology to determine the significance of an air quality impact arising from the construction of a new development, based on the magnitude of change. The methodology provides a five step approach to determining the significance:

*"**STEP 1** is to screen the requirement for a more detailed assessment. No further assessment is required if there are no receptors within a certain distance of the works.*

***STEP 2** is to assess the risk of dust impacts. This is done separately for each of the four activities (demolition; earthworks; construction; and trackout) and takes account of:*

the scale and nature of the works, which determines the potential dust emission magnitude (STEP 2A); and

the sensitivity of the area (STEP 2B).

These factors are combined in STEP 2C to give the risk of dust impacts.

Risks are described in terms of there being a low, medium or high risk of dust impacts for each of the four separate potential activities. Where there are low, medium or high risks of an impact, then site-specific mitigation will be required, proportionate to the level of risk.

Based on the threshold criteria and professional judgement one or more of the groups of activities may be assigned a 'negligible' risk. Such cases could arise, for example, because the scale is very small and there are no receptors near to the activity.

***STEP 3** is to determine the site-specific mitigation for each of the four potential activities in STEP 2. This will be based on the risk of dust impacts identified in STEP 2. Where a local authority has issued guidance on measures to be adopted at demolition / construction sites, these should also be taken into account.*

***STEP 4** is to examine the residual effects and to determine whether or not these are significant.*

***STEP 5** is to prepare the dust assessment report."*

3.3. Methodology for Determining Operational Effects

To determine the operational effects of the Proposed Development, the change in traffic flow at sensitive receptors in the future opening year of the proposed development, both with and without development related traffic, was modelled using the methodology described in the DMRB Dispersion Model (details of which can be seen in **Appendix 2**, utilising data described in **Appendix 3**).

To determine the impact of the proposed development on surrounding local sensitive receptors, the impact magnitude has been derived from Land-Use Planning & Development Control: Planning for Air Quality, jointly published by the IAQM and EPUK. Error! Reference source not found. identifies the advice given in the IAQM / EPUK Guidance regarding impact descriptors upon individual receptors.

Table 3.1: Impact Descriptors for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Year	% Change in Concentrations Relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Source: Table 6.3 of the IAQM Guidance

The guidance goes on to offer the following explanation (taken from the footnotes of Table 6.3 of the IAQM Guidance):

"AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.

The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e.. less than 0.5% will be described as Negligible.

The Table is only designed to be used with annual mean concentrations.

Descriptors for individual receptors only; the overall significance is determined using professional judgement (see Chapter 7). For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.

When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.

The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.

It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it."

3.4. Significance Criteria

Land-Use Planning & Development Control: Planning for Air Quality provides a framework to assess significance in air quality assessments. As described in the guidance, the *"assessment framework for describing impacts can be used as a starting point to make a judgement on significance of effect, but there will be other influences that might need to be accounted for. The impact descriptors set out in Table 6.3* [Replicated in **Table 3.1** of this chapter] *are not, of themselves, a clear and unambiguous guide to reaching a conclusion on significance. These impact descriptors are intended for application at a series of individual receptors. Whilst it may be that there are 'slight', 'moderate' or 'substantial' impacts at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances.(Paragraph 7.4)".*

The Land-Use Planning & Development Control guidance goes on to state that any significance needs to be assessed using a certain amount of professional judgement and should take into account *"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"* (Paragraph 7.7). For example, for a large development, a major adverse impact to a single dwelling might be considered insignificant; however, a minor impact to 100,000 dwellings might be considered to be highly significant. Furthermore, the absolute level of pollutant concentrations are also important in determining significance; for example, a moderate impact to a small group of dwellings might be considered highly significant if the concentrations of NO_2 were well in excess of the NAQO level, however, that same moderate impact might be considered insignificant if concentrations were well below the NAQO.

4. SCOPING

4.1. Overview

The National Planning Practice Guidance on Air Quality is explicit in stating that *"Assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality".* This is reiterated in *Land-Use Planning & Development Control: Planning for Air Quality*, jointly published by the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) in May 2015 and updated in January 2017, which provided guidance on screening as to whether an air quality assessment is required and what needs to assessed.

4.2. Impacts of the Local Area on the Development

The IAQM/EPUK Guidance suggests that whether an assessment of the impacts of the local area on the proposed development is required is a matter of judgement, but should take into account:

- *"the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- *the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- *the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular NO2), that would cause unacceptably high exposure for users of the new development; and*
- *the presence of a source of odour and/or dust that may affect amenity for future occupants of the development."*

4.3. Impacts of the Development on the Local Area

To determine whether an assessment of the impacts of the development on the local environment is required, the IAQM/EPUK Guidance suggests a two stage approach. The guidance states that *"The **first stage** is intended to screen out smaller development and/or developments where impacts can be considered to have insignificant effects. The **second stage** relates to specific details regarding the proposed development and the likelihood of air quality impacts."*

Figure 4.1 reproduces Stage 1 of the IAQM/EPUK Guidance' two stage approach. In order to proceed to Stage 2, development needs to meet both one of the criteria in "A", and one of the criteria in "B". If the development fails to meet these criteria, then an air quality assessment looking at the impacts of the development on the local area will not be required.

Figure 4.2 reproduces Stage 2 of the IAQM/EPUK Guidance' two stage approach. If the development meets the criteria contained within Stage 1, *"more specific guidance as to when an air quality assessment is likely to be required to assess the impacts of the proposed development on the local area."* If the development then meets any of the eight criteria in Stage 2, an assessment of the impacts of the proposed development on the surrounding environment will be required.

Figure 4.1: IAQM/EPUK Guidance – Stage 1 Criteria

Criteria to Proceed to Stage 2

A. If any of the following apply:

- 10 or more residential units or a site area of more than 0.5ha
- more than 1,000 m² of floor space for all other uses or a site area greater than 1ha

B. Coupled with any of the following:

- the development has more than 10 parking spaces
- the development will have a centralised energy facility or other centralised combustion process

Note: Consideration should still be given to the potential impacts of neighbouring sources on the site, even if an assessment of impacts of the development on the surrounding area is screened out.

Figure 4.2: IAQM/EPUK Guidance – Stage 2 Criteria

The development will:	Indicative Criteria to Proceed to an Air Quality Assessment [a]
1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5t gross vehicle weight)	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight)	A change of HDV flows of - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere
3. Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA
4. Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.
5. Introduce or change a bus station.	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20 m of a relevant receptor Coupled with the car park having more than 100 movements per day (total in and out)
7. Have one or more substantial combustion processes	Where the combustion unit is: - any centralised plant using bio fuel - any combustion plant with single or combined thermal input >300kW - a standby emergency generator associated with a centralised energy centre (if likely to be tested/used >18 hours a year)
8. Have a combustion process of any size	Where the pollutants are exhausted from a vent or stack in a location and at a height that may give rise to impacts at receptors through insufficient dispersion. This criterion is intended to address those situations where a new development may be close to other buildings that could be residential and/or which could adversely affect the plume's dispersion by way of their size and/or height.

4.4. Site Specific Scoping Assessment

The proposed development is located in an Air Quality Management Area, where exceedances of the National Air Quality Objective for NO_2 often occur; therefore **an assessment of the impacts of the local area on the development is required**.

The proposed development consists of 9 new dwellings – there will be no new car parking spaces and combustion processes are not proposed; therefore, **an assessment of the impacts of the development on the local area is not required**.

Since the development consists of 9 dwellings, **an air quality neutral assessment is not required**.

5. BASELINE CONDITIONS

5.1. Air Quality Review and Assessment

Local Authorities have been required to carry out a review of local air quality within their boundaries to assess areas that may fail to achieve the NAQO's. Where these objectives are unlikely to be achieved, local authorities must designate these areas as Air Quality Management Areas (AQMA's) and prepare a written action plan to achieve the NAQO's.

The review of air quality takes on several prescribed stages, of which each stage is reported. Following the London Borough of Camden's review of air quality within the Borough, it showed that the National Air Quality Objectives for nitrogen dioxide (NO_2) and Particulate Matter (PM_{10}) are likely to be exceeded across large parts of the Borough. As a consequence, the council declared an AQMA across the whole Borough.

5.2. Local Air Quality Monitoring

The London Borough of Camden has conducted air quality monitoring, including at Kentish Town Road, approximately 500m to the east of the proposed development site. **Table 5.1** summarises the air quality monitoring data.

Table 5.1: Air Quality Monitoring

Location	Annual Mean Concentrations of NO_2 (µg/m^3)				
	2010	2011	2012	2013	2014
Kentish Town Road	74	57.19	58.97	65.32	57.83

5.3. Industrial Emissions

Both the Environment Agency's register of industrial sites under the EC Integrated Pollution Prevention and Control Directive (IPPC) and the Local Authority's list of registered Part A2 and Part B permitted premises under the Pollution, Prevention and Control Act 1999 and the Environmental Permitting (England and Wales) Regulations 2010 have shown that there are no sites within close proximity of the development site that could be affecting air pollutant levels.

5.4. Baseline Onsite Pollution Concentrations

To characterise the air quality at the development site at present, predictions of air pollutant concentrations at the development site have been made using the air quality model for the baseline year (2014). **Appendix 2** provides a description of the methodology used within the assessment, including the method to calculate NO_2 from NO_x. **Appendix 3** outlines the input data, including traffic data, background concentrations and receptor locations. In addition, details of the verification factor applied to the predicted concentrations of NO_x can also be found in **Appendix 3**.

Concentrations have been calculated for two representative points across the development site. The locations of these receptor locations can be seen on the site plan in **Appendix 3**. The results of these predictions can be seen in **Table 5.2**.

Table 5.2: Baseline Air Quality Concentrations 2014 – Development Site

Receptor	NO_2 (µg/m^3)	PM_{10} (µg/m^3)		$PM_{2.5}$ (µg/m^3)
	Annual mean	Annual mean	Days >50 µg/m^3	Annual mean
Front of Site	32.79	20.25	3.71	14.17
Rear of Site	31.18	20.15	3.59	14.11
NAQO	**40**	**40**	**35**	**25**

If pollutant concentrations in **Table 5.2** are compared to the National Air Quality Objectives, it can be seen that on the development site at present, concentrations of all pollutants are below the National Air Quality Objectives.

6. IMPACTS OF THE LOCAL AREA ON THE DEVELOPMENT

6.1. Annual Mean Concentrations

To characterise the air quality at the development site when constructed, predictions of air pollutant concentrations at the development site have been made using the air quality model for proposed year of occupation (2019). **Appendix 2** provides a description of the methodology used within the assessment, including the method to calculate NO_2 from NO_x. **Appendix 3** outlines the input data, including traffic data, background concentrations and receptor locations. In addition, details of the verification factor applied to the predicted concentrations of NO_x can also be found in **Appendix 3**.

Concentrations have been calculated for two representative points across the development site. The locations of these receptor locations can be seen on the site plan in **Appendix 3**. The results of these predictions can be seen in **Table 6.1**.

Table 6.1: Predicted Future Air Quality Concentrations 2019 – Development Site

Receptor	NO_2 (µg/m^3)	PM_{10} (µg/m^3)		$PM_{2.5}$ (µg/m^3)
	Annual mean	Annual mean	Days >50 µg/m^3	Annual mean
Front of Site	32.78	20.25	3.71	14.17
Rear of Site	31.17	20.15	3.59	14.11
NAQO	**40**	**40**	**35**	**25**

6.2. NO_2 1-hour Exposure

In order to meet the hourly Air Quality Standard on NO_2, the average hourly concentration of NO_2 must not exceed the hourly objective level of 200 µg/m^3 more than 18 times in one calendar year. If this standard is not met, there would be concern that even short duration exposure to pollutant concentrations could be prejudicial to health, which could be a concern for gardens, balconies and other outdoor amenity spaces associated with the development.

According to research conducted in 2003[1], there is only a risk that the NO_2 1-hour objective (200 µg/m^3) could be exceeded if the annual mean nitrogen dioxide concentration is greater than 60 µg/m^3. At the development site, the worst case annual mean is 32.79µg/m^3, therefore hourly exceedances are not expected to occur. Consequently, local short duration pollutant concentrations would not be considered a cause on concern in gardens, balconies and other outdoor amenity spaces associated with the development.

[1] Analysis of Relationship between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites, Laxen and Marner, 2003.

7. IMPACTS OF THE DEVELOPMENT ON THE LOCAL AREA

The scoping assessment contained within **Section 4** of this report identifies that the impact of the proposed development on the local environment is likely to be insignificant and therefore no further assessment is required.

8. CONSTRUCTION DUST IMPACT ASSESSMENT

8.1. Overview

The main air quality impacts that may arise during construction activities are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes; and
- An increase in concentrations of airborne particles (e.g. PM_{10}, $PM_{2.5}$) and nitrogen dioxide due to exhaust emissions from site plant and traffic that can impact adversely on human health.

The most common impacts are dust soiling and increased ambient PM_{10} concentrations due to dust arising from the site. Most of this PM_{10} is likely to be in the $PM_{2.5-10}$ fraction, known as coarse particles.

It is very difficult to quantify emissions of dust from construction activities. It is therefore common practise to provide a qualitative assessment of potential impacts. The Institute of Air Quality Management's *Guidance on the assessment of dust from demolition and construction (February 2014)* contains a complex methodology for determining the significance of construction impacts on air quality. The following sections outline the steps outlined in the IAQM methodology.

8.2. Step 1 – Screening the Need for a Detailed Assessment

The IAQM guidance states that:

"An assessment will normally be required where there is:

- *a 'human receptor' within:*
    - *350 m of the boundary of the site; or*
    - *50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).*
- *an 'ecological receptor' within:*
    - *50 m of the boundary of the site; or*
    - *50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s)."*

There are existing receptors within 350m of the boundary of the development site and within 50m of the route used by construction vehicles on the public highway. Therefore, a detailed assessment is required to determine potential dust impacts.

Step 1 Summary:

A detailed assessment is required to determine potential dust impacts.

8.3. Step 2 – Assess the Risks of Dust Impacts

The IAQM guidance states that:

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

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

- *the scale and nature of the works, which determines the potential dust emission magnitude as small, medium or large (STEP 2A); and*
- *the sensitivity of the area to dust impacts (STEP 2B), which is defined as low, medium or high sensitivity .*

These two factors are combined in STEP 2C to determine the risk of dust impacts with no mitigation applied. The risk category assigned to the site can be different for each of the four potential activities (demolition, earthworks, construction and trackout). More than one of these activities may occur on a site at any one time."

8.3.1. Step 2a – Dust Emission Magnitude

The first step (Step 2a) is therefore to assess the magnitude of the anticipated works. **Table 8.1** summarises the dust emission magnitude for each activity. Given the size of the building to be demolished, the dust emission magnitude is considered to be *"small"*. Earthworks nor trackout are not expected to be required given the urban nature of this brownfield site. The building to be constructed is fairly small, so the dust emission magnitude is considered to be *"small"*.

Table 8.1: Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	**Small**
Earthworks	**N/A**
Construction	**Small**
Trackout	**N/A**

8.3.2. Step 2b – Sensitivity of the Area

The next step (Step 2b) is therefore to assess the sensitivity of the area that could be affected by the anticipated works. **Table 8.2** summarises the sensitivity of the area for each activity.

There are a number of existing dwellings in the area that are considered to be high sensitivity receptors. There are between 10 and 100 high sensitivity receptors within 20m of the site boundary; therefore the sensitivity to dust soiling effects on people and property is *"high"* for all activities.

The annual mean concentration of PM_{10} is less than 24; given the number of high sensitivity receptors outlined above, this results in a *"low"* sensitivity of the area to human health impacts for all activities.

There are no ecological receptors that are considered to be anything greater than low sensitivity receptors within 50m of the site; this results in a *"low"* sensitivity of the area to ecological impacts for all activities.

Table 8.2: Outcome of Defining the Sensitivity of the Area

Potential Impact	Sensitivity of Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	N/A	High	N/A
Human Health	Low	N/A	Low	N/A
Ecological	Low	N/A	Low	N/A

8.3.3. Step 2c – Define the Risks

The next step (Step 2c) is to assign the level of risk for each activity, based on the receptor sensitivity and the dust emission magnitude. **Table 8.3** summarises the dust risk for each activity.

Table 8.3: Summary Dust Risk Table to Define Site-Specific Mitigation

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	N/A	Low	N/A
Human Health	Negligible	N/A	Negligible	N/A
Ecological	Negligible	N/A	Negligible	N/A

Step 2 Summary:

- *Dust Emission Magnitude is "Small" for demolition and construction.*
- *The Sensitivity of the area of is "High" for dust soiling and "Low" for ecological impacts and human health.*
- *The site is considered a "Medium Risk Site" in respect of demolition.*

8.4. Step 3 – Site Specific Mitigation

Stage 2 determines that the site is a *"Medium Risk Site*" in respect of demolition.

The IAQM guidance provides a list of potential mitigation measures and suggests where these measures are highly recommended, desirable or not required based upon the risk of the site. For all sites that are a *"Medium Risk Site*" or higher, a Dust Management Plan is highly recommended and should incorporate the mitigation measures recommended based on the site risk.

The IAQM's Guidance states that the following measures are highly recommended or desirable as mitigation for all medium risk sites:

- Communications: Develop and implement a stakeholder communications plan that includes community engagement before work commences.
- Communications: Display the name and contact details of person(s) accountable for air quality and dust issues on the Site boundary.
- Communications: Display the head or regional office contact information.
- Communications: Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the LPA. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the Site. In London, additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real time PM_{10} continuous monitoring and / or visual inspections.
- 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.
- Site management: Make the complaints log available to the local authority when asked.
- Site management: 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: Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the LPA when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of Site boundary, with cleaning to be provided if necessary.
- Monitoring: Carry out regular Site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Monitoring: 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.
- Monitoring: Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work

commences on-site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

- Preparing and maintaining the Site: Plan Site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Preparing and maintaining the Site: Erect solid screens or barriers around dusty activities (or the Site boundary) that are at least as high as any stockpiles on-site.
- Preparing and maintaining the Site: Fully enclose Site or specific operations where there is a high potential for dust production and the Site is actives for an extensive period.
- Preparing and maintaining the Site: Avoid Site runoff of water or mud.
- Preparing and maintaining the Site: Keep Site fencing, barriers and scaffolding clean using wet methods.
- Preparing and maintaining the Site: Remove materials that have a potential to produce dust from Site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Preparing and maintaining the Site: Cover, seed or fence stockpiles to prevent wind whipping.
- 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.
- Operating vehicle / machinery and sustainable travel: Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Operating vehicle / machinery and sustainable travel: Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Operating vehicle / machinery and sustainable travel: Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)
- Operating vehicle / machinery and sustainable travel: Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Operating vehicle / machinery and sustainable travel: Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
- Operations: Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Operations: Ensure an adequate water supply on the Site for effective dust / particulate matter suppression/mitigation, using non-potable water where possible and appropriate.

- Operations: Use enclosed chutes and conveyors and covered skips.
- Operations: Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Operations: Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Waste management: Avoid bonfires and burning of waste materials.

The IAQM's Guidance states that the following measures are highly recommended or desirable as mitigation for all medium risk sites in relation to demolition:

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

In addition to the mitigation contained within the IAQM Guidance, the Control of Dust and Emissions from Construction and Demolition SPG contains more specific detailed mitigation measures with regards to precise construction processes, which should be incorporated into the DMP as appropriate.

The Control of Dust and Emissions from Construction and Demolition SPG also includes details on construction dust site monitoring.

Step 3 Summary:

The site is considered a "Medium Risk Site" overall and a Dust Management Plan is recommended incorporating a number of specific mitigation measures based on the site specific risks.

8.5. Step 4 – Determining Significant Effects

The site is considered a *"Medium Risk Site"* overall and if appropriate mitigation measures are put in place, as identified in Step 3, significant effects on receptors are unlikely to occur. Considering both the construction details and the specific characteristics of the site, it is anticipated that effective mitigation will be possible and residual effects will not be considered significant.

Step 4 Summary:

With risk appropriate mitigation, residual effects will not be considered significant.

8.6. Step 5 – Dust Assessment Report

Step 5 Summary:

Dust and other pollutant emissions from the construction, demolition, earthworks and trackout phases of the construction of the proposed development will see the site designated a "Medium Risk Site". However, with risk appropriate mitigation, residual effects will not be considered significant.

9. MITIGATION

As a consequence of the proposed development, there will not be a significant increase in pollutant concentrations and therefore mitigation is not seen to be necessary, other than those routinely used to control construction dust, as detailed in the previous section. Similarly, concentrations of all pollutants are below the National Air Quality Objectives at the development site and therefore it is not necessary to implement mitigation to reduce the exposure from NO_2 or any other pollutant to future occupiers of the proposed development.

10. CONCLUSIONS & SUMMARY

An air quality assessment has been undertaken in accordance with the Department of Environment, Food and Rural Affairs' (Defra) current *Technical Guidance on Local Air Quality Management (LAQM) (TG16)* and addresses the effects of air pollutant emissions from traffic using the adjacent roads, and emissions associated with the development of the site. In addition, a risk based assessment of the likely impact of construction on the air quality of the local environment has been conducted in accordance with the Institute of Air Quality Management's 2014 edition of the *Guidance on the assessment of dust from demolition and construction.*

Baseline pollutant concentrations on site have been investigated using both existing monitoring data and through predictions using the Breeze Roads Detailed Dispersion Model methodology. At present, and in the opening year of the proposed development (2019), concentrations of all pollutants are below the Air Quality Objectives; therefore air pollution on the proposed development site indicates that the site would be suitable for residential use.

In order to assess the impact of the proposed development on local air quality, the IAQM/EPUK Guidance *Land-Use Planning & Development Control: Planning for Air Quality* has been utilised. The assessment has shown that due to limited traffic generation onto already highly trafficked roads, the impact of new vehicle emissions from the proposed development is consider to be *"negligible*".

With regards to the impacts of construction on air quality, dust and other pollutant emissions from the construction and demolition phases of the construction of the proposed development will see the site designated a "*Medium Risk Site"*. However, with risk appropriate mitigation, residual effects will not be considered significant.

Since it has been shown that the proposed development meets the guidance contained within *Technical Guidance on Local Air Quality Management (LAQM) (TG16),* IAQM/EPUK's *Land-Use Planning & Development Control: Planning for Air Quality* and IAQM's *Guidance on the assessment of dust from demolition and construction*, it is considered that the proposed development adheres to the principles of the National Planning Policy Framework since the new development will not be *"put at risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution"*. Since it has been shown that in terms of air quality, the proposals adhere to local and national planning policy, it is considered that the air pollution should not be a constraint on the proposed residential development.

Appendix 1
Glossary of Terms

Appendix 1: Glossary of Terms

1,3-butadiene: Is a Volatile Organic Compound (VOC) emitted into the atmosphere principally from fuel combustion of petrol and diesel vehicles. Possible chronic health effects include cancer, central nervous system disorders, liver and kidney damage, reproductive disorders, and birth defects.

Air Quality Standard/Air Quality Objective: The concentrations of pollutants in the atmosphere, which can broadly be taken to achieve a certain level of environmental quality. The standards are based on assessment of the effects of each pollutant on human health including the effects on sensitive sub groups.

Annual mean: The average of the concentrations measured for each pollutant for one year. In the case of the Air Quality Objectives this is for a calendar year.

Air Quality Management Area (AQMA): An area that a local authority has designated for action, based upon predicted exceedences of Air Quality Objectives.

Benzene: A VOC which is a minor constituent of petrol. The main sources of benzene in the atmosphere in Europe are the distribution and combustion of petrol. Of these, combustion by petrol vehicles is the single biggest source (70% of total emissions).

Concentration: The amount of a (polluting) substance in a volume (of air), typically expressed as a mass of pollutant per unit volume of air (for example, microgrammes per cubic metre, µg/m^3) or a volume of gaseous pollutant per unit volume of air (parts per million, ppm).

Exceedance: A period of time where the concentration of a pollutant is greater than the appropriate Air Quality Objective.

Nitrogen Oxides: Nitric oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity supply industry. NO is not considered to be harmful to health. However, once released to the atmosphere, NO is usually very rapidly oxidised to nitrogen dioxide (NO_2), which is harmful to health. NO_2 and NO are both oxides of nitrogen and together are referred to as nitrogen oxides (NO_x).

Particulate Matter: Fine Particles are composed of a wide range of materials arising from a variety of sources including combustion sources (mainly road traffic), and coarse particles, suspended soils and dust from construction work. Particles are measured in a number of different size fractions according to their mean aerodynamic diameter. Most monitoring is currently focused on PM_{10} (less than 10 microns in diameter), but the finer fractions such as $PM_{2.5}$ (less than 2.5 microns in diameter) is becoming of increasing interest in terms of health effects.

µg/m^3 micrograms per cubic metre of air: A measure of concentration in terms of mass per unit volume. A concentration of 1 µg/m^3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

Appendix 2
Air Quality Model

Appendix 2: Air Quality Model

The Design Manual for Roads and Bridges

In the UK, the Department for Environment, Food & Rural Affairs (Defra) provides guidance on the most appropriate methods to estimate pollutant concentrations for use in Local Air Quality Management (LAQM). Defra regularly updates its Technical Guidance, with the latest LAQM Technical Guidance (TG16) published in 2016.

The methodology in TG16 directs air quality professionals to a number of tools published by Defra to predict and manage air quality. One of the main tools is the calculation procedure contained within the Design Manual for Roads and Bridges (DMRB). DMRB Volume 11, Section 3, Part 1, describes the so-called 'DMRB Screening Method'.

The methodology is provided in spreadsheet format and is designed to estimate pollutant concentrations at specific locations from the associated road network.

The methodology has undergone a number of significant revisions over the period 2002-2007 with the latest version becoming available in July 2007. The methodology provides estimates of air pollutant concentrations that in general provide very good agreement with measured data and pollutant concentration levels predicted utilising more detailed dispersion models.

Where local information is available on traffic composition the method allows for the division of traffic into a range of classes. Within these classes it is assumed that the distribution of vehicles according to fuel type, emission standard and engine size, would conform to national average statistics.

An atmospheric dispersion equation was derived from calculations using an atmospheric dispersion model developed by TRL. The rate at which exhaust pollutants disperse depends on the atmospheric conditions; and the speed and direction of the wind being of particular importance. In deriving the dispersion equation a wind speed of 2m/s was assumed and no weighting for wind direction assumed.

A comparison of modelled with measured pollutant concentration values showed that overall there was good agreement at the majority of the AURN and HA monitoring sites providing further confidence in the model.

The model does not take account of annualised meteorological data, height of source or receiver nor is it able to model canyon effects. Nevertheless, it is useful as a screening tool and in particular for comparing the effects of various road traffic conditions where the road is in close proximity to receptor location.

TG16 provides detailed guidance on the modelling of air pollutants and in particular highlights a procedure to validate models, including DMRB. The procedure discusses the comparison of modelled results against measured levels, either from diffusion tubes (for NO_2) or continuous monitors (for NO_2 or PM_{10}).

Model verification and subsequent adjustment for oxides of nitrogen is undertaken based upon NO_X as most models (including DMRB) predict NO_2 based upon its relationship to NO_x. Consequently, the verification process requires conversion to NO_x of any measurements of NO_2 in order to compare against modelled levels of NO_x.

Defra has published in 2009 a methodology to calculate NO_x from NO_2 and as part of its LAQM toolkit[2]. The calculation method allows local authorities and air quality consultants to derive NO_2 and NO_x wherever NO_x is predicted by modelling emissions from roads e.g. using the DMRB (version 1.03c, July 2007) methodology. The calculation method incorporates the impact of expected changes in the fraction of NO_x emitted as NO_2 (f – NO_2) and changes in regional concentrations of NO_x, NO_2 and O_3.

Background concentrations for various pollutants are published and updated regularly by Defra, so it is possible to calculate the contribution of NO_x from road traffic at a particular location. If the ratio of the monitored road traffic contribution to the modelled road traffic contribution of NO_x is calculated, this factor can be applied to the component derived from road traffic emissions for any predictions of NO_x in the area. Therefore, it is possible to validate the model such that predictions should be within 10% of air quality measurements.

[2] http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html

Appendix 3
Modelling Procedure and Input Data

Appendix 3: Modelling Procedure and Input Data

The following Appendix summarises the input data and assumptions used in the modelling of air pollutants.

Traffic Data

The traffic flow data for Kentish Town Road has been taken from the Department for Transport's Matrix database of traffic count data and factored up with high growth factors where appropriate. For Grafton Road, manual peak hour traffic counts were undertaken to inform an AADT traffic flow. The traffic information is detailed below.

Traffic Flow Data

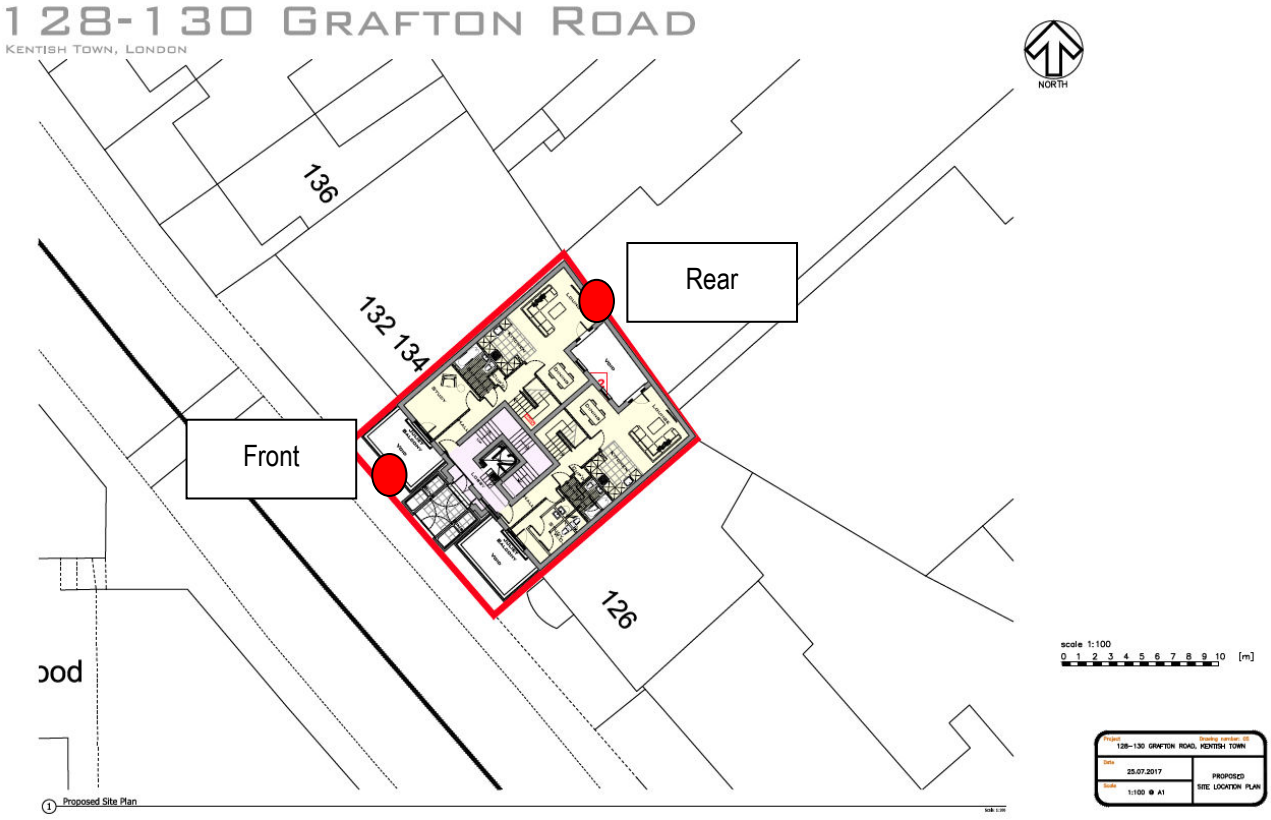
	AADT 2014	AADT 2019	% HGV
Kentish Town Road	20171	21730	4.2
Grafton Road	2501	2694	2.9

Background Concentration of Air Pollutants

At this location (as is typical in large parts of London) the monitored background concentrations of NO_2 are higher than the background concentrations of NO_2 and PM_{10} contained within the background maps contained within the UK National Air Quality Information Archive, as recommended by the Local Air Quality Management Technical Guidance TG(16). Consequently, the background concentrations from the Frognal Way Bloomsbury Background Monitoring Stations for 2014 has been utilised in all modelling. An annual mean concentration of 28.55 $\mu g/m^3$ of NO_2 has been used, along with an annual mean concentration of 20 $\mu g/m^3$ of PM_{10}.

Receptor Locations

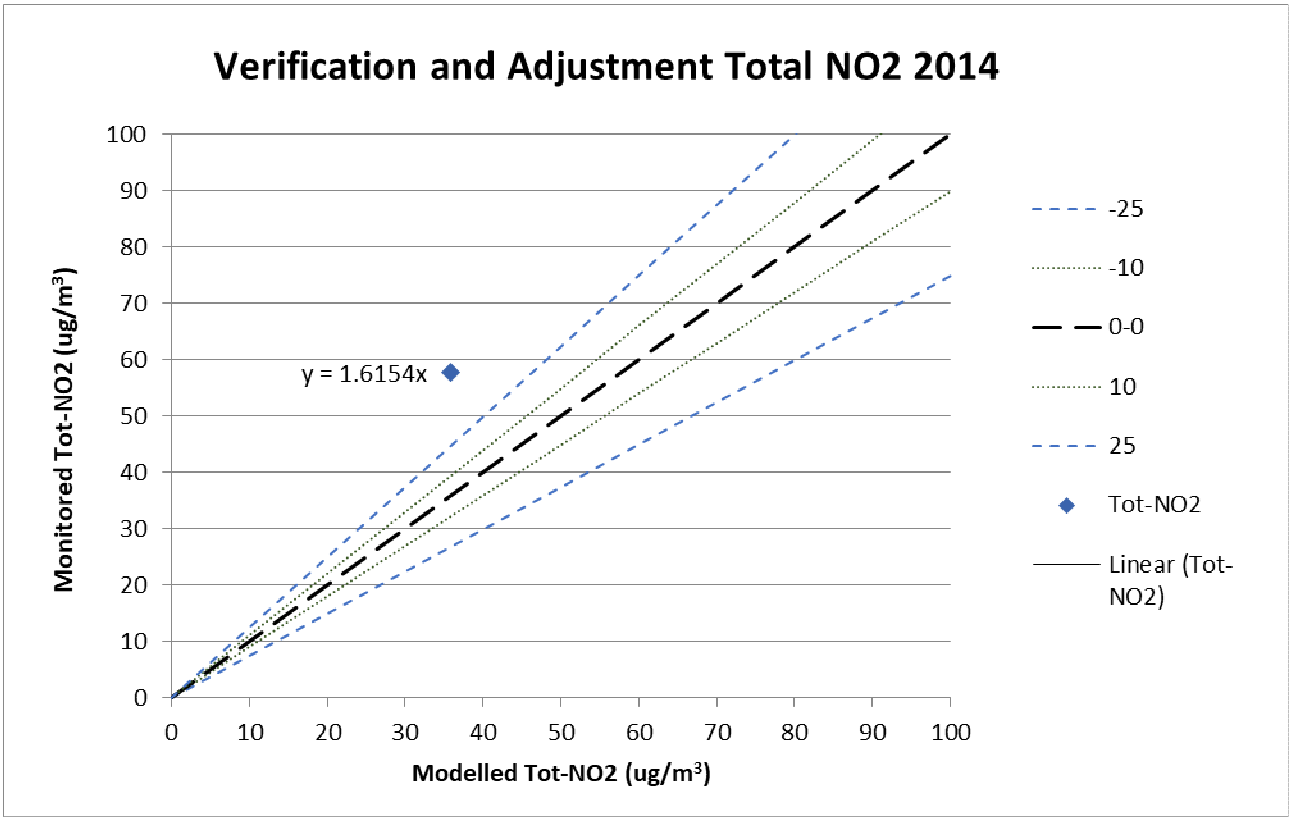
The site plan below shows the locations of the sample sensitive receptor locations used within the modelling:

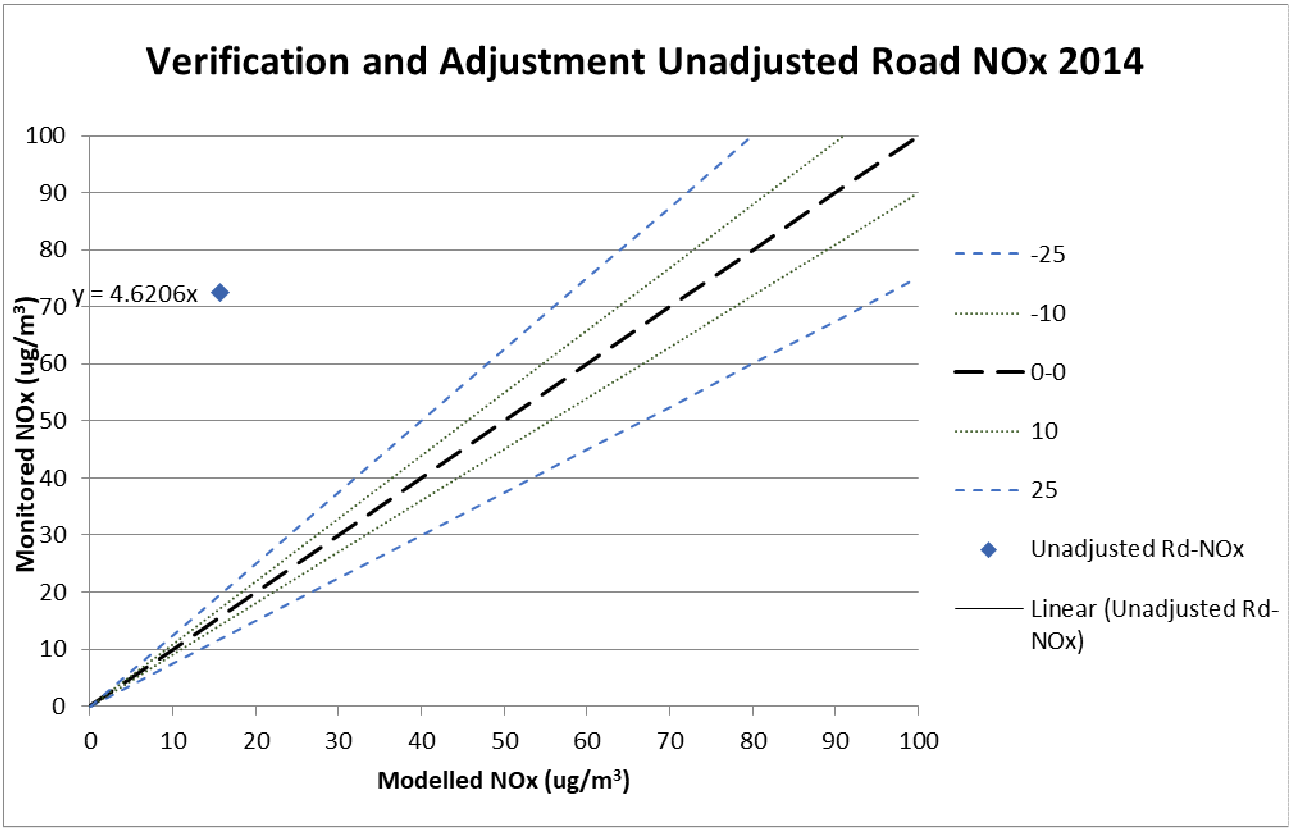


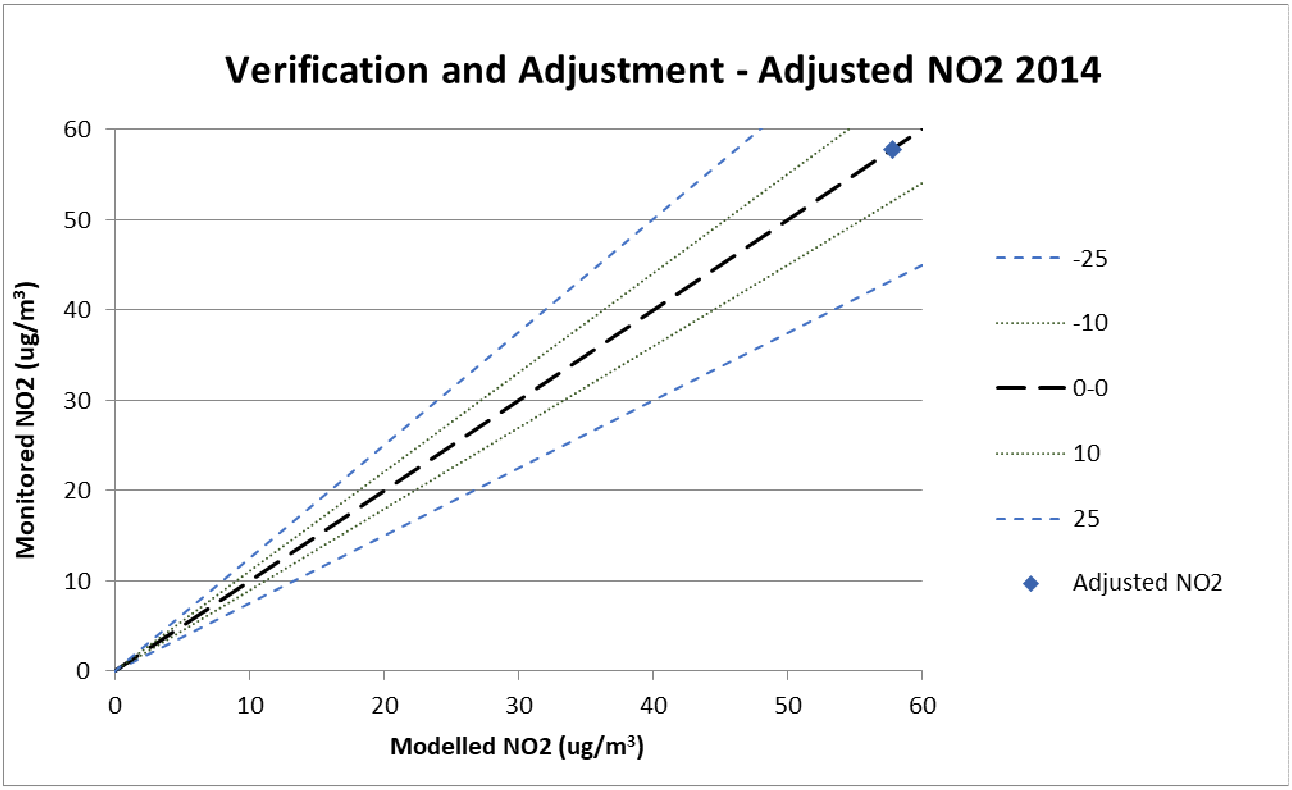
Verification and Adjustment

Verification of the air pollutant model was carried out in accordance with LAQM Technical Guidance TG16 using the data from the diffusion tube located in the vicinity of the site for 2014. The exercise required the modelling of the diffusion tube location for 2014 and comparing the modelled results with the monitoring results. The verification data is summarised below and shows that pollutant concentrations where under predicted using the model; therefore an adjustment factor of 4.62 was applied to the model contribution of NO_x.

	Modelled Rds NO_x	Modelled Tot-NO_2	Monitored Tot-NO_2	%Diff Mod/Mon Tot-NO_2	Modelled Rd-NO_x	Monitored Rd-NO_x	NO_x ADJ Corr1	Adj Mod Rd-NO_x	Adj Mod Tot-NO_2	Monitored Tot-NO_2	%Diff Mod/Mon Adj Tot-NO_2
Kentish Town Road	15.71	35.8	57.8	-38	15.71	72.59	4.62	72.58	57.83	57.8	0


Verification and Adjustment Total NO2 2014
Monitored Tot-NO2 (ug/m³)
Modelled Tot-NO2 (ug/m³)
y = 1.6154x
0
10
20
30
40
50
60
70
80
90
100
-25
-10
0-0
10
25
Tot-NO2
Linear (Tot-NO2)


Verification and Adjustment Unadjusted Road NOx 2014
Monitored NOx (ug/m³)
Modelled NOx (ug/m³)
y = 4.6206x
0
10
20
30
40
50
60
70
80
90
100
-25
-10
0-0
10
25
Unadjusted Rd-NOx
Linear (Unadjusted Rd-NOx)


Verification and Adjustment - Adjusted NO2 2014
Monitored NO2 (ug/m³)
Modelled NO2 (ug/m³)
0
10
20
30
40
50
60
-25
-10
0-0
10
25
Adjusted NO2