now part of

Torridon House

Air Quality Assessment

On behalf of **Westminster City Council**

City of Westminster

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Office Address: 10 Queen Square, Bristol, BS1 4NT
T: +44 (0)117 332 7840

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	Name	Position	Signature	Date
Prepared by:	Daniel Francis	Graduate Air Quality Scientist	D.F	October 2019
Reviewed by:	Kiri Heal	Senior Associate	K.H	October 2019
Approved by:	Cathy Hall	Director	C.H	October 2019
For and on behalf of Peter Brett Associates LLP				

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Executive Summary

The air quality effects associated with the construction and operational phases for the residential development on a car park located on land north of Torridon House, Westminster, London, have been assessed. The proposed development site is located within the boundary of the City of Westminster (CoW) and adjacent to the boundary of London Borough of Brent (LBB).

The assessment described the existing baseline air quality in proximity to the Site, considered the suitability of the Site for the Proposed Development and assessed the impact of the construction of the Development on local air quality. The main air pollutants of concern related to construction are dust and particulate matter (PM_{10}), and for road traffic they are nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$).

The construction phase assessment has identified appropriate mitigation to employ against construction dust impacts in accordance with the requirements of the SPG on 'The control of dust and emissions during construction and demolition. With mitigation in place the construction impacts are judged as being not significant

The development will have reduced parking associated with it and therefore the effect of development related traffic on local air quality has been scoped out of the assessment. An assessment to evaluate whether the proposed development is 'Air Quality Neutral' in terms of transport emissions has been undertaken. This assessment has shown that the development can be considered as 'air quality neutral' in terms of transport emissions and no further site specific mitigation is required.

Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been predicted for a number of worst-case locations representing future receptor locations within the Site. Air quality for future residents will be acceptable as there are no predicted exceedances of the relevant air quality strategy objectives within the proposed development. Whilst in 2018 the $PM_{2.5}$ concentration at the Site is predicted to be within 5% of the WHO guidelines (and would therefore be considered 'existing poor air quality' by the new London Plan), concentrations are predicted to have decreased by 2020 to below this threshold. Therefore, as per the relevant requirements of the NPPF and London Plan, the site is considered suitable for the proposed residential development

The proposed development is therefore considered to be in accordance with the requirements of the NPPF, London Plan (and accompanying SPG), Westminster City Plan, CoW AQAP and National and European regulations regarding Air Quality.

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1 Introduction

1.1 Proposed Development

1.1.1 Westminster City Council (WCC) has commissioned Peter Brett Associates LLP (PBA), now part of Stantec to undertake an air quality assessment to support a planning application for the proposed redevelopment of a car park located north of Torridon House for residential purposes. The proposed development site is located within the boundary of the Westminster City Council.

1.1.2 The application seeks detailed planning permission for:

"Demolition of existing structures including storage sheds and redevelopment of existing car park to provide 21 residential units (Use Class C3) in the form of two blocks including a 5 storey flat block and a three storey row of mews houses, provision of replacement car parking, cycle parking, boundary treatment including replacement entrance gates, storage reprovision, landscaping and associated works."

1.2 Scope

1.2.1 This report describes existing air quality within the study area, considers the suitability of the site for residential development, and assesses the impact of the construction on air quality in the surrounding area. The main air pollutants of concern related to construction are dust and particulate matter (PM_{10}), and for road traffic are nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$.

1.2.2 The current car park at the site includes 37 spaces, the proposed development will include 19 spaces (17 re-provided spaces and 2 "new" dedicated disabled bays). The reduction in car parking spaces will lead to a reduction in vehicle movements associated with the site and therefore the effect of development related traffic on local air quality has been scoped out of the assessment.

1.2.3 An assessment to evaluate whether the proposed development is 'Air Quality Neutral' in terms of transport emissions has, however, been undertaken.

1.2.4 The assessment has been prepared taking into account relevant local and national guidance and regulations.

2 Relevant Legislation, Policy and Guidance

2.1 The Air Quality Strategy

2.1.1 The Air Quality Strategy (2007) establishes the policy framework for ambient air quality management and assessment in the UK (Defra, 2007). The primary objective is to ensure that everyone can enjoy a level of ambient air quality which poses no significant risk to health or quality of life. The Strategy sets out the National Air Quality Objectives (NAQOs) and Government policy on achieving these objectives.

2.1.2 Part IV of the Environment Act 1995 introduced a system of Local Air Quality Management (LAQM) (Environment Act, 1995). This requires local authorities to regularly and systematically review and assess air quality within their boundary, and appraise development and transport plans against these assessments. The relevant NAQOs for LAQM are prescribed in the Air Quality (England) Regulations 2000 (Statutory Instrument, 2000) and the Air Quality (Amendment) (England) Regulations 2002 (Statutory Instrument, 2002).

2.1.3 Where an objective is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the objectives within its AQMA.

2.1.4 The Local Air Quality Management Technical Guidance 2016, issued by the Department for Environment, Food and Rural Affairs (Defra) for local authorities provides advice as to where the NAQOs apply (LAQM.TG(16); Defra, 2016). These include outdoor locations where members of the public are likely to be regularly present for the averaging period of the objective (which vary from 15 minutes to a year). Thus, for example, annual mean objectives apply at the façades of residential properties, whilst the 24-hour objective (for PM_{10}) would also apply within the garden. They do not apply to occupational, indoor or in-vehicle exposure.

2.2 Clean Air Strategy 2019

2.2.1 The Clean Air Strategy aims to lower national emissions of pollutants, thereby reducing background pollution and minimising human exposure to harmful concentrations of pollution. It proposes “tough new goals to cut public exposure to particulate matter pollution, as recommended by the World Health Organization”. The Strategy will create a stronger and more coherent framework for action to tackle air pollution (Defra, 2019a).

2.3 EU Limit Values

2.3.1 The Air Quality Standards (Amendment) Regulations 2016 amended the Standard Regulations 2010, which implemented the European Union’s Directive on ambient air quality and cleaner air for Europe (2008/50/EC), and includes limit values for NO_2 (Statutory Instrument, 2016). These limit values are numerically the same as the NAQO values but differ in terms of compliance dates, locations where they apply and the legal responsibility for ensuring that they are complied with. The compliance date for the NO_2 EU Limit Value was 1 January 2010, five years later than the date for the NAQO.

2.3.2 Directive 2008/50/EC consolidated the previous framework directive on ambient air quality assessment and management and its first three daughter directives. The limit values remained unchanged, but it now allows Member States a time extension for compliance, subject to European Commission (EC) approval.

2.3.3 The Directive limit values are applicable at all locations except:

- Where members of the public do not have access and there is no fixed habitation;

- On factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply; and
- On the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access.

Air Quality Objectives

Human Health

2.3.4 The NAQOs for NO_2 and PM_{10} set out in the Air Quality Regulations (England) 2000 (Statutory Instrument, 2000) and the Air Quality (England) (Amendment) Regulations 2002 (Statutory Instrument, 2002), are shown in **Table 2.1.**

Table 2.1 NO_2 and PM_{10} Objectives

Pollutant	Time Period	Objective
Nitrogen Dioxide (NO_2)	1-hour mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual mean	40 µg/m^3
Particulate Matter (PM_{10})	24-hour mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual mean	40 µg/m^3

2.3.5 The objectives for NO_2 and PM_{10} were to have been achieved by 2005 and 2004, respectively, but also continue to apply in all future years thereafter. Analysis of long-term monitoring data suggests that if the annual mean NO_2 concentration is less than 60 µg/m^3 then the one-hour mean NO_2 objective is unlikely to be exceeded where road transport is the main source of pollution. Therefore, in this assessment this concentration has been used to screen whether the one-hour mean objective is likely to be achieved (Defra, 2016). Similar to NO_2, a PM_{10} annual mean below 32 µg/m^3 is used to screen whether the 24-hour PM_{10} mean objective is likely to be achieved (Defra, 2016).

2.3.6 The Air Quality Strategy 2007 (Defra, 2007) includes an exposure reduction target for smaller particles known as $PM_{2.5}$. These are an annual mean target of 25 µg/m^3 by 2020 and an average urban background exposure reduction target of 15% between 2010 and 2020.

2.3.7 The Ambient Air Quality and Cleaner Air for Europe directive (2008/50/EC) was adopted in May 2008, and includes a national exposure reduction target, a target value and a limit value for $PM_{2.5}$, shown in **Table 2.2.** The UK Government transposed this new directive into national legislation in June 2010.

Table 2.2 $PM_{2.5}$ Objectives

	Time Period	Objective	To be Achieved by
UK Objectives	Annual mean	25 µg/m^3	2020
	3 year running annual mean	15% reduction in concentrations measured at urban background sites	Between 2010 and 2020
European Obligations	Annual mean	Target value of 25 µg/m^3	2010

	Time Period	Objective	To be Achieved by
	Annual mean	Limit value of 25 µg/m^3	2015
	Annual mean	Stage 2 indicative Limit value of 20 µg/m^3	2020
	3 year Average Exposure Indicator (AEI) (a)	Exposure reduction target relative to the AEI depending on the 2010 value of the 3 year AEI (ranging from a 0% to a 20% reduction)	2020
	3 year Average Exposure Indicator (AEI)	Exposure concentration obligation of 20 µg/m^3	2015

(a) The 3 year annual or AEI is calculated from the $PM_{2.5}$ concentration averaged across all urban background monitoring locations in the UK e.g. the AEI for 2010 is the mean concentration measured over 2008, 2009 and 2010.

2.3.8 The Draft London Plan (GLA, 2019) in section 9.1.1A states that the Mayor is working towards achieving World Health Organisation guidelines for $PM_{2.5}$ of 10 µg/m^3 as an annual mean.

2.4 Planning Policy

National Policy

2.4.1 The revised National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how they are expected to be applied (Ministry of Housing, Communities & Local Government, 2019) and the following paragraphs are relevant from an air quality perspective.

2.4.2 Paragraph 170 on conserving and enhancing the natural environment states:

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land stability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans, and…"

2.4.3 Paragraph 180 within ground conditions and pollution states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."

2.4.4 Paragraph 181, also states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

2.4.5 Paragraph 182 states that:

"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed"

Planning Practice Guidance

2.4.6 Planning Practice Guidance (PPG) (Planning Practice Guidance, 2019) was first published in March 2014 to support the National Planning Policy Framework.

2.4.7 Paragraph 005, Reference 32-005-20191101 (revision date 01.11.2019), of the PPG provides guidance on how considerations regarding air quality can be relevant to the development management process as follows:

"Whether 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 have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity.

Where air quality is a relevant consideration the local planning authority may need to establish:

- *The 'baseline' local air quality, including what would happen to air quality in the absence of the development;*
- *Whether the proposed development could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity); and*
- *Whether occupiers or users of the development could experience poor living conditions or health due to poor air quality.*

2.4.8 Paragraph 006, Reference 32-006-20191101 (revision date 01.11.2019), of the PPG identifies what specific air quality issues need to be considered in determining a planning application:

"Considerations that may be relevant to determining a planning application include whether the development would:

- *Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; and significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*

- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;*

- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*

- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations; and*

- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value."*

2.4.9 Paragraph 007, Reference 32-007-20191101 (revision date 01.11.2019), of the PPG provides guidance on how detailed an assessment needs to be;

"Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific."

and

"The following could form part of assessments:

- *A description of baseline conditions and any air quality concerns affecting the area, and how these could change both with and without the proposed development;*

- *Sensitive habitats (including designated sites of importance for biodiversity);*

- *the assessment methods to be adopted and any requirements for the verification of modelling air quality;*

- *The basis for assessing impacts and determining the significance of an impact;*

- *Where relevant, the cumulative or in-combination effects arising from several developments;*

- *Construction phase impacts;*

- *Acceptable mitigation measures to reduce or remove adverse effects; and*

- *Measures that could deliver improved air quality even when legally binding limits for concentrations of major air pollutants are not being breached."*

2.4.10 Paragraph 008, Reference 32-008-20140306 (revision date 01.11.2019), of the PPG provides guidance on how an impact on air quality can be mitigated;

"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented. Planning conditions and obligations can be used to secure mitigation where the relevant tests are met.

Examples of mitigation include:

- *Maintaining adequate separation distances between sources of air pollution and receptors;*
- *Using green infrastructure, trees, where this can create a barrier or maintain separation between sources of pollution and receptors;*
- *Appropriate means of filtration and ventilation;*
- *Including infrastructure to promote modes of transport with a low impact on air quality (such as electric vehicle charging points);*
- *Controlling dust and emissions from construction, operation and demolition; and*
- *Contributing funding to measures, including those identified in air quality action plans and low emission strategies, designed to offset the impact on air quality arising from new development."*

The London Plan

2.4.11 The London Plan Consolidated with Alterations since 2011 provides strategic planning guidance for Greater London (Greater London Authority, 2016). Each borough's development plans must be in "general conformity" with it.

2.4.12 The Plan includes Policy 7.14 (Improving Air Quality) which states that 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 in likely to be used by large numbers of people vulnerable to poor air quality, such as steps to promote greater use of sustainable transport modes;*
- *Promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the Greater London Authority 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 AQMAs);*
- *Ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where this provision is demonstrated to be impractical or inappropriate, and that 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; and*
- *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".*

2.4.13 Boroughs and others with relevant responsibilities should also have policies that:

- *"Seek reductions in levels of pollutants referred to in the Government's National Air Quality Strategy having regard to the Mayor's Air Quality Strategy; and*

- *Take account of the findings of the Air Quality Review and Assessments and Action Plans, in particular where* AQMAs have been designated."

2.4.14 The Mayor will work with strategic partners to ensure the spatial, transport and design policies of the London Plan support his Air Quality Strategy.

2.4.15 The Plan also includes Policy 8.2 (Planning Obligations) which states that the Mayor will provide guidance for boroughs and other partners on the preparation of frameworks for negotiations on planning obligations reflecting strategic priorities including the improvement of Air Quality.

Draft London Plan

2.4.16 The Draft New London Plan Draft London Plan – Consolidated Suggested Changes Version was published in July 2019. The Plan was subject to Examination in 2018 and the published final London Plan is expected in February /March 2020.

2.4.17 The current 2016 Plan is still the adopted Development Plan, but the Draft New London Plan is a material consideration in planning decisions. The significance given to it is a matter for the decision maker, but it gains more weight as it moves through the process to adoption.

2.4.18 Policy Planning for Good Growth 3 on creating a healthy City states:

"*To improve Londoners' health and reduce health inequalities, those involved in planning and development must:*

… DB seek to improve London's air quality, reduce public exposure to poor air quality and minimise inequalities in levels of exposure to air pollution..."

2.4.19 The draft Plan includes Policy Sustainable Infrastructure 1 (SI1) Improving Air Quality which aims to:

"*...ensure that new developments are designed and built, as far as is possible,* ***to improve local air quality and reduce the extent to which the public are exposed to poor air quality****. This means that new developments, as a minimum, must not cause new exceedances of legal air quality standards, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits*".

2.4.20 Policy SI1 Improving Air Quality continues and states:

"A Development plans, through relevant strategic, site-specific and area-based polices should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.

B To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:

1) Development proposals should not:

a) lead to further deterioration of existing poor air quality

b) create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits

c) create unacceptable risk of high levels of exposure to poor air quality.

2) In order to meet the requirements in Part 1, as a minimum:

a) Development proposal must be at least air quality neutral

b) Development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retrofitted mitigation measures.

c) Major development proposal must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1

d) Development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality such as children or older people, should demonstrate that design measures have been used to minimise exposure. (Panel recommendations October 2019).

C Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating:

a) How proposals have considered ways to maximise benefits to local air quality, and

b) What measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this.

D In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance.

E Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of the development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emission cannot be further reduced by on-suite measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development."

2.4.21 Paragraph 9.1.8 defines Air Quality Focus Areas (AQFA) as:

"Air Quality Focus Areas (AQFA) are locations that not only exceed the EU annual mean limit value for nitrogen dioxide (NO2) but are also locations with high human exposure. AQFAs are not the only areas with poor air quality but they have been defined to identify areas where currently planned national, regional and local measures to reduce air pollution may not fully resolve poor air quality issues. There are currently 187 AQFAs across London.

2.4.22 Paragraph 9.1.2A defines 'Poor Air Quality':

"Where this policy refers to 'existing poor air quality' this should be taken to include areas where legal limits for any pollutant, or World Health Organization targets for Particulate Matter, are already exceeded and areas where current pollution levels are within 5% of these limits"

2.4.23 Paragraph 9.1.6C provides advice on the interpretation of the results of 'Air Quality Neutral' Assessments:

"For most minor developments achieving Air Quality Neutral will be enough to demonstrate that they are in accordance with Part B1 of this policy. However, where characteristics of the development or local features raise concerns about air quality, or where there are additional requirements for assessments in local policy, a full Air Quality Assessment may be required.

Additional measures may also be needed to address local impacts. Guidance on Air Quality Neutral will set out streamlined assessment procedures for minor developments."

London Environmental Strategy

2.4.24 The London Environmental Strategy, published in May 2018, evaluates the current condition of London's environment at a city-wide level (Mayor of London, 2018). This is the first strategy to bring together approaches to every aspect of London's environment, integrating the following areas:

- air quality
- green infrastructure
- climate change mitigation and energy
- waste
- adapting to climate change
- ambient noise
- low carbon circular economy

2.4.25 The Strategy aims, among other objectives:

"*for London to have the best air quality of any major world city by 2050, going beyond the legal requirements to protect human health and minimise inequalities*".

2.4.26 Chapter 4 on Air Quality includes a series of objectives, policies and proposals to improve air quality. Several key issues have been highlighted to be addressed in the strategy:

- Achieving legal compliance as quickly as possible;
- Diesel vehicles, especially cars and vans;
- Tackling all sources of pollution;
- Government action;
- Maximising co-benefits between air quality and climate change policies; and
- Further reductions are needed in PM_{10} and $PM_{2.5}$, particularly from transboundary pollution, tyre and brake wear, and wood burning.

Sustainable Design and Construction Supplementary Planning Guidance

2.4.27 Supplementary Planning Guidance (SPG) on 'Sustainable Design and Construction' adopted in April 2014 forms part of the Implementation Framework for the London Plan (Greater London Authority, 2014a). For air pollution, the Mayor's Priorities are stated as:

- *"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 (of the document); and*

- *Developers and contractors should follow the guidance set out in the SPG on 'The control of dust and emissions during construction and demolition' when constructing their development (Greater London Authority, 2014b)."*

2.4.28 The SPG requires that air quality assessments are prepared for major developments where the development:

- is located within an AQMA;

- is likely to result in a new air pollution exceedance;

- is located within 150 m of a sensitive receptor (schools, hospitals, care homes, nurseries, residential development);

- will bring sensitive receptors into an area of poor air quality;

- includes biomass boilers and/or combined heat and power; and

- involves waste management/treatment activities, mineral extraction or any other general industrial combustion process.

2.4.29 For major developments that meet the above criteria, an air quality assessment is required to be submitted with the planning application and include:

- a review of air quality around the development site using existing air quality monitoring and/or modelling data;

- air quality dispersion modelling data carried out in accordance with the London Councils Air Quality and Planning Guidance;

- an indication of the number of people (receptors) which will be exposed to poor air quality as a result of the development, and show their location on a map;

- an assessment of the impact on air quality during the construction phase and detailed mitigation methods for controlling dust and pollution emissions in line with the adopted SPG on 'The control of dust and emissions from construction and demolition';

- 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; and

- a maintenance regime for any combustion equipment or mitigation measures.

2.4.30 The SPG provides guidance on:

- Minimising air quality emissions from location, transport, construction and demolition, and design and occupation;

- Protecting internal air quality;

- What is meant by 'air quality neutral';

- Emissions standards for combustion plant; and

- Offsetting provisions.

2.4.31 ‘Air quality neutral’ applies across London as a whole and emission benchmarks have been proposed in terms of buildings’ operation and transport emissions in order to meet these criteria. It is understood that the benchmark should be capable of being met without the need for significant additional mitigation.

2.4.32 Where individual and/or communal gas fired boilers are installed in commercial and domestic buildings they should achieve a NO_x rating of less than 40mgNO_x/kWh. If the particular combustion equipment is not known at the time of the planning application, developers are required to provide a written statement of their commitment and ability to meet the emissions standards within their Air Quality Assessments.

2.4.33 Where developments do not meet the air quality neutral benchmarks, it is suggested that appropriate on-site mitigation measures will be required to off-set any excess in emissions. Measures could include:

- Green planting/walls and screens;
- Upgrade or abatement work to combustion plant;
- Retro-fitting abatement technology for vehicles and flues; and
- Exposure reduction.

Control of Dust and Emissions During Construction and Demolition Supplementary Planning Guidance

2.4.34 In addition, as part of the Implementation Framework for the London Plan, a SPG on ‘The control of dust and emissions during construction and demolition’ was published in July 2014 (Greater London Authority, 2014b).

2.4.35 This SPG requires an ‘Air Quality and Dust Risk Assessment’ to be submitted at the time of a planning application; with an Air Quality and Dust Management Plan submitted prior to the commencement of works.

2.4.36 It also provides guidance for:

- The preparation of an ‘Air Quality and Dust Risk Assessment’ for construction and demolition activities, including air quality (dust) risk assessments;
- The stages of development the ‘Air Quality and Dust Risk Assessment’ is to cover include demolition, earthwork, construction stages and trackout (vehicles leaving the site);
- The identification of the potential scale (large, medium, small) of dust emissions for each stage of work;
- The identification of the level of risk due to the scale of dust emissions on soiling (dirt), health and the natural environment, depending on the duration of the activities, their intensity, the prevailing meteorological conditions, the existing levels of background pollution and the sensitivity of receptors to dust;
- Best practice methods for controlling dust and pollution control on-site and to prevent trackout;
- Recommendations for monitoring low, medium- and/or high-risk sites; and
- Early notification of new 2015 and 2020 standards for non-road mobile machinery.

Local Policy

Westminster Unitary Development Plan

2.4.37 Westminster's Unitary Development Plan (UDP) was approved by full council on 24 January 2007, and parts of it were 'saved' by the Secretary of State on the 24 January 2010. Saved Policy ENV 5 aims to reduce air pollution and states:

"(A) The City Council will encourage new development that does not lead to an increase in local air pollution.

(B) The City Council will promote measures to improve air quality, in particular encouraging developers to minimise global and local air pollution and emission of odours by:

1) minimising traffic generated by developments

2) using natural ventilation systems and lighting wherever possible

3) using the most energy efficient forms of heating, air conditioning and active ventilation systems

4) careful design and siting of central heating and ventilation exhausts

5) avoiding or reducing emissions from the burning of fossil fuels

6) following the Westminster Considerate Builders' code of practice to contain dust and fumes on building sites.

(C) For those developments that require air conditioning systems, the City Council will encourage use of dry rather than wet systems.

(D) The City Council will monitor air pollutants, including those from motor vehicles, and seek reductions in those pollutants.

(E) When considering applications for development involving the storage or use of hazardous substances, the City Council will seek the advice of the Health and Safety Executive concerning the nature and severity of the risks presented by potential major hazards to people in the surrounding area."

Westminster City Plan

2.4.38 The revised Westminster City Plan (WCP) was adopted in November 2016 and includes policies to deliver sustainable development in the city (WCC, 2016). Policy S31 on air quality states:

"The Council will require a reduction of air pollution, with the aim of meeting the objectives for pollutants set out in the national strategy.

Developments will minimise emissions of air pollution from both static and traffic generated sources.

Developments that include uses that are more vulnerable to air pollution (Air Quality Sensitive Receptors) will minimise the impact of poor air quality on occupants through the design of the building and appropriate technology. "

Westminster Air Quality Manifesto

2.4.39 The Westminster Air Quality Manifesto was formally adopted in March 2018 and presents a series of pledges setting out their commitment to improve Westminster's air quality (WCC, 2018). Priorities include:

- Reducing or cleaning dirty journey and creating better infrastructure for electric and low emission vehicles;

- Placing emissions and pollution in the forefront of decision making on public spaces and buildings and encouraging all those who shape spaces and buildings to do likewise;

- Making cleaner and environmentally friendly options easier for our residents and changing behaviour; and

- Moving the air quality agenda forward through thought leadership and innovation, and encouraging the academic community of Westminster.

Air Quality Action Plan

2.4.40 WCC has declared the entire city as an AQMA due to exceedances of the annual mean and one-hour mean NO_2 objectives, as well as the annual mean and 24-hour mean PM_{10} objective. As a result of this declaration, the Council is required to produce an AQAP. The City of Westminster Air Quality Action Plan 2013-2018 (WCC, 2013) describes measures aimed at reducing air pollution across the city. Principal measures include:

- Tackling emissions from transport, i.e. support schemes to encourage people to use other forms of sustainable travel such as walking and cycling, promote the implementation of travel plans for schools and businesses and undertake local communication campaigns to raise awareness of the benefit of fuel-efficient vehicles;

- Tackling emissions from Buildings and Development, i.e. strengthen and further develop air quality policy in the emerging local planning documents in order to develop transparent air quality assessment methodology, prioritise low polluting transport options in the development and include air quality requirements in Sustainable Design SPD to help reduce unwanted emissions from boilers; and

Increasing awareness of air pollution, i.e. monitor air pollution across the city and periodically review the air quality monitoring network, undertake communication campaigns to raise awareness of air pollution health impacts.

3 Methodology

3.1.1 The assessment methodology detailed in the following sections has been applied to ascertain the potential impacts of emissions to air in order to identify their acceptability and compliance with policy and regulatory requirements (outlined in Section 2 of this report), or whether additional mitigation is required.

3.1.2 This assessment first identifies the existing air quality within the Study Area and considers the suitability of the Site for the proposed end-use. The potential impact of construction and operational activities on air quality and sensitive receptors in the Study Area is then assessed.

3.2 Study Area

3.2.1 The Study Area adopted for this assessment is:

- For the construction phase assessment, the Study Area (based on IAQM, 2014 guidance) is defined as up to 350m from the development or 50m from the route of construction vehicles up to 500m from the site entrance; and,
- For the operational phase assessment, the Study Area (based on IAQM, 2017 guidance) is defined as all roads within 250m of the development.

3.3 Baseline Air Quality

3.3.1 Information on existing air quality has been obtained by collating the results of monitoring carried out the WCC. Background concentrations for the site have been defined using the national pollution maps published by Defra. These cover the whole country on a 1x1 km grid (Defra, 2019b).

3.4 Construction Impacts

3.4.1 During demolition and construction, the main potential impacts are dust soiling (potentially causing annoyance effects) and locally elevated concentrations of PM_{10}.(potentially causing health effects)

3.4.2 The suspension of particles in the air is dependent on surface characteristics, weather conditions and on-site activities. Impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source.

3.4.3 Separation distance is also an important factor. Large dust particles (greater than 30µm), responsible for most dust annoyance, will largely deposit within 100 m of sources. Intermediate particles (10-30µm) can travel 200 – 500 m. Consequently, significant dust annoyance is usually limited to within a few hundred metres of its source. Smaller particles (less than 10µm) are deposited slowly and may travel up to 1 km; however, the impact on the short-term concentrations of PM_{10} occurs over a shorter distance. This is due to the rapid decrease in concentrations with distance from the source due to dispersion.

3.4.4 The Greater London Authority has issued Supplementary Planning Guidance (SPG) on 'The control of dust and emissions during demolition and construction' (GLA, 2014b). This SPG informs the methodology used in this assessment.

3.4.5 The assessment methodology considers three separate potential dust impacts with account being taken of the sensitivity of the area that may experience these effects:

- annoyance due to dust soiling;
- the risk of health effects due to an increase in exposure to PM_{10}; and

- harm to ecological receptors.

3.4.6 The first stage of the assessment involves a screening to determine if there are sensitive receptors within threshold distances of the site activities associated with the construction phase of the scheme; defined as the study area. No further assessment is required if there are no receptors within the study area.

3.4.7 The assessment of potential risk is determined by considering the risk of dust impacts arising from four activities in the absence of mitigation:

- demolition;
- earthworks;
- construction; and
- track-out.

3.4.8 In accordance with the SPG, the dust emission magnitude is defined as either large, medium or small in **Table 3.1** taking into account the general activity descriptors on site and professional judgement.

3.4.9 The sensitivity of the study area to construction dust impacts is defined as high, medium and low in **Table 3.2,** taking into account professional judgement.

Table 3.1 Indicative Criteria for Dust Emission Magnitude

Dust Emission Magnitude	Activity
Large	**Demolition** >50,000 m^3 building demolished, dusty material (i.e. concrete), on-site crushing/screening, demolition >20 m above ground level
	Earthworks >10,000 m^2 site area, dusty soil type (i.e. clay), >10 earth moving vehicles active simultaneously, >8 m high bunds formed, >100,000 tonnes material moved
	Construction >100,000 m^3 building volume, on site concrete batching, sandblasting
	Trackout >50 HDVs out / day, dusty soil type (i.e. clay), >100 m unpaved roads
Medium	**Demolition** 20,000 – 50,000 m^3 building demolished, dusty material (i.e. concrete) 10 – 20 m above ground level
	Earthworks 2,500 – 10,000 m^2 site area, moderately dusty soil (i.e. silt), 5 – 10 earth moving vehicles active simultaneously, 4 m – 8 m high bunds, 20,000 -100,000 tonnes material moved
	Construction 25,000 – 100,000 m^3 building volume, on site concrete batching
	Trackout 10 - 50 HDVs out / day, moderately dusty surface material, 50 – 100 m unpaved roads
Small	**Demolition** <20,000 m^3 building demolished, non-dusty material, <10 m above ground level, work in winter

Dust Emission Magnitude	Activity
	Earthworks <2,500 m^2 site area, non-dusty soil, <5 earth moving vehicles active simultaneously, <4 m high bunds, <20,000 tonnes material moved
	Construction <25,000 m^3, non-dusty material
	Trackout <10 HDVs out / day, non-dusty soil, < 50 m unpaved roads

Table 3.2 Indicative Area Sensitivity Definitions

Area Sensitivity	People and Property Receptors	Ecological Receptors
High	>100 dwellings, hospitals, schools, care homes within 50 m 10 – 100 dwellings within 20 m Museums, car parks, car showrooms within 50 m PM_{10} concentrations approach or are above the daily mean objective.	National or Internationally designated site within 20 m with dust sensitive features / species present
Medium	>100 dwellings, hospitals, schools, care homes within 100m 10 – 100 dwellings within 50 m < 10 dwellings within 20 m Offices/shops/parks within 20 m PM_{10} concentrations below the daily mean objective.	National or Internationally designated site within 50 m with dust sensitive features / species present Nationally designated site or particularly important plant species within 20 m
Low	>100 dwellings, hospitals, schools, care homes 100 –350 m away 10 – 100 dwellings within 50 – 350 m < 10 dwellings within 20 – 350 m Playing fields, parks, farmland, footpaths, short term car parks, roads, shopping streets PM_{10} concentrations well below the daily mean objective.	Nationally designated site or particularly important plant species 20 – 50 m Locally designated site with dust sensitive features within 50 m

3.4.1 Based on the dust emission magnitude and the area sensitivity, the risk of dust impacts is then determined (**Table 3.3**, **Table 3.4** and **Table 3.5**), taking into account professional judgement.

Table 3.3 Risk of Dust Impacts - Demolition

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

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

Table 3.4 Risk of Dust Impacts - Earthworks and Construction

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

Table 3.5 Risk of Dust Impacts - Trackout

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

3.4.2 Based on the risk of dust impacts, appropriate mitigation is selected from the IAQM guidance using professional judgement.

Significance Criteria

3.4.3 The construction impact significance criteria are based on the SPG on 'The control of dust and emissions during construction and demolition'. The guidance recommends that no assessment of the significance of effects is made without mitigation in place, as mitigation is assumed to be secured by planning conditions, legal requirements or required by regulations.

3.4.4 With appropriate mitigation in place, the residual effect of construction impacts on air quality is assessed as not significant.

3.5 Road Traffic Impacts

Sensitive Receptor Locations

3.5.1 Relevant sensitive locations are places where members of the public might be expected to be regularly present over the averaging period of the objectives. For the annual mean and daily mean objectives that are the focus of this assessment, sensitive receptors will generally be residential properties, schools, nursing homes, etc. When identifying these receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, and where there is potential for a combined effect of several road links.

3.5.2 Based on the above criteria, five receptor locations within the proposed development site have been chosen in order to assess the suitability of the site for residential development (shown in **Appendix F, Figure 1**). Receptor locations were modelled at a height of 1.5m representing residential exposure at ground floor level at the site boundary, as appropriate; such receptors are described in Table 3.6 below. The proposed receptors were chosen to represent locations where impacts from road traffic related emissions from B450 Kilburn Lane are likely to be the greatest, i.e. on the western boundary of the site.

3.5.3 Concentrations have also been predicted at the automatic monitoring station at Ark Franklin School in order to verify the modelled results (see **Appendix C** for further details on the verification method).

Table 3.6 Proposed Receptors Description

Receptor	Location	Height (m)
PR1	Northern Façade	1.5
PR2	Eastern Façade	1.5
PR3	Southern Façade	1.5
PR4	Western Façade	1.5
PR5	North-Western Façade	1.5

Impact Predictions

3.5.4 Predictions have been carried out using the ADMS-Roads dispersion model (v4.1.1). The model requires the user to provide various input data, including the Annual Average Daily Traffic (AADT) flow, the proportion of Heavy Duty Vehicles (HDVs), road characteristics (including road width and street canyon height, where applicable), and the vehicle speed. It also requires meteorological data. The model has been run using 2018 meteorological data from the Heathrow meteorological station, which are considered suitable for this area (see **Appendix D** for further details on the model inputs).

3.5.5 AADT flows and the proportions of HDVs, for roads within 250 m of the proposed development site and monitoring site have been extracted from London Atmospheric Emissions Inventory. Traffic data used in this assessment are summarised in **Appendix E**. No traffic data was available for Andover Place, which is located within 10m of the proposed receptor sites, therefore a nominal value of 500 AADT with the same fleet composition as the A5 was used to represent a 'worst case' traffic fleet.

3.5.6 Traffic emissions were calculated using the Emission Factor Toolkit (EFT) v9.0, which utilises NOx emission factors taken from the European Environment Agency COPERT 5 emission tool. The traffic data were entered into the EFT, along with speed data to provide combined emission rates for each of the road links entered into the model. Road vehicular emissions are primarily associated with the exhaust emissions but also include particles generated from abrasion (of tyres, brakes and road). The EFT allows users to calculate road vehicle pollutant emission rates for NOx, PM_{10}, (exhaust and brake, tyre and road wear) and $PM_{2.5}$ (exhaust and brake, tyre and road wear) for a specified year, road type, vehicle speed and vehicle fleet composition.

3.5.7 The EFT provides pollutant emission rates for 2017 through to 2030 and takes into consideration the following information available from the National Atmospheric Emissions Inventory (NAEI):

- fleet composition data for motorways, urban and rural roads in London and rest of the UK;
- fleet composition based on European emission standards from pre-Euro I to Euro 6(a-d)/VI;
- scaling factors reflecting improvements in the quality of fuel and some degree of retrofitting; and
- technology conversions in the national fleet.

3.5.8 As a result of this the road vehicle exhaust emissions are projected to decrease year-on-year due to technological advances and improvements to the fleet mix i.e. penetration of Euro VI HGVs, which recent research suggests are performing well. Whilst there is current uncertainty over NOx emissions from vehicle exhausts (particularly from Euro 5 and 6 LGVs) it is important to note the EFT is not based on the Euro emission standards. Specifically, the latest version of the EFT (v9.0) includes updated NOx and PM speed emission coefficient equations for Euro 5 and 6 vehicles taken from the European Environment Agency (EEA) COPERT 5 emission

calculation tool, reflecting emerging evidence on the real-world emission performance of these vehicles.

3.5.9 In order to take account of uncertainties relating to future year vehicle emissions, an assessment has been carried out utilising 2018 emission factors and background concentrations, thus assuming no improvement in vehicle emissions or concentrations

Significance Criteria

3.5.10 The relevant AQO are set out in **Table 2.1** and **Table 2.2.** There is no official guidance in the UK on how to assess the significance of air quality impacts of existing sources on a new development. The assessment has been limited to predicting air quality at the site and the significance of this is based on whether the AQOs for each pollutant are exceeded or not.

Assumptions and Limitations

3.5.11 There are many components that contribute to the uncertainty in predicted concentrations. The model used in this assessment is dependent upon the traffic data that have been input which will have inherent uncertainties associated with them. There is then additional uncertainty as the model is required to simplify real-world conditions into a series of algorithms.

3.5.12 A disparity between national road transport emissions projections and measured annual mean concentrations of nitrogen oxides and NO_2 has been identified in recent years. Whilst projections suggest that both annual mean nitrogen oxides and NO_2 concentrations from road traffic emissions should have fallen significantly over the past 6 – 8 years, at many monitoring sites levels have remained relatively stable, or have shown a slight increase.

3.5.13 The complete development modelling has been based on 2018 emission factors and background concentration. The model has been verified against 2018 monitoring data. This is considered to provide an appropriately conservative assessment taking into account the uncertainties regarding future vehicle emission factors.

3.6 Air Quality Neutral Calculations

3.6.1 The Air Quality Neutral calculations have been undertaken following the methodology described in the 'Air Quality Neutral Planning Support Update: GLA80391' guidance (Air Quality Consultants, 2014).

4 Baseline Air Quality

4.1 Limit Value

4.1.1 The Site is within the 'Greater London Urban Area' zone which Defra have reported to the EU as exceeding the annual average EU limit value for nitrogen dioxide and forms part of Defra's Air Quality Action Plan for NO_2.

4.1.2 A wide range of methods are being applied by Defra, GLA and Local authorities to reduce emission of air pollutants (as summarised in the **Section 2**) and of particular relevance to the development are controls relating to emissions from road traffic within London.

4.1.3 The London Low Emission Zone (LEZ) incorporates the Site and currently requires compliance (or pay a daily access charge) with the Euro IV standard for particulate matter (PM) for HGV and the Euro 3 for vans. The Euro IV emission standards for PM and NOx are 0.02 g/kWh and 3.5g/kWh respectively.

4.1.4 From October 2020 this will be toughened to require compliance (or pay a £100-£300 daily access charge) with the Euro VI standard for both NOx and particulate matter. The Euro VI emission standards for PM and NOx are 0.01 g/kWh and 0.4 g/kWh respectively; this has the potential to lead to a significant decrease in NOx emissions from HGV traffic in the Study Area.

4.1.5 Subsequently the London Ultra low Emission Zone (ULEZ) is scheduled to be extended to encompass the Site in October 2021; the ULEZ also sets compliance requirements for cars and private hire vehicles (Euro 4 for petrol and Euro 6 for Diesel) and should lead to further significant reductions in traffic related emission in the Study Area.

4.2 LAQM

4.2.1 WCC has investigated air quality within its area as part of its responsibilities under the LAQM regime. A whole borough AQMA has been declared due to exceedances of the annual and hourly mean NO_2 objectives, as well as the annual mean and 24-hour mean PM_{10} objective.

4.2.2 The site is partially located in Kilburn Town Centre AQFA, and is approximately 850 metres from the A5 Edgeware Road AQFA.

4.3 Monitoring

NO_2

4.3.1 WCC carried out monitoring of NO_2 concentrations at a number of locations across the borough. The closest and most representative locations are located within LBB and the CoW are described below and shown in **Figure 2**. Data for these sites are presented in **Table 4.1.**

Table 4.1 Measured NO_2 Concentrations

Site ID	Site Type	Within AQMA	Annual Mean (µg/m³)				
			2014	2015	2016	2017	2018
Automatic Site							
BT8 Ark Franklin Primary School*	Roadside	Y	-	-	-	**-**	**46.5**
Diffusion Tubes							
BRT 56, Chamberlayne Road	Roadside	Y	**67.7**	**56.8**	**69.4**	**58.3**	-
BRT 57, Kilburn Bridge	Roadside		**86.2**	**85.3**	**84.2**	**64.4**	-
Objective		**40**					

Exceedances of the objective highlighted in bold. NO_2 annual means in excess of 60 µg/m^3 indicating a potential exceedance of the NO_2 hourly mean AQS objective are shown in bold and underlined.
BRT 56 2014 – 2017 data taken from the Brent Annual Status Report 2018.
BT8 Ark Franklin data downloaded from London Air webpage
*Used for model verification

4.3.2 Measured concentrations at the closest monitoring location to the development site, Ark Franklin Automatic Site, was above the annual mean objective in 2018. The 1-hour mean NO_2 objective was not exceeded in 2018. Measured concentrations at the BRT 56 and BRT 57 monitoring locations were above the annual mean objective. The predicted annual mean NO_2 concentrations exceed 60 µg/m^3 at BRT 57 in 2014-2017 and therefore exceedance of the 1-hour mean NO_2 objective in the area is likely.

4.3.3 The closest monitoring location BRT 57 is considered to be a busy road link. The proposed development site is located more than 70 m from the kerb of the A5 and therefore concentrations at the development site would be expected to be lower than the measured concentrations.

PM_{10} and $PM_{2.5}$

4.3.4 The results of the PM_{10} monitoring at Ark Franklin Automatic Site monitoring site are shown in Table 4.2 below. There is no $PM_{2.5}$ monitoring undertaken in close proximity to the proposed development site.

Table 4.2 Measured PM_{10} Concentrations

Site ID	2018
Annual Mean PM_{10} (µg/m^3)	
BT8 Ark Franklin Primary School	19.0
Objective	**40**
Number of days > 50µg/m^3	
BT8 Ark Franklin Primary School	1
Objective	**35**

4.3.5 Measured PM_{10} concentrations have been below the relevant objectives and limit values.

4.4 Background Concentrations

4.4.1 In addition to these measured concentrations, estimated background concentrations for the site have been obtained from the national maps provided by Defra (Table 5 3; Defra, 2019b). The mapped background concentrations were calibrated against background concentrations measured at the Kensington urban background automatic monitoring site

Table 4.3 Estimated Annual Mean Background Concentrations

Year	Location	Annual Mean (µg/m^3)			
		NO_x	NO_2	PM_{10}	$PM_{2.5}$
2018	523_183	33.9	25.2	13.7	8.9
	523_182	30.9	23.6	13.2	8.6
2020	523_183	28.7	22.2	13.2	8.6
	523_182	25.7	20.6	12.7	8.3
Objectives		**-**	**40**	**40**	**25**
Who Guideline		**-**	**-**	**-**	**10**

4.4.2 The background concentrations at the site are all below the relevant objectives and WHO guidelines.

5 Predicted Impacts

5.1 Site Suitability

5.1.1 Predicted concentrations at five modelled receptor locations are presented in Table 5.1. Details of the proposed receptors are shown in **Table 3.6** and shown in **Figure 2**.

Table 5.1 Predicted Concentrations Within the Development (2018)

Receptor	NO_2	PM_{10}	$PM_{2.5}$
PR1	29.3	14.9	9.7
PR2	29.0	14.8	9.6
PR3	27.7	14.5	9.4
PR4	27.9	14.5	9.4
PR5	28.3	14.6	9.5

5.1.1 There are no predicted exceedances of the annual mean NO_2, PM_{10}, or $PM_{2.5}$ AQO or WHO guidelines at any of the proposed receptors locations (PR1 – PR5) and therefore air quality for future residents is considered to be acceptable.

5.2 Construction Impacts

5.2.1 The main potential effects during construction are dust deposition and elevated PM_{10} concentrations. The following activities have the potential to cause emissions of dust:

- Site preparation including delivery of construction material, erection of fences and barriers;
- Demolition of existing buildings on site;
- Earthworks including digging foundations and landscaping;
- Materials handling such as storage of material in stockpiles and spillage;
- Construction and fabrication of units; and
- Disposal of waste materials off-site.

5.2.2 Typically the main cause of unmitigated dust generation on construction sites is from demolition and vehicles using unpaved haul roads, and off-site from the suspension of dust from mud deposited on local roads by construction traffic. The main determinants of unmitigated dust annoyance are the weather and the distance to the nearest receptor.

5.2.3 Based on the SPG on 'The control of dust and emissions during construction and demolition' criteria the potential dust emission magnitude for the phases of construction are as follows:

- for demolition activities the potential dust emission magnitude is considered to be 'small' given the scale and nature of existing onsite structures;
- for earthworks, the emissions magnitude is classified as 'small' given the approximately 0.08-hectare size of the site, activities involved and soil types;
- for construction activities, the dust emission magnitude is considered to be 'small' due to the total building volume and construction materials; and
- For trackout, the dust emission magnitude is considered to be 'small' due to the potential length of onsite haul roads and there are anticipated to be up to 10 - 25 HDV movements per day.

5.2.4 The study area is considered to be of 'medium' sensitivity to potential dust impacts (**Table 3.2**), due to the close proximity of a number of residential receptors and Naima Preparatory School within 20m of the site.

5.2.5 The study area is considered to be of 'low' sensitivity to potential PM_{10} impacts (**Table 3.2**), due to the baseline PM_{10} concentrations and distance to of sensitive receptors.

5.2.6 There are no sensitive ecological receptors within 50m of the site and therefore the study area is not considered to be sensitive to potential dust or PM_{10} impacts on ecological receptors.

5.2.7 The overall risk of dust impacts for both dust soiling and human health is shown below in **Table 5.2**.

Table 5.2 Risk Summary

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

5.2.8 Overall therefore, based on the requirement so the SPG**,** appropriate mitigation measures corresponding to a 'low risk' site are therefore required during the construction phase of the development (**see paragraph 6.1.1**).

5.3 Air Quality Neutral Calculations

5.3.1 The 'air quality neutral' transport emission benchmark for inner London and residential use (C3) allows for approximately a maximum of 1.1 trips per dwelling for a development to be considered 'air quality neutral', as shown in **Appendix B.** The Development has been shown to produce 8 trips per day and therefore is under the 23.1 daily trip benchmark for a development of 21 residential units.

5.3.2 The development is therefore considered to be 'air quality neutral' in terms of transport emissions.

6 Mitigation

6.1 Construction

6.1.1 The following low risk mitigation measures from the SPG on 'The control of dust and emissions during construction and demolition' demolition' are recommended to ensure the potential impacts are 'not significant'.

Site Management

- Display the name and contact details of persons accountable on the site boundary;
- Display the head or regional office information on the site boundary;
- Record and respond to all dust and air quality pollutant emissions complaints;
- Make a complaint log available to the local authority when asked;
- Carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the local authority when asked;
- Increase site inspection frequency during prolonged dry or windy conditions and when activities with high dust potential are being undertaken; and
- Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation is recorded in the logbook.

Preparing and Maintaining the Site

- 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 at least as high as any stockpile on site;
- *Fully enclosure site or specific operations where there is a high potential for dust production and the site is active for an extensive period;*
- Avoid site run-off of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove potentially dusty materials from site as soon as possible.

Operating Vehicle/Machinery

- Ensure all on road vehicles comply with the London Low Emission Zone;
- Ensure all non-road mobile machinery (NRMM) comply with the standards; where applicable;
- Ensure all vehicles switch off engines when stationary;
- Avoid the use of diesel or petrol-powered generators where possible;
- Impose and signpost a maximum speed limit of 10mph on surface haul and work areas; and
- Implement a Travel Plan that supports and encourages sustainable travel (public transports, cycling, walking, and car-sharing).

Operations

- Only use cutting, grinding and sawing equipment with dust suppression equipment;
- Ensure an adequate supply of water on site for dust suppressant;
- 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 water sprays on such equipment where appropriate.

Waste Management

- Reuse and recycle waste to reduce dust from waste materials; and
- Avoid bonfires and burning of waste materials on site.

Demolition

- Use of soft strip inside buildings before demolition;
- Ensure effective water suppression is used during demolition operations;
- Avoid explosive blasting; and
- Bag and remove any biological debris or damp down such material before demolition.

Construction

- Avoid scabbling (roughening of concrete surfaces) if possible; and
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out.

Trackout

- Regularly use a water-assisted dust sweeper on the access and local roads, as necessary to remove any material track on the site;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transportation; and
- Implement a wheel washing system.

7 Summary and Conclusions

7.1.1 The air quality impacts associated with the proposed redevelopment of the car park site at Torridon House, Andover Place, located within the boundary of the CoW have been assessed.

7.1.2 WCC have investigated air quality within its area as part of its responsibilities under the LAQM regime. WCC has declared the whole borough as an AQMA due to exceedances of the annual mean and one-hour mean NO_2 objectives, as well as the annual mean and 24-hour mean PM_{10} objective. The site also lies within an AQFA and therefore requires potential exposure n to be assessed as well as contribution of the development to emission of air pollutants.

7.1.3 There are no exceedances of the national air quality objectives or WHO guidelines within the site. Whilst in 2018 the $PM_{2.5}$ concentration at the Site is predicted to be within 5% of the WHO guidelines (and would therefore be considered 'existing poor air quality' by the new London Plan), concentrations are predicted to have decreased by 2020 to below this threshold. Therefore, as per the relevant requirements of the NPPF and London Plan, the site is considered suitable for the proposed residential development.

7.1.4 The construction works have the potential to create dust. During construction, it is recommended that in accordance with the requirements of the SPG on 'The control of dust and emissions during construction and demolition' a package of mitigation measures is put in place to minimise the low risk of elevated PM_{10} concentrations and dust nuisance in the surrounding area. With mitigation in place the construction impacts are judged as being not significant.

7.1.5 This assessment has shown that the development can be considered as 'air quality neutral' in terms of transport emissions and no further site-specific mitigation is required.

7.1.6 The proposed development is therefore considered to be in accordance with the requirements of the NPPF, London Plan (and accompanying SPG), Westminster City Plan, CoW AQAP and National and European regulations regarding Air Quality.

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Appendix A Glossary

Abbreviations	Meaning
AADT	Annual Average Daily Traffic
ADMS	Air Dispersion Modelling System
AQAP	Air Quality Action Plan
AQA	Air Quality Assessment
AQMA	Air Quality Management Area
CoW	City of Westminster
DEFRA	Department for Environment, Food and Rural Affairs
Diffusion Tube	A passive sampler used for collecting NO_2 in the air
EC	European Commission
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
GIA	Gross Internal Area
GLA	Greater London Authority
HDV	Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes, includes Heavy Goods Vehicles and buses
IAQM	Institute of Air Quality Management
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LEZ	Low Emission Zone
LGV	Light Good Vehicle
NAQO	National Air Quality Objective as set out in the Air Quality Strategy and the Air Quality Regulations
NO_2	Nitrogen Dioxide
NO_X	Nitrogen oxides, generally considered to be nitric oxide and NO_2. Its main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles
NPPF	National Planning Policy Framework
NRMM	Non-road mobile machinery
PM_{10}	Small airborne particles less than 10 µm in diameter
PBA	Peter Brett Associates LLP
PPG	Planning Practice Guidance
Receptor	A location where the effects of pollution may occur
SPG	Supplementary Planning Guidance
TEB	Transport Emission Benchmark
WCC	Westminster City Council

Appendix B Air Quality Neutral Benchmarks

B.1.1 Two Transport Emissions Benchmarks (TEBs) have been defined, one for NO_x and one for PM_{10}, for Retail (A1 and A2), Commercial (B1) and living accommodation (C3). The TEBs are based on a limited range of land-use categories to match the London Travel Demand Surveys (LTDS) data as closely as possible.

B.1.2 The following table provides the Transport Emissions Benchmarks based on the gross floor area and the location of the development.

Table B.1: 'Air Quality Neutral' Emissions Benchmarks for Transport (TEBs)

Land Use	CAZ	Inner	Outer
NO_x (g/m²/annum)			
Retail (A1)	169	219	249
Office (B1)	1.27	11.4	68.5
NO_x (g/dwelling/annum)			
Residential (C3)	234	558	1553
PM_{10} (g/m²/annum)			
Retail (A1)	29.3	39.3	42.9
Office (B1)	0.22	2.05	11.8
PM_{10} (g/dwelling/annum)			
Residential (C3,C4)	40.7	100	267

B.1.3 Where a specific TEB has not been calculated, it is possible to shown that a development would meet the benchmark if the scheme-generated trip rate for a particular land-use class does not exceed the benchmark trip rate, derived from Trip Rate Assessment Valid for London (TRAVL). If the scheme-generated trip rate exceeds the benchmark trip rate, it is not possible at this stage to derive the excess emissions, and it will be for the developer to suggest an alternative approach.

B.1.4 Benchmark trip rates for those land-use classes where it was not possible to derive trip lengths are shown in Table B.2

Table B.2: Average Number of Trips per Annum for Different Development Categories

Land Use	Number of Trips (trips/m²/annum)		
	Caz	Inner	Outer
A3	153	137	170
A4	2.0	8.0	-
A5	-	32.4	590
B2	-	15.6	18.3
B8	-	5.5	6.5
C1	1.9	5.0	6.9
C2	-	3.8	19.5
D1	0.07	65.1	46.1
D2	5.0	22.5	49.0

Appendix C Model Verification

Nitrogen Dioxide

Most nitrogen dioxide is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emission of nitrogen oxides ($NO_x = NO + NO_2$). The model has been run to predict the 2018 annual mean road-NO_x contribution at the BT8 Ark Franklin roadside automatic site (identified in **Table 5.1**), which is the most representative of the proposed development.

The model output of road-NO_x has been compared with the 'measured' road-NO_x, which was determined from the measured NO_2 concentration using the NO_x from NO_2 calculator and the adjusted background NO_2 concentrations from the Defra background map.

An adjustment factor was determined as follows:

Measured NO_2: 46.5µg/m^3

Measured road-NO_x: 60.63µg/m^3

Modelled road-NO_x : 17.4531µg/m^3

Road-NO_x adjustment factor: 60.63/17.4531= 3.47

This factor implies that the model is under-predicting the road-NO_x contribution. This is a common experience with this and most other models.

PM_{10}

The Ark Franklin Automatic monitoring station monitors PM_{10}, and this station has been used to calculate a verification factor for PM_{10} following a similar methodology as that used for nitrogen dioxide.

Road PM_{10} (calculated from Measured PM_{10} at the monitoring site and calibrated background PM_{10} for the appropriate grid-square) is divided by the modelled road PM_{10} to produce a factor which can be applied to PM_{10} model outputs.

Measured PM_{10} = 19.0 µg/m^3

Calibrated background PM_{10} = 12.9 µg/m^3

Measured road-PM_{10} = 6.1 µg/m^3

Modelled road-PM_{10} = 0.97 µg/m^3

PM_{10} verification factor = 6.313

$PM_{2.5}$

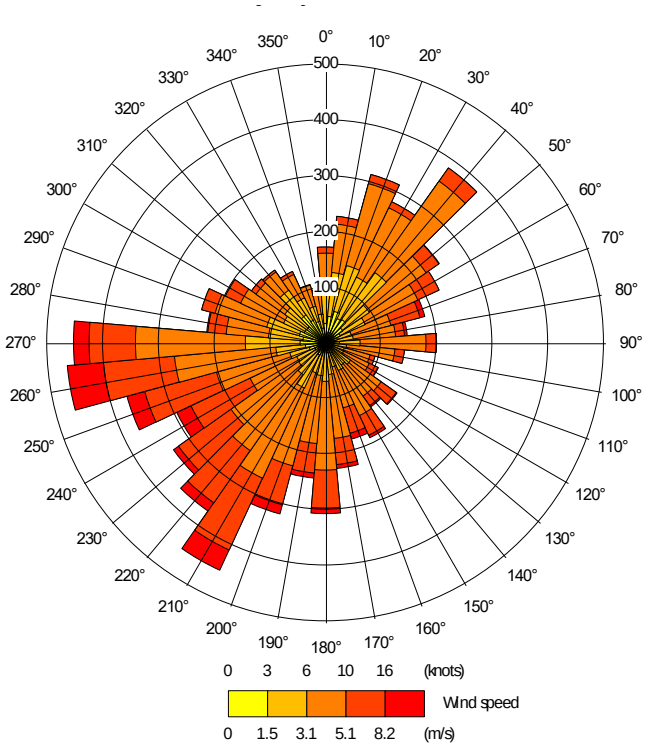
No monitoring of $PM_{2.5}$ is carried out in proximity to the development site. The primary adjustment factor calculated for PM_{10} concentrations has therefore been applied to the modelled road-$PM_{2.5}$ concentrations.

Appendix D Model Inputs and Tools

Meteorological Data	2018 Hourly meteorological data from Heathrow Station has been used in the model. The wind rose is shown in figure E1.
ADMS	Version 4.1.1
Time Varying Emission Factors	Based on Department for Transport statistics. Table TRA0307. Motor vehicle traffic distribution by time of day and day of the week on all roads, Great Britain: 2018.
Latitude	51.5º
Surface Roughness	A value of 1.5 for Large Urban Areas was used to represent the modelled area. A value of 0.3 for agricultural areas was used to represent the meteorological station site.
Minimum Monin-Obukhov length	A value of 100 for Large Conurbations was used to represent the modelled area and the value of 30 for Mixed Urban/Industrial was used to represent the meteorological station site.
Urban Canopy	The urban canopy module was used to take into account the effects of building in the urban area. This module modifies the standard ADMS vertical profiles of atmospheric velocity and turbulence.
Emission Factor Toolkit (EFT)	V9.0 , April 2019.
NO_x to NO_2 Conversion	NO_x to NO_2 calculator version 7.1, April 2019
Background Maps	2017 reference year background maps

Meteorological Station

The wind rose below presents the 2018 Heathrow Airport.data used for this assessment.



2018 Heathrow Wind rose

Appendix E Traffic Data

Location	LAEI Object Id	2018 Baseline	
		AADT	HDV (%)
CAMBRIDGE AVENUE	160035	8,321	21.3
MAIDA VALE	160089	15,270	9.3
KILBURN PARK ROAD	173634	4,613	7.3
CARLTON VALE	173635	7,018	3.5
CAMBRIDGE GARDENS	173639	7,762	15.6
KILBURN PARK ROAD	173754	4,613	7.3
CARLTON VALE	173755	7,018	3.5
MAIDA VALE	190262	15,257	9.3
KILBURN HIGH ROAD	190263	17,953	9.3
CARLTON VALE	190265	7,018	3.5
CAMBRIDGE AVENUE	202733	8,129	19.5
MAIDA VALE	225869	15,270	9.3
CAMBRIDGE ROAD	368782	7,762	15.6
KILBURN PARK ROAD	369928	5,568	23.2
KILBURN PARK ROAD	369060	4,613	7.3
CAMBRIDGE ROAD	370075	7,762	15.6
CAMBRIDGE GARDENS	378406	4,358	24.9
GREVILLE PLACE	378105	5,028	7.4
KILBURN HIGH ROAD	427158	17,848	9.3
KILBURN HIGH ROAD	427445	8,976	9.3
KILBURN HIGH ROAD	428098	8,985	9.3
KILBURN HIGH ROAD	428101	17,971	9.3
KILBURN PARK ROAD	446285	5,690	22.9
KILBURN HIGH ROAD	446807	17953	9.3
KILBURN PARK ROAD	448222	4613	7.3
CARLTON VALE	448223	7018	3.5
GREVILLE PLACE	449085	5023	7.2
CARLTON VALE	449238	7008	3.4
MAIDA VALE	458061	15299	9.3
CAMBRIDGE ROAD	458522	7905	15.5
KILBURN PARK ROAD	446285	5744	22.8
CARLTON VALE	173635	7008	3.4
Andover Place N	1	500	15.82
Andover Place S	2	500	15.82

Appendix F Figures