Newcombe House and Kensington Church Street
Air Quality Report

July 2018

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Appendix A

Construction of Dust Assessment

1 Introduction

Ove Arup & Partners Limited (Arup) has been commissioned by Notting Hill Gate KCS Ltd to undertake an air quality assessment to accompany a planning application comprising the demolition of the existing buildings and redevelopment to provide office, residential, and retail uses, and a flexible surgery/office use, across six buildings (ranging from ground plus two storeys to ground plus 17 storeys), together with landscaping to provide a new public square, ancillary parking and associated works (the Proposed Development). The address of the site is 43/45 Notting Hill Gate, London, 39/41 Notting Hill Gate and 161-237 Kensington Church Street.

Air quality studies are concerned with the presence of airborne pollutants in the atmosphere. This report outlines relevant air quality management policy and legislation, describes the existing air quality conditions in the vicinity of the Proposed Development and outlines the potential air quality effects associated with its construction and operation. Mitigation measures are also proposed which would be implemented to reduce the effect of the Proposed Development on air quality and the effect of existing air quality on future residents of the Proposed Development, as far as practicable.

It should be noted that a previous air quality assessment was submitted in relation to the planning application reference: PP/17/05782, submitted in September 2017, which is now the subject of proposed amendments. The amendments to the September 2017 application are set out in detail within the Planning Statement, but can be summarised as:

- an increase in the number of homes (to a total of 55) and alterations to the housing mix;
- an increase in the proportion of affordable homes (to 35% by habitable room and 41.8% by unit);
- an increase in office floorspace of c. 414 sqm GEA (to a total of c. 5,306 sqm);
- the addition of one storey to Kensington Church Street Building 1 in C3 residential use (from four storeys to five);
- the addition of two storeys to West Perimeter Building 3 in B1 office use (from five storeys to seven);
- alterations to the layouts of Kensington Church Street Buildings 1 and 2, and West Perimeter Buildings 1 and 3, with associated changes to the facades;
- minor alterations to the façade of the Corner Building on levels 4, 5 and 6 which respond to the revised massing of West Perimeter Building 3; and
- minor alterations to the services strategy for West Perimeter Building 2.

(the "Proposed Amendments").

The purpose of this report is to assess the amendments to the scheme and at the same time to address comments received during the previous consultation period and update the report to take account of more recent data in relation to the assessment, as set out below.

- The use of more recent data in relation to the assessment, including:
  - The latest 2015-based background concentrations provided by Defra. A comparison with the local urban background monitoring in the vicinity of the site has also been carried out;
  - New traffic data (based on a scheme-specific traffic count in 2018) to enable model verification;
  - The latest Emission Factors Toolkit (v8.0.1) and NOx to NO_2 converter (v6.1);
  - New traffic data adjustment (based on the TEMPRO database version 72); and
  - Latest data based on the revised proposed scheme to carry out the construction dust risk assessment and air quality neutral assessment.
- Addressing comments received from the previous report submitted, including the provision of dispersion model verification and the application of appropriate adjustment factor, and the inclusion of ground floor receptors to assess against 1-hour mean NO_2 air quality objective.

To ensure that these matters are fully assessed in terms of any potential air quality impacts, this report has been prepared as a stand-alone report and this report assesses the full extent of the Proposed Development (and not just the Proposed Amendments in isolation). This report therefore replaces the Air Quality Report dated September 2017. This July 2018 report, rather than the September 2017 report, should be referred to by the planning authority for the purposes of air quality matters in respect of the Proposed Development. References to the Proposed Development within this report are to the Proposed Development as amended by the Proposed Amendments.

1.1 Description of the Development

- The Proposed Development comprises the redevelopment of the site (the Site) which currently comprises:
- Newcombe House (43-45 Notting Hill Gate) - an office building of ground plus 11 storeys plus plant (B1 Use Class);
- 39-41 Notting Hill Gate & 209-237 Kensington Church Street - a linear block of 1 to 2 storeys accommodating shops and restaurants (A1 & A3 Use Class);
- Royston Court (161-207 Kensington Church Street) - a building of ground plus 4 storeys with retail at ground floor (A1 & A3 Use Class) and residential on upper floors (C3 Use Class);
- A surface car park of 61 spaces; and
- Newcombe Street and part of Uxbridge Street.

The site is located in the administrative area of the Royal Borough of Kensington and Chelsea (RBKC).

This study assesses the likely air quality impacts from the construction and operation of the Proposed Development, focusing on emissions of nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$). Emissions of these pollutants may be associated with construction activities on site, changes in traffic movement to and from the Proposed Development and emissions generated by the on-site combustion plant proposed (one natural gas combined heat and power (CHP) unit and three 850kWh gas boilers, fitted with catalysts to reduce emissions) as part of the Proposed Development.

2 Air Quality Legislation

2.1 European Air Quality Management

In 1996 the European Commission published the Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC)[1]. This Directive defined the policy framework for 13 air pollutants, including NO_2, known to have harmful effects on human health and the environment. Limit values (pollutant concentrations not to be exceeded by a certain date) for each specified pollutant were set through a series of Daughter Directives, including Directive 1999/30/EC (the 1st Daughter Directive)[2] which sets limit values for nitrogen dioxide (NO_2) and particulate matter (amongst other pollutants) in ambient air.

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

The Directives were transposed into national legislation in England by the Air Quality Standards Regulations 2016[4]. The Secretary of State for the Environment has the duty of ensuring compliance with the air quality limit values.

2.2 Air Quality Objectives and Limit Values

Air quality limit values and objectives are quality standards for clean air. Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment (i.e. effects occur (long-term) after a prolonged period of exposure to elevated concentrations). Others have standards expressed as 24-hour, 1-hour or 15-minute average concentrations (short-term) due to the acute way in which they affect health or the natural environment (i.e. after a relatively short period of exposure). Some pollutants have standards expressed in terms of both long-term and short-term concentrations. Table 1 sets out these EU air quality limit values and national air quality objectives for the pollutants relevant to this study (NO_2, PM_{10} and $PM_{2.5}$).

In the majority of cases the air quality limit values and air quality objectives have the same pollutant concentration threshold and date for compliance. The key difference is that the Secretary of State for the Environment, Food and Rural Affairs is required under European Law to ensure compliance with the air quality limit values whereas local authorities are only obliged under national legislation to undertake best efforts to comply with the air quality objectives. Another key difference is that air quality objectives only apply at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present. To assist local authorities in demonstrating best efforts, the Environment Act 1995 requires that when carrying out their local air quality functions, local authorities shall have regard to guidance issued by the Secretary of State.

Table 1:Air Quality Objectives

Pollutant	Averaging period	Limit value / Objective	Date for compliance
Nitrogen Dioxide (NO_2)	Annual mean	$40\mu g/m^3$	UK(a) 11 June 2010
			EU(b) 01 Jan 2010
	1-hour mean	$200\mu g/m^3$ not to be exceeded more than 18 times a year (99.8th percentile)	UK(a) 11 June 2010
			EU(b) 01 Jan 2010
Particulate Matter (PM_{10})	Annual mean	$40\mu g/m^3$	UK(a) 11 June 2010
			EU(b) 01 Jan 2005
	24-hour mean	$50\mu g/m^3$ not to be exceeded more than 35 times a year (90.4th percentile)	UK(a) 11 June 2010
			EU(b) 01 Jan 2005
Fine Particulate Matter ($PM_{2.5}$)	Annual mean	$25\mu g/m^3$	UK(a)/EU(b) 01 Jan 2015

(a) The Air Quality Standards Regulations 2010, SI2010/1001
(b) Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

2.3 Environment Act 1995

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

2.4 Dust Nuisance

Dust is the generic term which the British Standard document BS 6069 (Part Two) uses to describe particulate matter in the size range 1–75µm (micrometers) in diameter. Dust

[1] Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management.
[2] Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air.
[3] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.
[4] The Air Quality Standards (Amendment) Regulations 2016, SI 2016/1184.
[5] Environment Act 1995, Chapter 25, Part IV Air Quality.

nuisance is the result of the perception of the soiling of surfaces by excessive rates of dust deposition. Under provisions in the Environmental Protection Act 1990[6], dust nuisance is defined as a statutory nuisance.

There are currently no standards or guidelines for dust nuisance in the UK, nor are formal dust deposition standards specified. This reflects the uncertainties in dust monitoring technology, and the highly subjective relationship between deposition events, surface soiling and the perception of such events as a nuisance. In law, complaints about excessive dust deposition would have to be investigated by the local authority and any complaint upheld for a statutory nuisance to occur.

However, dust deposition is generally managed by suitable on-site practices and mitigation rather than by the determination of statutory nuisance and/or prosecution or enforcement notice(s).

3 Planning Policy and Guidance

3.1 National Policy and Guidance

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

3.1.1 National Planning Policy Framework (2012)

The National Planning Policy Framework[7] (NPPF) was published in March 2012 with the purpose of planning to achieve sustainable development. Paragraph 124 of the NPPF on air quality states that:

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

In addition, paragraph 120 states that:

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

[6] Environmental Protection Act 1990, Chapter 43, Part III Statutory Nuisances and Clean Air.
[7] Department for Communities and Local Government (2012) National Planning Policy Framework.
[8] Department for Communities and Local Government (2014) Planning Practice Guidance: Air Quality.
[9] Defra (2016) Local Air Quality Management Policy Guidance. PG(16).

3.1.2 Planning Practice Guidance (2014)

As part of the NPPF, planning practice guidance on various topics was published[8] in 2014 and is periodically updated. In relation to air quality, the guidance refers to the significance of air quality assessments to determine the impacts of Proposed Developments in the area and describes the role of local and neighbourhood plans with regard to air quality. It also provides a flowchart method to assist local authorities with determining how considerations of air quality fit into the development management process.

3.1.3 Local Air Quality Management Policy and Technical Guidance

The 2016 policy guidance note from Defra, LAQM (PG16)[9], provides additional guidance on the links between transport and air quality. LAQM (PG16) describes how road transport contributes to local air pollution and how transport measures may bring improvements in air quality. Key transport-related Government initiatives are set out, including regulatory measures and standards to reduce vehicle emissions and improve fuels, tax-based measures and the development of an integrated transport strategy.

LAQM (PG16) also provides guidance on the links between air quality and the land-use planning system. The guidance advises that air quality considerations should be integrated into the planning process at the earliest stage and is intended to aid local authorities in developing action plans to deal with specific air quality problems and create strategies to improve air quality. It summarises the main ways in which the land-use planning system can help deliver compliance with the air quality objectives.

Technical Guidance (TG16)[10] is designed to support local authorities in carrying out their duties to review and assess air quality in their area. Where relevant, this guidance has been taken into account.

3.2 Regional Policy and Guidance

3.2.1 London Plan

The latest London Plan, consolidated with alterations since 2011[11], is the spatial development strategy for the Greater London area until 2036 and integrates all economic, environmental, transport and social frameworks. This has been amended to be consistent with the NPPF. Specifically, for new development proposals, the latest London Plan looks at air quality by proposing the following measures:

- minimise increased exposure to existing poor air quality and make provision to address local problems of air quality 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 Greater

[10] Defra (2018) Local Air Quality Management Technical Guidance.TG16.
[11] Greater London Authority (2016) The London Plan: The Spatial Development Strategy for London Consolidated With Alterations Since 2011.

London Authority (GLA) and London Councils' 'The control of dust and emissions from construction and demolition (July 2014)';

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

These policies have been considered throughout the completion of this Air Quality Assessment.

3.2.2 Sustainable Design and Construction Supplementary Planning Guidance

Supplementary Planning Guidance (SPG) for Sustainable Design and Construction[12] was published in April 2014 by the GLA. Section 4.3 of the SPG focuses on air pollution and provides guidance on when assessments should be undertaken and how intelligent design can help minimise the effect of a development on local air quality. The primary way in which the guidance aims to minimise air quality impacts is by setting an air quality neutral policy for buildings and transport, as well as emissions standards for combustion plant. The air quality neutral policy sets benchmarks against which the annual emissions of NO_x and PM_{10} from traffic and combustion plant of a Proposed Development should be assessed.

Emission standards for combustion plant are outlined in the SPG for individual and/or communal gas boilers which are installed in commercial and domestic buildings; boilers should achieve a NO_x rating of <40 $mgNO_x$/kWh.

3.2.3 The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance

Supplementary Planning Guidance (SPG) for The Control of Dust and Emissions during Construction and Demolition[13] was published in July 2014 by the GLA. It seeks to reduce emissions of dust, PM_{10} and $PM_{2.5}$ from construction and demolition activities in London. It also aims to manage emissions of nitrogen oxides (NO_x) from construction and demolition machinery by means of a new non-road mobile machinery (NRMM) ultra-low emissions zone (ULEZ).

3.2.4 London Local Air Quality Management Technical Guidance

The London Local Air Quality Management technical guidance (LLAQM.TG(16))[14] applies only to London's 32 boroughs (and the City of London), whilst LAQM.TG(16) applies to all other UK local authorities. Although the LLAQM.TG(16) technical guidance is largely based on the updated national guidance LAQM.TG(16), it does incorporate London-specific elements of the LAQM system.

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

3.3 Local Policy

3.3.1 Royal Borough of Kensington and Chelsea Consolidated Local Plan

The Consolidated Local Plan[15] was produced in July 2015 as a combination of previous reviews and alterations since the Core Strategy adoption in 2010. The plan deals with air quality in the policy CO 7 (Strategic objective for Respecting Environmental Limits). This policy states *"Our strategic objective to respect environmental limits is to contribute to the mitigation of, and adaption to, climate change, significantly reduce carbon dioxide emissions, maintain low and further reduce car use, carefully manage flood risk and waste, protect and attract biodiversity, improve air quality, and reduce and control noise within the borough".*

The Council aims to improve air quality through actions such as:

- *"Measures to improve other travel choices so that car dependency is reduced;*
- *Green links… to improve biodiversity and air quality…;*
- *Encourage proposals and design solutions which improve air quality through low emission strategies;*
- *All development proposals must have regard to the Council's Air Quality Management Plan*;
- *Encourage proposals and design solutions which will improve air quality through low emission strategies;*
- *Encourage proposals to reduce exposure to air pollution and where possible improve air quality;*
- *Support initiatives which reflect the borough's designation as an Air Quality Management Area to reduce this pollution*
- *Ensure that development mitigates against, and adapts to, climate change without unacceptable impacts on air quality."*

Policy CE 5 focuses on air quality and states the council will *"control the impact of development on air quality, including the consideration of pollution from vehicles, construction the heating and cooling of buildings".* To control development to minimise the impact on air quality and mitigate against exceedances of air pollutants the Council will:

[12] Greater London Authority (2014) Sustainable Design and Construction Supplementary Planning Guidance, April 2014.
[13] Greater London Authority (2014) The Control of Dust and Emissions during Construction and Demolition, Supplementary Planning Guidance, July 2014.
[14] Greater London Authority (2016) London Local Air Quality Management Technical Guidance TG (16).
[15] Royal Borough of Kensington and Chelsea (2015) Consolidated Local Plan.

- *"Require an air quality assessment for all major development;*
- *Require developments to be 'air quality neutral' and resist development proposals which would materially increase exceedences levels of local air pollutants and have an unacceptable impact on amenity or health unless the development mitigates this impact through physical measures or and financial contributions to implement proposals in the Council's Local Air Quality Management Plan;*
- *Require that the Code for Sustainable Homes and BREEAM assessments obtains all credits available for reducing pollution and emissions, and improving air quality;*
- *Resist biomass combustion and combined heat and power technologies/CCHP which may lead to an increase of emissions and seek to use greater energy efficiency and non-combustion renewable technologies to make carbon savings unless its use will not have a detrimental impact on air quality; and*
- *Control emissions of particles and NOx during demolition and construction and carry out a risk assessment to identify potential impacts and corresponding mitigation measures, including on site monitoring, if required by the Council."*

3.3.2 Royal Borough of Kensington and Chelsea Development Framework

RBKC's Local Development Framework (LDF) was adopted in June 2009 and the air quality aspects are contained in the Air Quality, Supplementary Planning Document (AQ SPD)[16].

The Development Policies were reviewed and the following policies in relation to air quality identified:

- *The Council will require the submission of an emissions assessment for all major development being 10 or more units or greater than 1,000m2, before the application will be validated.*
- Traffic Reduction and Low Emission Strategies: *The Council will encourage the use of planning conditions or S106 obligations to achieve reductions in traffic volumes and therefore the emissions from traffic. Developments which will generate significant additional traffic are required to submit an extensive transport impact assessment and, where relevant, a site specific low emission strategy proposing adequate emission reduction/mitigation measures.*
- Developing the Infrastructure of Low Polluting Fuels: *The Council will encourage the provision of alternative refuelling infrastructure within new developments and existing filling stations, unless other material planning considerations suggest otherwise, and may use a section 106 planning obligation or planning condition to achieve this.*
- Indoor Air Quality: *The impact of outdoor air pollution on indoor air quality and human health in new developments should be taken into account at the earliest stages of building design and this should be addressed in the emissions assessment.*
- Locating Sensitive Development: *The Council will require that sensitive developments or parts of developments, such as schools and children's playgrounds, are located away from sources of high air pollution, such as busy roads or adequate measures are taken to minimise exposure. The position and orientation of such sensitive elements should be taken into account at the earliest stages of building design.*
- Biomass: *The Council will require all planning applicants proposing the use of biofuel and biomass-fuelled systems to submit a detailed air quality analysis, demonstrating that the heat generated from biomass is an effective alternative to conventional fuels and not in conflict with the Council's Air Quality Action Plan (AQAP) and the Clean Air Act.*
- Construction and Demolition: *The Council will expect that developers comply with the minimum standards on construction management, detailed in the London Councils' best practice guidance to Control Dust and Emissions from Construction and Demolition*[17]*. Additional measures to minimise emissions during the construction phase may also be required and could form part of a number of low emissions strategies. In this regard, S106 planning obligations may be used to ensure that construction sites meet various requirements for the control of dust and emissions from construction and demolition. The Council is also currently considering the use of planning conditions, attached to planning approvals, to ensure that the applicant or landowner is a member of the Considerate Constructors Scheme.*

3.3.3 Air Quality and Climate Change Action Plan 2016–2021

The emissions that affect climate change and air quality share a common source. The council intends to raise issue awareness, reduce its own emissions, engage locally (e.g. businesses, schools) to promote cleaner technology and transport, collaborate with London boroughs and officials to reduce emissions, act to increase climate change and air pollution resilience, encourage responsible environmental practice and empowerment in the local community. The council is determined to substantially reduce emissions to help meet air quality targets locally and abate climate change impacts.

The aims of the policy are;

- Reduce emissions (polluting emissions and greenhouse gases).
- Reduce exposure by providing advisory information and implementing physical measures (e.g. green infrastructure), and increase resilience to manage climate change risks.
- Influence change by raising public awareness, urging authorities and governments to take radical action and leading by example.

Objects and actions of the policies are going to address;

- Public health – increase awareness of poor air quality and climate change health impacts and improve home-based care for those effected.

  Actions: supporting indoor air, outdoor air and health related programmes (e.g.: stop smoking programmes, promoting cycling).

- Building usage and development – 30% reduction by 2017 and 40% by 2020 of CO_2 emissions (2008 baseline), improve efficiency and emissions in council-owned and

[16] The Royal Borough of Kensington and Chelsea, Air Quality, Supplementary Planning Document – Adopted June 2009, Local Development Framework

[17] The London Council's best practice guidance has now been superseded by the Supplementary Planning Guidance (SPG) for The Control of Dust and Emissions during Construction, see Section 3.2.3.

new buildings while retrofitting existing properties and use planning systems to reduce future emissions exposure.

Actions: energy and heating efficiency improvements in council buildings and schools, explore renewable energy options in council homes.

- Transport – reduce motor traffic and promoting less-polluting vehicles through leading by example.

  Actions: reduce vehicle emissions and promote awareness, encouraging electric car use, encouraging walking and cycling.

- Business and community – engage with communities and businesses to reduce CO_2 emissions, pollution and waste and improve energy efficiency.

  Actions: empower locals and businesses to reduce emissions, promote recycling, good waste management and 'buying local', encourage community garden/green space schemes.

- Greening measures and local improvement – increase installation of greening measures (e.g.: parks, outdoor space) and develop measures to allow resilience against climate change impacts (e.g.: heatwaves, flooding).

  Actions: improve flood management (e.g.: management strategy, SuDS), promote green infrastructure (e.g.: roofing, walls, gardens), quantify effect of 'greening'.

- Lobbying and partnership – ensure funding for activities, sharing of knowledge and holistic approaches to poor air quality and climate change.

  Actions: inclusion into initiatives like Climate Local, Cycle Hire and the Ultra-Low Emissions Zone, co-ordinate with TfL to promote public transport/reduce emissions, lobby for higher environmental standards, taxi emissions reduction, increased public transport routes.

3.4 Other Relevant Policy and Guidance

3.4.1 Institute of Air Quality Management Dust Guidance

The 2016 Institute of Air Quality Management (IAQM) guidance v1.1[18] provides guidance to development consultants and environmental health officers on how to assess air quality impacts from construction. The IAQM guidance provides a method for classifying the significance of effect from construction activities based on the 'dust emission magnitude' (high, medium or low) and sensitivity of the area (which is based on the number of sensitive receptors and their proximity to the site). The guidance recommends that once the significance of effect from construction is identified, the appropriate mitigation measures are implemented. Experience has shown that once the appropriate mitigation measures are applied in most cases the resulting dust impacts can be reduced to negligible levels.

3.4.2 Environmental Protection UK (EPUK)/Institute of Air Quality Management (IAQM) Land-Use Planning & Development Control (2017)

The 2017 update to the Land-Use Planning & Development Control guidance document[19] provides a framework for professionals operating in the planning system to provide a means of reaching sound decisions, having regard to the air quality implications of development proposals.

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

4 Methodology

The overall approach to the air quality assessment comprised:

- A review of the existing air quality conditions at and in the vicinity of the Site;
- An assessment of the potential changes in air quality arising from the construction and operation of the Proposed Development including traffic and emissions from the energy centre; and
- Formulation of mitigation measures, where necessary, to ensure any adverse impacts on air quality are minimised.

4.1 Method of Baseline Assessment

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

The following data sources have been used to determine the baseline and future conditions of air quality in the study area:

- Local authority review and assessment reports and local air quality monitoring data[20];
- The Defra Local Air Quality Management website[21]; and
- The Environment Agency website[22].

[18] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1.
[19] EPUK/IAQM (2017) Land-Use Planning & Development Control: Planning for Air Quality.
[20] Royal Borough of Kensington and Chelsea Air Quality Annual Status Report for 2016, July 2017.
[21] Defra Local Air Quality Management website; https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=345; [Accessed: June 2018].
[22] Environment Agency website; https://environment.data.gov.uk/public-register/view/search-industrial-installations; [Accessed: June 2018].

A desk-based review was undertaken using the data sources described above. The review identified the main sources of air pollution within a radius of 2km around the Proposed Development, local air quality monitoring data for recent years and local background pollutant concentrations.

4.2 Method of Construction Assessment

The development will include demolition and construction of buildings. The IAQM18 and GLA13 dust guidance has been used to assess the impacts from dust on local sensitive receptors.

Construction related traffic has the potential to impact local concentrations of pollutants. Therefore, the traffic volumes have been screened using the criteria as set out in the EPUK/IAQM guidance[19] to determine an appropriate level of assessment.

4.2.1 Construction Dust Assessment

The effects from demolition and construction of the Proposed Development have been assessed using the qualitative approach described in the latest guidance by the Institute of Air Quality Management (IAQM)[18] and GLA13.

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

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes;
- Elevated PM_{10} concentrations as a result of dust generating activities on site; and
- An increase in NO_2 and PM_{10} concentrations due to exhaust emissions from non-road mobile machinery and vehicles accessing the site.

The IAQM guidance considers the potential for dust emissions from four activities:

- Demolition of existing structures;
- Earthworks;
- Construction of new structures; and
- Trackout.

Earthworks refer to the processes of soil stripping, ground levelling, excavation and land capping, while trackout is the transport of dust and dirt from the site onto the public road network where it may be deposited and then re-suspended by vehicles using the network. This arises when vehicles leave the site with dust materials, which may then spill onto the road, or when they travel over muddy ground on site and then transfer dust and dirt onto the road network.

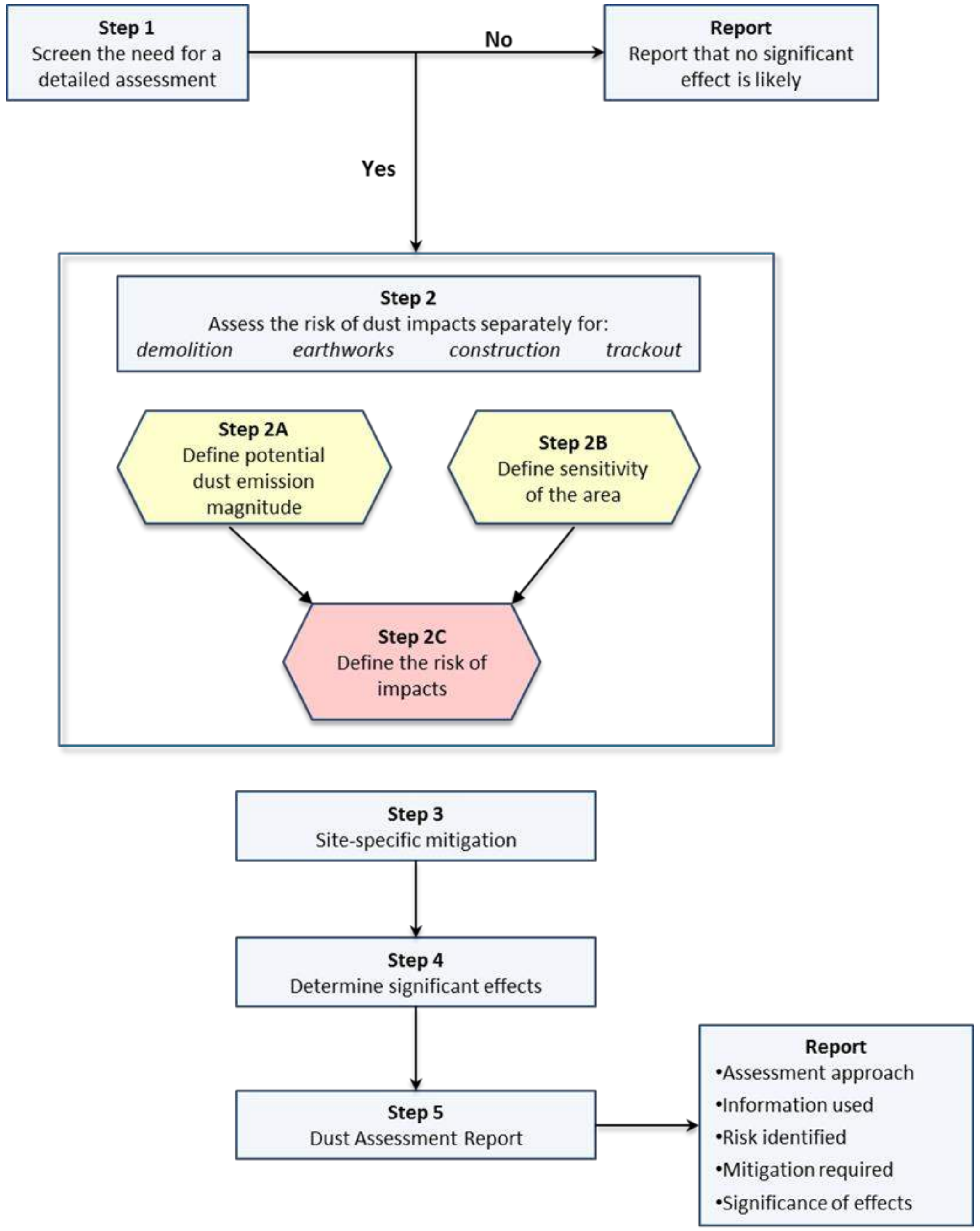
For each of these dust-generating activities, the guidance considers three separate effects:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to a significant increase in PM_{10} exposure.
- The receptors can be human or ecological and are chosen based on their sensitivity to dust soiling and PM_{10} exposure.

The methodology takes into account the emission magnitude of each of the four activities, the sensitivity of the area and, for human health, the levels of background PM_{10} concentrations. This is then taken into consideration when deriving the risk of impact of each of the four activities, and the overall risk and effects for the construction of the Proposed Development. Suitable mitigation measures are also proposed to reduce the risk of the Proposed Development.

There are five steps in the assessment process described in the IAQM guidance. These are summarised in Figure 1: IAQM dust assessment methodology and a further description is provided in the following paragraphs.

Figure 1: IAQM dust assessment methodology



4.2.1.1 Step 1: Need for assessment

The first step is the initial screening for the need for a detailed assessment. According to the IAQM guidance, an assessment is required where there are sensitive receptors:

- Within 350m of the site boundary; and
- Within 50m of route(s) used by construction vehicles on the public highway and up to 500m from the site access to the Proposed Development; and
- An assessment is also required if there are any ecological receptors within 50m of the site boundary or 200m of the Affected Road Network (ARN).

4.2.1.2 Step 2: Assess the risk of dust impacts

This step is split into three sections as follows:

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

Each of the dust-generating activities is given a dust emission magnitude depending on the scale and nature of the works (step 2A) based on the criteria presented in Table A 1 at Appendix A.

The sensitivity of the surrounding area is then determined (step 2B) for each dust effect from the above dust-generating activities, based on the proximity and number of receptors, their sensitivity to dust, the local PM_{10} background concentrations and any other site-specific factors. Table A 2 to Table A 4 at Appendix A show the criteria for defining the sensitivity of the area to different dust effects.

The overall risk of the impacts for each activity is then determined (step 2C) prior to the application of any mitigation measures (Table A 5 at Appendix A) and an overall risk for the site derived.

4.2.1.3 Step 3: Determine the site-specific mitigation

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

4.2.1.4 Step 4: Determine any significant residual effects

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

4.2.1.5 Step 5: Prepare a dust assessment report

The last step of the assessment is the preparation of a Dust Assessment Report. This forms part of this report (Section 6).

4.3 Construction Traffic Assessment

The construction phase of the development will cause temporary additional traffic on the roads surrounding the development for the duration of the construction period. Effects of traffic generated by the construction of the development have been assessed using the ADMS-

Roads atmospheric dispersion model. Information regarding additional construction traffic movements was provided by Arup.

The following sections detail the inputs and processes used in this assessment.

4.3.1 Assessment Scenarios

The assessment scenarios are summarised as follows:

- Baseline for verification (2016);
- Do Minimum (DM1), year of construction, 2020, assuming no construction traffic, using 2016 background and emission factors;
- Do Minimum (DM2), year of construction, 2020, assuming no construction traffic, using 2020 background and emission factors;
- Do Something (DS1), worst-case scenario in 2020 using 2016 background and emission factors; and
- Do Something (DS2), more optimistic scenario in 2020 using 2020 background and emission factors.

4.3.2 Sensitive Receptors

Pollutant concentrations have been forecast at selected receptors where there may be exposure to traffic emissions from vehicles travelling to/from the site, i.e. residential properties as well as locations where people may stay for one hour or more (e.g. outdoor sitting area for café), in close proximity to roads/junctions with the greatest predicted changes in traffic flows. Details of the assessed receptors are given in Table 2 and their location shown in Figure 4. It should be noted that the height at which the receptors were modelled relates to the lowest point of exposure at that receptor location i.e. closest to the road emissions.

Assessed receptors are outside of the site boundary for the Proposed Development and as such are anticipated to be occupied throughout the construction and operational phases of the Proposed Development.

Table 2: Receptors assessed during the construction phase

Receptor		Type	NGR (m)		Height
			X	Y	
1	Notting Hill Gate	Residential	525098	180388	4.5
2	Notting Hill Gate	Residential	525454	180522	4.5
3	Uxbridge Street	Residential	525098	180357	1.5
4	Hillgate Street	Residential	525166	180369	1.5
5	Uxbridge Street	Residential	525232	180398	1.5
6	Jameson Street	Residential	525278	180379	1.5
7	Jameson Street	Residential	525275	180351	1.5
8	Kensington Place	Residential	525127	180241	1.5
9	Kensington Place	Residential	525183	180263	1.5
10	Kensington Place	Residential	525287	180305	1.5
11	Kensington Place	Residential	525330	180321	1.5
12	Kensington Church Street	Residential	525371	180366	4.5
13	Kensington Church Street	Residential	525381	180315	4.5
14	Notting Hill Gate	Cafe	525172	180437	1.5
15	Linden Gardens	Residential	525422	180518	1.5
16	Kensington Mall	Residential	525433	180420	1.5
17	Kensington Mall	Residential	525392	180375	1.5
18	Notting Hill Gate	Cafe	525275	180434	1.5

4.3.3 Traffic Data

Traffic data for the construction phase was taken from the CTMP prepared by Arup in 2017 and the addendum completed in 2018 and consisted of the likely number of vehicle movements per month throughout the entire construction programme. As a worst-case scenario, the maximum rolling annual average daily construction traffic of 45 trips (equal to an HDV AADT of 45) has been used to determine the construction traffic impact. It has also been assumed that all these vehicles will be Heavy Goods Vehicles (HGVs) and the construction vehicles will travel on all the roads modelled. It is likely the peak construction vehicle movements will happen in the first full calendar year of construction (i.e. 2020), although it is subject to change depending on the planning application progress.

The flow of the construction vehicles was added to the traffic data provided by TTP Consulting which consisted of 24-hour Annual Average Daily Traffic (AADT) flows and the percentage of HDVs for the existing scenario plus committed development in the surrounding area for 2020 was recalculated.

Emission rates for all road sources were calculated using the UK Defra Emissions Factor Toolkit (EFT) v8.0.1[23]. A conservative year of 2016, which assumes no improvement in emissions from vehicles between 2016 and 2020, and a more optimistic year of 2020, have both been used. Speeds were reduced to 20kph close to junctions following the LAQM.TG16[24] guidance.

Traffic data for the model road network is given in Table 5 and the location of these roads shown in Figure 4.

[23] Defra, Emissions Factor Toolkit for Vehicle Emissions, Available from: https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html [Accessed: June 2018]

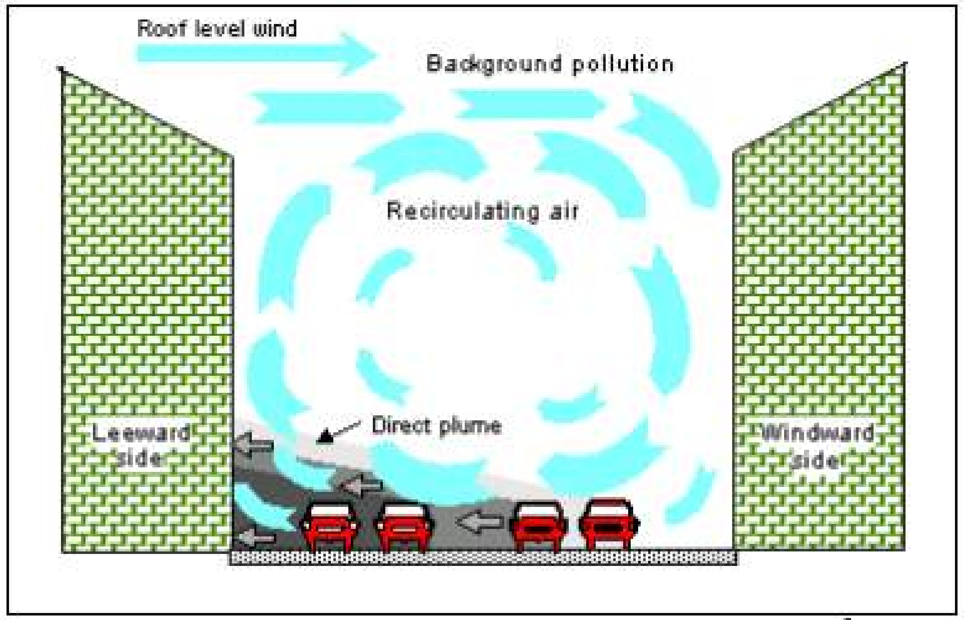
[24] Defra, Local Air Quality Management Technical Guidance, February 2016

Table 3 - Modelled road network for construction traffic emissions

Road Link		Base 2020		Construction 2020	
		AADT	HDV%	AADT	HDV%
1	Pembridge Road[A]	9,493	13.4%	9,538	13.8%
2	Kensington High Street 1[A]	20,838	17.0%	20,883	17.2%
3	Kensington High Street 2[A]	23,532	13.7%	23,577	13.9%
4	Kensington Church Street (S) [A]	17,938	11.0%	17,983	11.2%
5	Notting Hill Gate	30,131	18.3%	30,221	18.5%
6	Kensington Church Street (N)	10,633	14.9%	10,678	15.3%
7	Kensington Mall	13,933	18.5%	13,956	18.6%
8	Kensington Place	991	7.1%	991	7.1%
9	Uxbridge Street	808	9.9%	808	9.9%
A – Data provided for model verification					

The existing urban streetscape on all road links (except Notting Hill Gate) creates a street canyon. The street canyon effect can impact dispersion in the canyon, such as increasing concentrations on the leeside of the road, Figure 2. The ADMS-Roads model is able to model the impacts of street canyons and these have been included in the model set-up.

Figure 2: Conventional street canyon air flow



4.3.4 Model Set Up

This section details the inputs and set up for the construction traffic dispersion modelling.

4.3.4.1 Meteorological Data

Meteorological data used in this assessment has been taken from measurements at Heathrow Airport meteorological station for the year 2016. Heathrow Airport is located approximately 15km south-west of the Proposed Development. This meteorological site is considered the most suitable for this assessment.

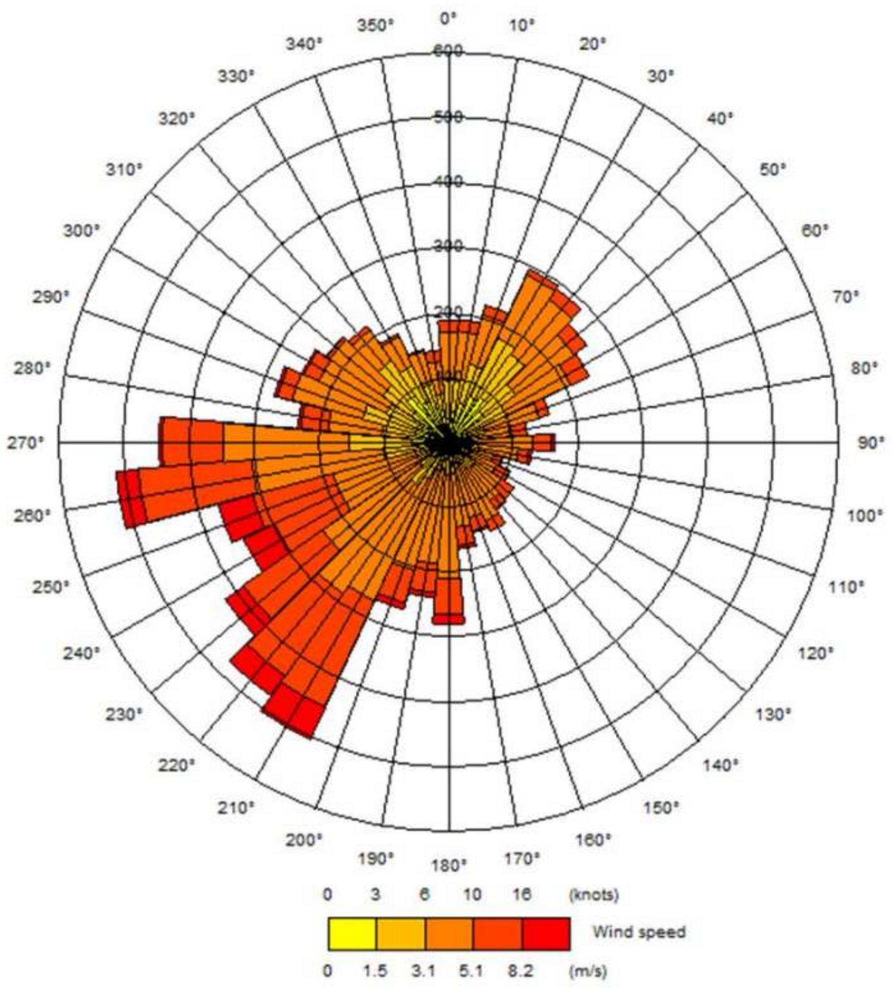
Most dispersion models of roads do not use meteorological data if they relate to calm winds conditions, as dispersion of air pollutants is more difficult to calculate in these circumstances. ADMS-Roads treats calm wind conditions by setting the minimum wind speed to 0.75m/s. LAQM.TG(16) guidance states that the meteorological data file is tested in a dispersion model and the relevant output log file checked to confirm the number of missing hours and calm hours that cannot be used by the dispersion model. This is important when considering predictions of high percentiles and the number of exceedances. The guidance recommends that meteorological data should only be used if the percentage of usable hours is greater than 75% and preferably greater than 90%.

The meteorological data selected from Heathrow airport includes greater than 95% of usable data. This is above the 90% threshold and this data therefore meets the requirement of the Defra guidance.

The wind rose for the Heathrow Airport 2016 meteorological data is presented in Figure 3

It can be seen that the predominant wind direction is from the south-west and therefore receptors located to the north-east of the emission sources will be the most affected.

Figure 3: Wind Rose for Heathrow Airport 2016 Meteorological Data



4.3.4.2 NO_x to NO_2

The model predicts roadside NO_x concentrations, which comprise principally nitric oxide (NO) and primary NO_2. The emitted NO reacts with oxidants in the air (mainly ozone) to form more NO_2, known as secondary NO_2. Since only NO_2 has been associated with effects on human health, the air quality standards for the protection of human health are based on NO_2 rather than NO_x or NO. Thus, a suitable NO_x to NO_2 conversion needs to be applied to the modelled NO_x concentrations.

LAQM.TG16[10] guidance details an approach for calculating the roadside conversion of NO_x to NO_2, which takes into account the difference between ambient NO_x concentrations with and without the development, the concentration of ozone and the different proportions of primary NO_2 emissions in different years. This approach is available as a spreadsheet calculator, with the most up to date version having been released in October 2017 (v6.1)[25].

4.3.4.3 Other Model Parameters

The extent of mechanical turbulence (and hence, mixing) in the atmosphere is affected by the surface/ground over which the air is passing. Typical surface roughness values range from 1.5m (for cities, forests and industrial areas) to 0.0001m (for water or sandy deserts). In this assessment, the general land use in the local study area can be described as "large urban areas" with a corresponding surface roughness of 1.5m. A value of 1.0m (cities, woodland) has been used for the met data measurement site.

Another model parameter is the minimum Monin-Obukhov length, which describes the stability of the atmosphere. Typical values range from 2m to 20m for rural areas. In urban areas though, where traffic and buildings cause the generation of more heat, these values are higher. For this model, a length of 100m was used representing "large conurbations" for the study area, while a value of 30m (cities and large towns) has been used for the met data measurement site.

4.3.4.4 Model Verification

Model verification refers to the comparison of modelled and measured pollutant concentrations at the same points to determine the performance of the model. Should the model results for NO_2 be mostly within ±25% of the measured values and there is no systematic over or under-prediction of concentrations, then the LAQM.TG(16) guidance advises that no adjustment is necessary. If this is not the case, modelled concentrations are adjusted based on the observed relationship between modelled and measured NO_2 concentrations to provide a better agreement.

The outcome of the model verification exercise is reported in section 7.1.

4.4 Method of Operational Traffic Assessment

Operational air quality impacts from the Proposed Development arise principally as a result of traffic changes on the local road network and emissions from any on-site energy centre provision in the form of a combined heat and power (CHP) plant and gas boilers. Effects from traffic generated by the development and emissions from the energy centre have been assessed using the ADMS-Roads atmospheric dispersion model as detailed below.

4.4.1 Assessment Scenarios

The assessment scenarios are summarised as follows:

- 2016 baseline scenario for verification;
- 2023 opening year Do-Minimum (DM) scenario with 2016 background and emission factors (DM1);
- 2023 opening year DM scenario with 2023 background and emission factors (DM2);
- 2023 opening year Do-Something (DS) scenario with 2016 background and emission factors (DS1), and

[25] Defra, NOx to NO_2 Calculator, Available from: http://laqm.defra.gov.uk [Accessed: June 2018]

- 2023 opening year DS scenario with 2023 background and emission factors (DS2)

The 2023 DM scenarios represent the opening year scenario including committed development in the area without the Proposed Development, while the 2023 DS scenarios represent the DM scenarios plus traffic and energy centre emissions associated with the Proposed Development in place.

Two sets of results for the 2023 DM and 2023 DS scenarios are presented in this report, representing a worst-case scenario (by using 2016 background concentration and emission factors), and a more optimistic scenario with the assumptions that emission from vehicles, as well as background concentrations, will be lower (by using 2023 background concentration and emission factors). This will be further discussed in section 7.2.

4.4.2 Sensitive Receptors

Pollutant concentrations are predicted at the same receptors as those assessed in the construction traffic assessment. These selected existing receptors are outside of the site boundary for the Proposed Development and as such are anticipated to be occupied throughout the construction and operational phases of the Proposed Development.

Receptors at the façades of the Proposed Development at different heights are also included in the dispersion model to assess the future residents' likely exposure to air pollution.

Emissions from the proposed Energy Centre will also be taken into account. It should be noted that the heights the receptors were modelled at relate to the lowest point of exposure at that receptor location i.e. closest to the road emissions.

Details of the additional receptors at the facades of the Proposed Development are given in Table 4 and their location shown in Figure 4.

Table 4: Receptors assessed in the air quality assessment

Receptor		Type	NGR (m)		Height
			X	Y	
19	CB-CF (Front)4F	Residential	525313	180436	19.8
20	CB-CF (Front)5F	Residential	525313	180436	23.6
21	CB-CF (Front)6F	Residential	525313	180436	27.4
22	CB-CF (Front)7F	Residential	525313	180436	31.2
23	CB-CF (Front)8F	Residential	525313	180436	35.0
24	CB-CF (Front)9F	Residential	525313	180436	38.8
25	CB-CF (Front)10F	Residential	525313	180436	42.6
26	CB-CF (Front)11F	Residential	525313	180436	46.4
27	CB-CF (Front)12F	Residential	525313	180436	50.2
28	CB-CF (Front)13F	Residential	525313	180436	54.0
29	CB-CF (Front)14F	Residential	525313	180436	57.8
30	CB-CF (Front)15F	Residential	525313	180436	61.6
31	CB-CF (Front)16F	Residential	525313	180436	65.4
32	CB-CF (Front)17F	Residential	525313	180436	69.2
33	CB-CF (Back)4F	Residential	525316	180417	19.8
34	CB-CF (Back)5F	Residential	525316	180417	23.6
35	CB-CF (Back)6F	Residential	525316	180417	27.4
36	CB-CF (Back)7F	Residential	525316	180417	31.2
37	CB-CF (Back)8F	Residential	525316	180417	35.0
38	CB-CF (Back)9F	Residential	525316	180417	38.8
39	CB-CF (Back)10F	Residential	525316	180417	42.6
40	CB-CF (Back)11F	Residential	525316	180417	46.4
41	CB-CF (Back)12F	Residential	525316	180417	50.2
42	CB-CF (Back)13F	Residential	525316	180417	54.0
43	CB-CF (Back)14F	Residential	525316	180417	57.8
44	CB-CF (Back)15F	Residential	525316	180417	61.6
45	CB-CF (Back)16F	Residential	525316	180417	65.4
46	CB-CF (Back)17F	Residential	525316	180417	69.2
47	CB-EF (Front)4F	Residential	525333	180435	19.8
48	CB-EF (Front)5F	Residential	525333	180435	23.6
49	CB-EF (Front)6F	Residential	525333	180435	27.4
50	CB-EF (Front)7F	Residential	525333	180435	31.2
51	CB-EF (Front)8F	Residential	525333	180435	35.0
52	CB-EF (Front)9F	Residential	525333	180435	38.8
53	CB-EF (Front)10F	Residential	525333	180435	42.6
54	CB-EF (Front)11F	Residential	525333	180435	46.4
55	CB-EF (Front)12F	Residential	525333	180435	50.2
56	CB-EF (Front)13F	Residential	525333	180435	54.0
57	CB-EF (Back)4F	Residential	525326	180415	19.8
58	CB-EF (Back)5F	Residential	525326	180415	23.6
59	CB-EF (Back)6F	Residential	525326	180415	27.4
60	CB-EF (Back)7F	Residential	525326	180415	31.2
61	CB-EF (Back)8F	Residential	525326	180415	35.0
62	CB-EF (Back)9F	Residential	525326	180415	38.8
63	CB-EF (Back)10F	Residential	525326	180415	42.6
64	CB-EF (Back)11F	Residential	525326	180415	46.4
65	CB-EF (Back)12F	Residential	525326	180415	50.2
66	CB-EF (Back)13F	Residential	525326	180415	54.0
67	KCS1 (Front 1)1F	Residential	525345	180403	6.0

Receptor		Type	NGR (m)		Height
			X	Y	
68	KCS1 (Front 1)2F	Residential	525345	180403	9.0
69	KCS1 (Front 1)3F	Residential	525345	180403	12.0
70	KCS1 (Front 1)4F	Residential	525345	180403	15.0
71	KCS1 (Back)1F	Residential	525332	180388	6.0
72	KCS1 (Back)2F	Residential	525332	180388	9.0
73	KCS1 (Back)3F	Residential	525332	180388	12.0
74	KCS1 (Back)4F	Residential	525332	180388	15.0
75	KCS1 (Front 2)1F	Residential	525351	180372	6.0
76	KCS1 (Front 2)2F	Residential	525351	180372	9.0
77	KCS1 (Front 2)3F	Residential	525351	180372	12.0
78	KCS1 (Front 2)4F	Residential	525351	180372	15.0
79	KCS2 (Front)1F	Residential	525355	180347	6.0
80	KCS2 (Front)2F	Residential	525355	180347	9.0
81	KCS2 (Front)3F	Residential	525355	180347	12.0
82	KCS2 (Back)1F	Residential	525341	180348	6.0
83	KCS2 (Back)2F	Residential	525341	180348	9.0
84	KCS2 (Back)3F	Residential	525341	180348	12.0
85	KCS2 (End)1F	Residential	525352	180330	6.0
86	KCS2 (End)2F	Residential	525352	180330	9.0
87	KCS2 (End)3F	Residential	525352	180330	12.0
88	WPB1 (Front)1F	Residential	525308	180383	6.0
89	WPB1 (Front)2F	Residential	525308	180383	9.0
90	WPB1 (Back)1F	Residential	525317	180384	6.0
91	WPB1 (Back)2F	Residential	525317	180384	9.0

4.4.3 Traffic Data

Traffic data for the baseline, DM and DS scenarios were provided by TPP Consulting, the transport consultants for the project. An additional traffic survey was carried out in 2018 to enable model verification. Emission rates for all road sources were calculated using the latest UK Emission Factors Toolkit v8.0.1[26] for various years:

- 2016 for model verification;
- 2023 for future operational year.

Speeds were reduced to 20kph close to junctions following the LAQM.TG16[10] guidance. Traffic data for the model road network is given in Table 5 and the location of these roads shown in Figure 4.

Table 5: Modelled road network for operational traffic emissions

Road Link		Base 2016		DM 2023		DS 2023	
		AADT	HDV%	AADT	HDV%	AADT	HDV%
1	Pembridge Road[A]	8,927	13.4	9,534	13.4	9,534	13.4
2	Kensington High Street 1[A]	19,595	17.0	20,926	17.0	20,926	17.0
3	Kensington High Street 2[A]	22,129	13.7	23,632	13.7	23,632	13.7
4	Kensington Church Street (S) [A]	16,868	11.0	18,014	11.0	18,014	11.0
5	Notting Hill Gate	-	-	31,220	18.3	31,157	18.4
6	Kensington Church Street (N)	-	-	11,017	14.9	10,958	15.2
7	Kensington Mall	-	-	14,437	18.5	14,419	18.6
8	Kensington Place	-	-	1,027	7.1	954	7.7
9	Uxbridge Street	-	-	838	9.9	786	10.7
A – Data provided for model verification							

The other model set-up for the operational assessment is the same as outlined above for the construction traffic assessment.

4.5 Method of Combustion Sources Assessment

The current design of the Proposed Development proposes the installation of one natural gas CHP unit and three 850kWh gas boilers, fitted with catalysts to reduce emissions. Stack and emission parameters for the CHP unit and gas boilers anticipated to be installed at the Proposed Development have been obtained from manufacturer's technical datasheets[27,28]. It should be noted that the CHP unit is compliant with the emission standards set out in Appendix 7 of the GLA.

Sustainable Design and Construction SPG[12] and NOx emissions from the gas boilers meet the 40mg/kWh best practice standard. The EPUK/IAQM guidance[19] states that where a combustion plant NO_x emission rate is less than 5mg/s it is unlikely to give rise to impacts. Each of the proposed units exceed this criterion and are therefore included in a detailed assessment.

The assessment will focus on changes in NO_2 concentrations resulting from the Proposed Development during operation, as gas-fired boilers and CHP emit negligible amount of PM_{10} and $PM_{2.5}$ through the combustion process.

[26] Defra Emission Factor Toolkit v8; http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html; [Accessed June 2018]

[27] Ener-G E70M (95mg/Nm^3) Technical Datasheet Natural Gas CHP Unit, NOx emissions are given as 95mg/Nm^3 @ 5% O_2

[28] Ultragas (150-1000) Gas Boiler, Hoval, NOx emissions are given as 37mg/kWh

The receptor locations and model set-up are the same in the energy centre modelling as in the road vehicle emission modelling.

4.5.1 Building Effects

Tall buildings (higher than 30-40% of the stack height) on or around the Proposed Development can affect the dispersion of pollutants from the combustion sources, and therefore have been included in the dispersion model. If tall buildings are close to a stack, the plume can be entrained in the cavity zone downwind of the building. This can lead to higher ground concentrations near the stack than would be expected in the absence of buildings and can affect the dispersion of pollutants in the atmosphere. Downwash effects have been taken into account by the ADMS dispersion model.

A map showing the location of buildings included in the model is provided in Figure 4 and building geometries are detailed in Table 6. It should be noted that some simplification of the site was required for input into ADMS, and as such all buildings were modelled as rectangular objects. The stacks are located on the Corner Building - Central Form (which has been selected as the 'main building').

Table 6: Building geometries

Building	NGR (m)		Height (m)	Length (m)	Width (m)	Orientation from North (° degrees)
	X	Y				
Corner Building - Central Form	525316	180428	72	12	19	75
Corner Building - East Form	525329	180425	55.5	12	17.5	75

4.5.1.1 Process Conditions

Parameters used in the model are presented in Table 7. These are representative of two flues, one for the CHP plant and the second containing the exhausts of all three gas boilers. The stack location is shown in Figure 4. The parameters used for the gas boilers are for three units combined.

An absolute worst-case assessment has been undertaken assuming all plant, including gas boilers, are continuously operational throughout the year.

It should also be noted that the stack diameters used for dispersion modelling has been decreased so that the exit velocity of the flue gas from the CHP and gas boilers are compliant with the requirement from the GLA Sustainable Design and Construction SPG29 of a minimum of 10m/s.

Table 7: Process conditions

Parameter	Unit	CHP	3 x Gas Boiler
Boiler capacity	kW	70 (electrical output)	2,550
Stack location	NGR	525320, 180431	525320, 180431
Stack diameter	m	0.1	0.15
Flue gas efflux velocity	m/s	10.72	16.86
Temperature	˚C	120	69
Stack height	m	73	73
NOx emission rate	g/s	0.0054	0.03

4.5.1.2 Meteorological Data

To account for inter-annual variation in meteorological conditions three years of meteorological data has been used in the assessment for the emissions from the energy centre (note: one year of data was used for the road traffic emissions only, as dispersion of point source emissions are more dependent on meteorological condition than traffic emissions). The meteorological data used in this assessment was measured at London Heathrow Airport meteorological station over the period 1st January 2015 to 31st December 2017 (inclusive).

The use of three years of meteorological data for the assessment of the emissions from the energy centre provides a range of results at each receptor. The highest predicted concentration (i.e. maximum process contribution) at each receptor was chosen to provide a conservative approach to the results.

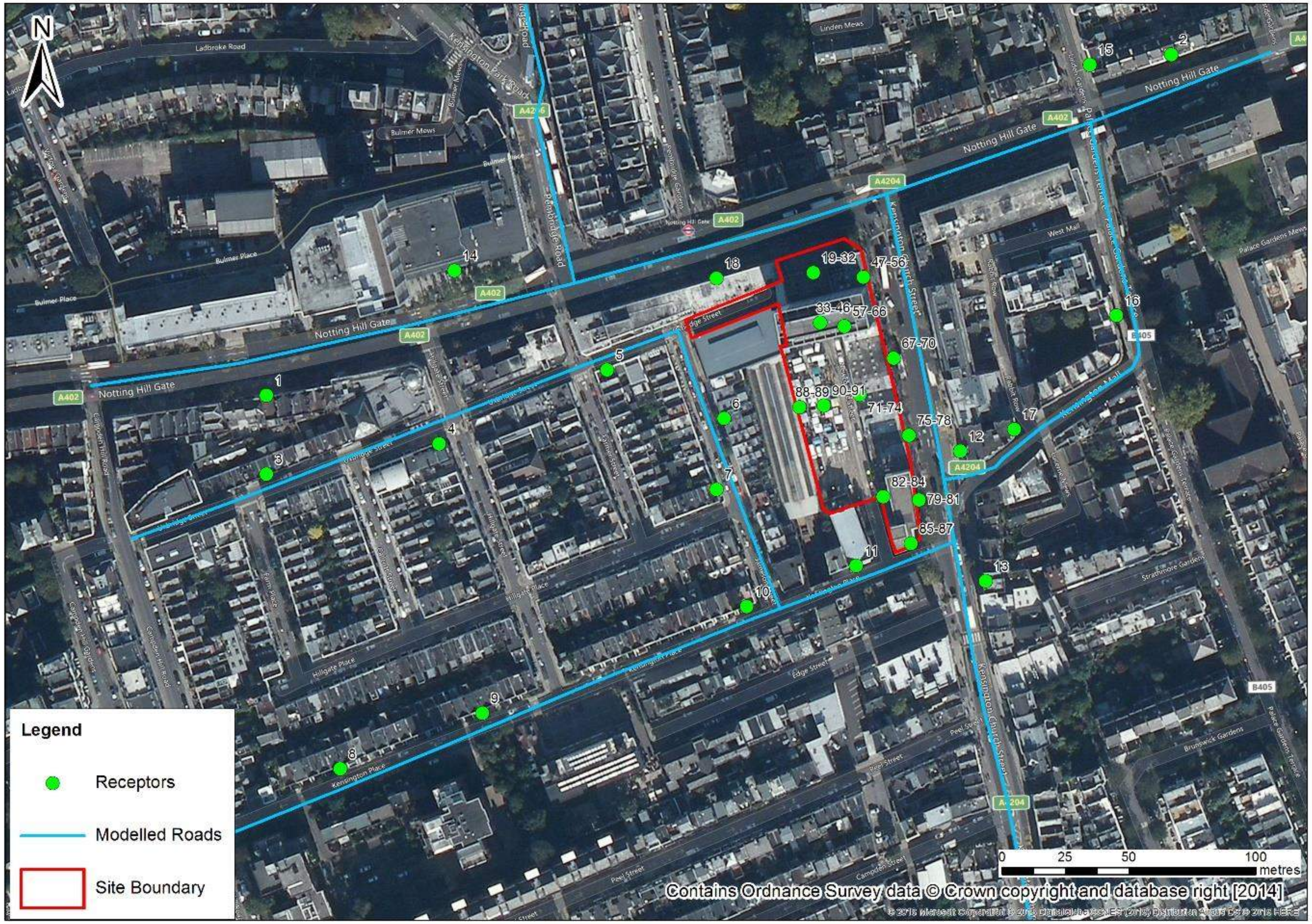
4.5.1.3 NOx to NO_2 Conversion

The emissions of NOx from the CHP and boilers have been converted to NO_2 based on a percentage conversion rate[30]. This assessment has assumed that 70% of long-term and 35% of short-term NOx concentrations will convert to NO_2. This is considered appropriate for this assessment.

[29] Greater London Authority (2014) Sustainable Design and Construction Supplementary Planning Guidance, April 2014 https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/sustainable-design-and

[30] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#environmental-standards-for-air-emissions, accessed July 2018.

Figure 4: Modelled roads and receptors



4.6 Assessment of Significance

The 2017 EPUK/IAQM guidance note ‘Land-Use Planning & Development Control’ provides an approach to determining the air quality impacts resulting from a Proposed Development and the overall significance of local air quality effects arising from a Proposed Development.

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

The assessment framework for determining impact descriptors at each of the assessed receptors is shown in Table 8.

Table 8: Impact Descriptors for Annual Mean NO_2 Concentrations

Annual average concentrations at receptor in the assessment year	**% Change in concentrations relative to annual mean NO_2 and PM_{10} objectives**			
	1	**2-5**	**6-10**	**>10**
75% or less of objective	Negligible	Negligible	Slight	Moderate
76-94% of objective	Negligible	Slight	Moderate	Moderate
95-102% of objective	Slight	Moderate	Moderate	Substantial
103-109% of objective	Moderate	Moderate	Substantial	Substantial
110% of more of objective	Moderate	Substantial	Substantial	Substantial

Note: Changes in pollutant concentrations of less than 0% i.e. <0.5% would be described as negligible

The guidance also provides advice for determining the magnitude of change for short-term NO_2 concentrations, which is shown in Table 9. The impact descriptor is determined by considering the process contribution only. However, consideration is also given to total pollutant concentrations, including existing concentrations, and comparison of these with the hourly mean NO_2 objective.

Table 9: Impact Descriptors for Hourly Mean NO_2 Concentrations

Change in hourly mean concentrations at receptor in the assessment year	**Magnitude of Change**	**Impact Descriptor**
<10% of hourly mean NO2 threshold	Imperceptible	Negligible
10-20% of hourly mean NO2 threshold	Small	Slight
20-50% of hourly mean NO2 threshold	Medium	Moderate
>50% of hourly mean NO2 threshold	Large	Substantial

The impact descriptors at each of the assessed receptors can then be used as a starting point to make a judgement on the overall significance of effect of a Proposed Development, however other influences would also need to be accounted for, such as:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

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

4.7 Method of Air Quality Neutral Assessment

An Air Quality Neutral Assessment has been undertaken as required by the Sustainable Design and Construction SPG29.

Building Emission Benchmarks (BEBs) and Transport Emission Benchmarks (TEBs) have been set for NOx, and PM_{10} for traffic only, according to the land-use classes of the Proposed Development. These are presented in Table 10.

In order to calculate the emissions from the Proposed Development and apply the BEBs and TEBs, the following information was obtained:

- proposed gross floor area (m^2) (for land-use classes B1, A1, A3, D1 and C3);
- fossil fuel energy density benchmarks (kWh/m^2) for different land-use classes;
- proposed on-site gas consumption;
- annual NOx emission rates for the Proposed Development; and

- daily vehicle trips associated with the Proposed Development

The BEBs and the TEBs for the Proposed Development have been calculated using the values in Table 10 and subtracted from the total building and transport emissions for the Proposed Development. Should the outcome be negative, then the building and transport emissions from the Proposed Development are within the benchmark and therefore no mitigation or offsetting would be required. These are standard figures outlined in the SPG on Sustainable Design and Construction (2014)[12].

Table 10: Air Quality Neutral Emissions Benchmarks for Building and Transport Emissions (g/m^2/annum)

Land Use	BEB	TEB	
	NOx	NOx	PM_{10}
Class A1+A3	22.6	169	29.3
Class B1	30.8	1.27	0.22
Class C3*	26.2	234	40.7
Class D1	43.0	N/A	N/A
* For residential land uses, emission benchmarks are provided as g/dwelling/annum			

Comparison against the BEBs and TEBs is undertaken in the assessment section.

As shown in Table 10, there is no TEB for land use class D1 – the surgery. The comparison for class D1 is therefore based on a trip rate benchmark as outlined by the guidance.

5 Baseline Assessment

5.1 Sources of Air Pollution

5.1.1 Industrial Processes

Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met and ensuring that any releases to the environment are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A or Part B processes, regulated through the Pollution Prevention and Control (PPC) system[31,32]. The Environmental Permitting regime regulates emissions to air, water and land through environmental permits. Part A regulates the environmental impacts of most industrial activities over a certain scale under the Industrial Emissions Directive 2010. Part B is known as the local air pollution prevention and control regime and applies to other activities that are outside the scope of the Industrial Emissions Directive 2010. Part B applies only to emissions to air from certain types of plants (for example, smaller foundries and petrol stations) that fall outside the scope of Part A.

There are no processes regulated under Part A within 1.5km of the Proposed Development, listed on the EA website[33]. Part B processes are regulated and reviewed by RBKC and given the nature of these processes are unlikely to significantly affect ambient air quality in the vicinity of the Proposed Development.

Emissions from Part B processes are assumed to be accounted for in the background concentrations.

The 2016 Air Quality Annual Status Report produced by RBKC also states that there is *"no new or significantly changed industrial or other sources."*

5.1.2 Road Traffic

In recent decades, atmospheric emissions from transport on a national basis have grown to match or exceed other sources in respect of many pollutants, particularly in urban areas. The Proposed Development lies just off the busy Notting Hill Gate and Kensington Church Street, which are included in the dispersion model. Vehicle emissions are likely to be one of the more dominant sources of air pollutants in the vicinity of the Proposed Development.

The impact of emissions from road traffic has been taken into account in the assessment of the operational phase.

5.2 Local Air Quality

As part of the review and assessment process, in 2000 RBKC declared the whole of the borough an AQMA[21] due to exceedances of the annual and hourly mean NO_2 objective and the 24 hour PM_{10} objective.

5.2.1 Local Monitoring

RBKC undertake both continuous and passive monitoring in the Borough. A review of the most recent annual status report (ASR)[20] highlighted that within 2km of the Proposed Development, there are two operational continuous monitors, monitoring both NO_2 and PM_{10}, and 11 passive NO_2 diffusion tubes. The locations are shown in Figure 5.

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

[33] Environment Agency website, Search installation permits; https://environment.data.gov.uk/public-register/view/search-industrial-installations; [Accessed: July 2018]

Figure 5: Monitoring sites within 2km of the Proposed Development

Automatic Monitoring

Automatic or continuous monitoring involves drawing air through an analyser continuously to obtain near real-time pollutant concentration data. The details of the automatic monitoring sites are presented in Table 11.

Recent NO2 monitoring results from 2012 to 2016 are shown in Table 12. Exceedances of the annual mean NO_2 and PM_{10} objectives (40µg/m^3) are displayed in bold. Where an exceedance has been measured at a monitoring site that is deemed not representative of public exposure, the procedure as defined in LAQM.TG16[10] has been used to estimate the concentration at the nearest receptor. This procedure has also been carried out for PM_{10} and $PM_{2.5}$ concentrations.

Table 11: Details of automatic monitoring sites within 2km of the Proposed Development

Site ID	Site location	OS Grid Reference		Site type
		X	Y	
KC1	North Kensington	524045	181752	Urban background
KC2	Cromwell Road 2	526524	178965	Roadside
KC5	Earls Court	525695	178363	Kerbside

Table 12: Automatic annual mean NO_2 monitoring results

Site ID	Site location	NO_2 annual mean concentration (µg/m^3)					
		2012	2013	2014	2015	2016	2016*
KC1	North Kensington	37.0	37.0	34.0	32.0	35.0	N/A
KC2	Cromwell Road 2	**69.0**	**60.0**	**56.0**	**55.0**	**58.0**	**51.9**
KC5	Earls Court	**101.0**	**95.0**	**93.0**	**91.0**	**86.0**	**76.0**

Note: Exceedances are highlighted in **bold**; N/A means data is not available for this station.
"*" Distance corrected 2016 results

Exceedances of the annual mean NO_2 objective were recorded at KC2 and KC5, a roadside and kerbside site, between 2012 and 2016. The maximum concentration recorded was 101.0µg/m^3 at KC5 in 2012.

Recent PM_{10} monitoring results from 2012 to 2016 are shown in Table 13. Exceedances of the annual mean PM_{10} objective (40µg/m^3) are displayed in bold.

Table 13: Automatic annual mean PM_{10} monitoring results

Site ID	Site location	PM_{10} annual mean concentration (µg/m^3)					
		2012	2013	2014	2015	2016	2016*
KC1	North Kensington	20.0	23.0	17.0	16.0	19.0	N/A
KC2	Cromwell Road 2	27.0	26.0	25.0	23.0	22.0	N/A
KC5	Earls Court	34.0	34.0	31.0	27.0	28.0	N/A

Note: Exceedances are highlighted in **bold**; N/A means data is not available for this station.
"*" Distance corrected 2016 results

There were no exceedances of the PM_{10} annual mean objective at any of the automatic monitoring sites between 2012 and 2016 and background concentrations are well below the annual mean objective.

Recent $PM_{2.5}$ monitoring results from 2012 to 2016 are shown in Table 14. Exceedances of the annual mean $PM_{2.5}$ objective (25µg/m^3) are displayed in bold.

Table 14: Automatic annual mean $PM_{2.5}$ monitoring results

Site ID	Site location	$PM_{2.5}$ annual mean concentration (µg/m^3)					
		2012	2013	2014	2015	2016	2016*
KC1	North Kensington	14.5	14.7	15.9	10.9	12.1	N/A
KC2	Cromwell Road 2	14.8	15.8	N/A	14.7	17.4	N/A

Note: Exceedances are highlighted in **bold**; N/A means data is not available for this station.
"*" Distance corrected 2016 results

There were no exceedances of the $PM_{2.5}$ annual mean objective at any of the automatic monitoring sites between 2012 and 2016. $PM_{2.5}$ was not measured at site KC5.

Passive Monitoring

There are 16 NO_2 diffusion tubes located within 2km of the Proposed Development. Location details for these sites are presented in Table 15.

Table 15: Diffusion tubes within 2km of Proposed Development

Site ID	Site location	OS Grid Reference		Site type
		X	Y	
KC31	Ladbroke Grove/North Kensington Library	524342	181271	Roadside
KC32	Holland Park	524784	179599	Urban background
KC33	Cromwell Road/Earls Court Road	525355	178841	Roadside
KC38	Earls Court Station	525548	178556	Roadside
KC41	Ladbroke Crescent	524294	181200	Urban background
KC42	Pembridge Square Library	525191	180705	Roadside
KC45	Chatsworth Court	525263	178936	Roadside
KC47	Sion Manning School	524046	181758	Urban background
KC53	Walmer House	523792	181189	Urban background
KC54	Cromwell Road/Natural History Museum	526550	178968	Roadside
KC58	Kensington High Street/Kensington Church Street	525630	179674	Roadside
KC59	Kensington High Street/Argyll Street	525342	179464	Kerbside
KC64	Warwick Road	524825	178902	Roadside
KC66	Acklam Road	524541	181893	Railway
KC68	Exhibition Road	526863	179060	Kerbside
KC69	Darfield Way	523587	180893	Background

Diffusion tube monitoring results for 2012 to 2016 at these sites are presented in Table 16. Exceedances of the annual mean NO_2 objective (40µg/m^3) are displayed in bold.

Table 16: Diffusion tube annual mean NO_2 monitoring results

Site ID	Site location	NO_2 annual mean concentration (µg/m^3)					
		2012	2013	2014	2015	2016	2016*
KC31	Ladbroke Grove/North Kensington Library	**52.6**	**60.9**	**53.5**	**49.3**	**55.5**	**62.7**
KC32	Holland Park	29.1	34.0	29.2	27.5	29.9	N/A
KC33	Cromwell Road/Earls Court Road	**84.2**	**106.3**	**98.2**	**84.5**	**105.0**	**80.0**
KC38	Earls Court Station	**100.7**	**108.8**	**100.7**	**99.0**	**101.0**	**109.0**
KC41	Ladbroke Crescent	34.8	**41.7**	36.7	34.6	38.2	N/A
KC42	Pembridge Square Library	**43.8**	**50.9**	**42.4**	**41.2**	**46.2**	**45.1**
KC45	Chatsworth Court	**50.5**	**57.9**	**53.5**	**48.6**	**52.6**	**47.3**
KC47	Sion Manning School	33.8	36.7	32.9	27.5	34.2	N/A
KC53	Walmer House	**48.5**	**53.6**	**48.4**	**42.6**	**47.0**	N/A
KC54	Cromwell Road/Natural History Museum	**73.4**	**80.6**	**73.7**	**62.9**	**72.5**	**71.9**
KC58	Kensington High Street/Kensington Church Street	**62.4**	**75.0**	**58.9**	**50.9**	**59.7**	**86.9**
KC59	Kensington High Street/Argyll Street	**83.4**	**86.9**	**74.9**	**70.3**	**79.0**	**76.0**
KC64	Warwick Road	**49.6**	**55.5**	**54.8**	**50.6**	**58.3**	**50.6**
KC66	Acklam Road	39.9	**45.4**	**44.2**	34.3	**55.8**	N/A
KC68	Exhibition Road	**48.0**	**58.3**	**52.9**	**44.6**	**51.0**	**49.0**
KC69	Darfield Way	N/A	N/A	**48.7**	39.3	**46.1**	N/A

Note: Exceedances are highlighted in **bold**; N/A means data is not available for this station.
"*" Distance corrected 2016 results

Exceedances of the annual mean NO_2 objective were recorded at 14 diffusion tube monitoring sites between 2012 and 2016. The objective was met at three out of the four urban background sites in recent years, but not met at KC53. The maximum concentration recorded was 109.0µg/m^3 at KC38, Earls Court Station in 2016.

There are widespread exceedances of the annual mean NO_2 objective at roadside and kerbside locations. At some locations where annual mean NO_2 concentrations are greater than 60µg/m^3, it is likely that the hourly mean NO_2 objective would also be exceeded[10]. It is likely that certain areas of the Proposed Development will exceed the annual mean and 1-hour mean NO_2 objective at lower floor locations adjacent to major roads, A402 Notting Hill Gate and Kensington Church Street.

Monitored results from nearby locations shows that the PM10 concentrations meet the annual and daily mean PM10 objectives. It is anticipated that the particulate matter objectives are currently met in the area proposed for development.

5.2.2 Background Concentrations

The Defra website[34] includes estimated background air pollution data for future years based on the baseline year of 2015 for NO_2, PM_{10} and $PM_{2.5}$ for each 1km by 1km OS grid square. Estimated pollutant concentrations in the OS grid square in which the site lies for 2016 are shown in Table 17. The annual mean NO_2 and PM_{10} background concentrations are currently below the air quality objective (40µg/m^3).

Table 17: Baseline (2016) Background Pollutant Concentrations (µg/m^3)

OS grid square		2016			
X	Y	NO_2	NOx	PM_{10}	$PM_{2.5}$
525500	180500	36.0	59.9	20.3	12.7

Table 18 shows the comparison between the Defra mapped NO_2 background and the measured urban background concentration at locations KC1, KC32, KC41 and KC47 from 2016. KC53 and KC69 are neglected from this comparison as it is considered that their locations are too close to the A3220 and A40 respectively and hence not representative of the true background concentration.

Table 18 Comparison between monitored NO_2 and Defra background concentrations

Site ID	Estimated Defra background concentration (µg/m^3)	Measured concentration (µg/m^3)	Difference (Estimated minus Measured)	Difference (%) (Estimated minus Measured)
KC1	42.1	35.0	7.1	17%
KC32	33.7	29.9	3.8	11%
KC41	42.1	38.2	3.9	9%
KC47	42.1	34.2	7.9	19%

As the estimated background concentrations for the OS grid squares are consistently higher than the actual measured background, as a conservative and worst-case approach, the Defra background concentrations for grid square 522500, 180500 have been used in the processing of results.

Background concentrations are predicted to decrease in future due to reductions in emission and Defra also provides the estimated prediction of background concentrations. Predicted background concentrations for 2020 and 2023 are presented in Table 19.

Table 19: Predicted future baseline (2020 and 2023) Background Pollutant Concentrations

Year	OS grid square		Pollutant concentrations (µg/m^3)		
	X	Y	NO_2	PM_{10}	$PM_{2.5}$
2020	525500	180500	28.9	19.4	11.9
2023			25.3	19.3	11.6

[34] Defra, https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015. Accessed June 2018.

6 Construction Dust Assessment

6.1 Introduction

The site is currently occupied by numerous buildings including retail units and an existing 12 storey office building. Excavation will also be undertaken to create the basement of the Proposed Development. As such, demolition and earthworks will be required to enable the development, the effects of which, as well as construction, are considered in the following section.

6.1.1 Sensitive Receptors

Sensitive receptors are defined as those properties/schools/hospitals that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction and operation of the Proposed Development. There are sensitive receptors located within 350m of the site boundary; there are numerous residential dwellings in this area, as well as nurseries and schools. As such, their sensitivity to dust soiling and PM10 exposure has been classified as high according to the IAQM guidance[18]. Construction dust buffers are shown in Figure 6.

6.1.2 Need for Assessment

An assessment is required due to the presence of sensitive receptors within 350m of the Proposed Development site and within 50m of the trackout routes as mentioned in Section 4.2. Hyde Park and Holland Park lie to the east and west of the site however, there are no ecological designated sites sensitive to dust within 50m of the site and so this element of the assessment is not considered further.

6.1.3 Dust Emission Magnitude

Following the methodology outlined in Section 4.2 and the criteria presented in Table A 1, each dust-generating activity has been assigned a dust emission magnitude as shown in Table 20. For earthworks, it has been assumed that these will occur in the whole site area as a worst case. For trackout, it has been assumed that construction vehicles will use Kensington Church Street to the south and Notting Hill Gate to the east and west to access the site.

Table 20: Dust Emission Magnitude for Construction Activities

Activity	Dust emission magnitude	Reasoning
Demolition	Medium	• total building volume 20,000 - 50,000m^3 • potentially dusty construction material • demolition activities 10 - 20m above ground level
Earthworks	Medium	• total site area 2,500 - 10,000m^2
Construction	Medium	• total building volume 25,000 - 100,000m^3 • potentially dusty construction material (e.g. concrete)
Trackout	Medium	• During peak construction phase, it has been assumed that there would be between 10-50 HDV outward movements per day • Given the location of the development, it is unlikely that vehicles would need to travel further than 100m on unpaved road

6.1.4 Sensitivity of the Area

The sensitivity of the area to dust soiling on people and property has been assigned as high, as there are more than 10 high sensitive receptors within 20m from any dust generating activity. The lower criterion for background PM10 concentrations in the IAQM guidance is 24µg/m3. The estimated background concentration is 21.3µg/m3. The sensitivity of the area to human health impacts has therefore been assigned as low. The overall sensitivity has been summarised as shown in Table 21.

Table 21: Sensitivity of the surrounding area

Potential Impact	Sensitivity of the surrounding area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	Low	Low	Low	Low

Using the criteria set out in the risk of dust impacts table in the appendix, the impacts on the area without mitigation are defined. Appropriate mitigation measures will be included in the CEMP which is to be developed and will be implemented by the contractor in relation to the development.

Risk of Impacts

Taking into consideration the dust emission magnitude and the sensitivity of the area, the site has been classified as medium risk for dust soiling towards demolition, earthworks, construction and track out, while it is low risk for human health (Table 22). Specific mitigation is described in Section 9.

Table 22: Summary Dust Risk Table Prior to Mitigation

Activity	Dust Soiling Risk	Human Health risk
Demolition	Medium	Low
Earthworks	Medium	Low
Construction	Medium	Low
Trackout	Medium	Low

6.1.5 Cumulative Construction Dust

It is anticipated that issues such as dust will be addressed through the imposition of planning conditions requiring the production of a Construction Environmental Management Plan (CEMP) and adherence to the RBKC Code of Construction Practice, which includes general measures for the control of dust. Any construction dust impact will therefore be controlled on a project by project basis and should not constitute to any significant cumulative impact.

Figure 6: Construction Dust Buffers

7 Construction Traffic and Operational Assessment

7.1 Model Verification

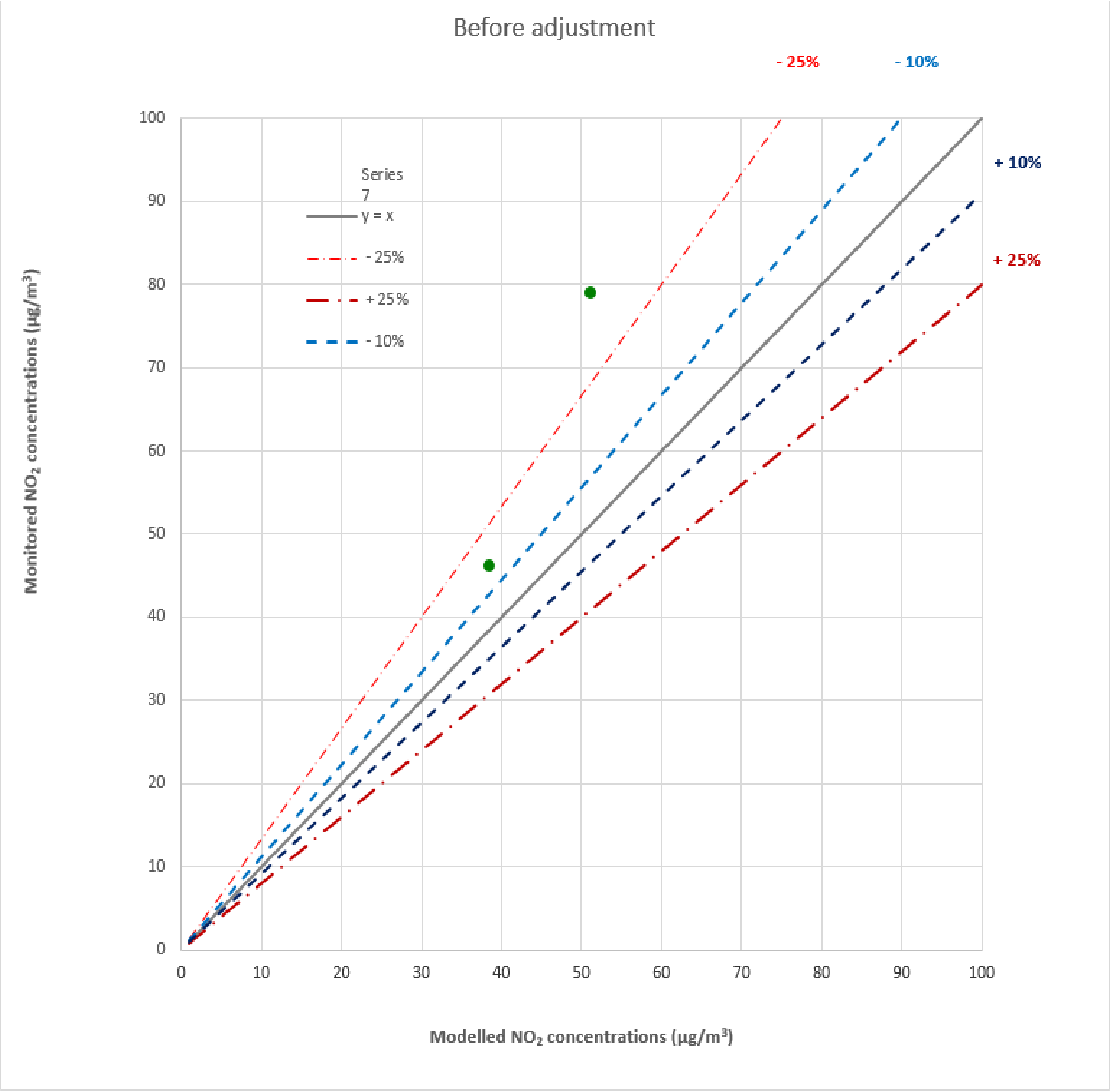
The model verification exercise used RBKC NO_2 monitoring data from the closest diffusion tube to the proposed site: KC42 (roadside) and KC59 (kerbside).

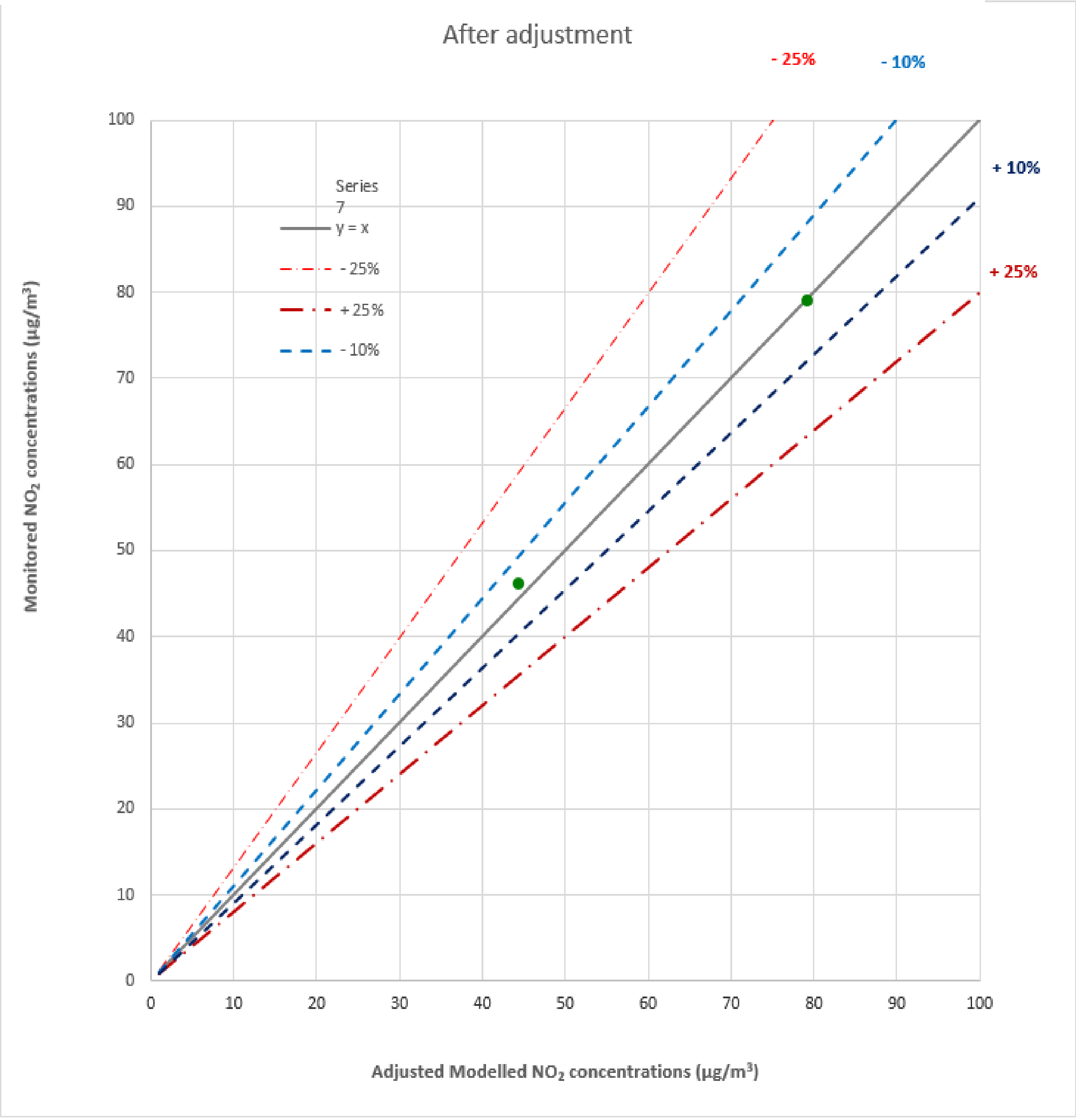
Monitoring results from 2016 for this location were obtained and the road contribution to the total NOx concentration calculated for use in the verification process. The model verification exercise was undertaken following the methodology contained in LAQM.TG (16). A comparison of monitored and modelled annual mean NO_2 concentrations for 2016 is shown in Figure 7 shows that the model (before any adjustment) is under-predicting. The percentage difference between the monitored and modelled results, which on average, is not within the recommended guideline stated in LAQM.TG(16) of 25%. Therefore, a model adjustment exercise has been carried out, and an adjustment factor of 3.416 has been applied to modelled results. A graphical comparison of the monitored and modelled annual mean NO_2 concentrations before and after adjustment are shown in Figure 7.

Table 23: Comparison of modelled and monitored annual mean NO_2 concentrations before adjustment (μg/m^3)

Site ID	Site type	Background NO_2 concentration (μg/m^3)	Monitored NO_2 concentration (μg/m^3)	Modelled NO_2 concentration (μg/m^3)	% Difference (Modelled - Monitored)/ Monitored
KC42	Roadside	36.0	46.2	38.6	-16.5%
KC59	Kerbside	35.8	79.0	51.1	-35.3%

Figure 7: Monitored and modelled annual mean NO_2 concentrations before and after adjustment





7.2 Construction Traffic Assessment

Dispersion modelling was undertaken of the road traffic emissions with and without the construction of the Proposed Development. Predicted annual mean NO_2 concentrations, using 2016 and 2020 background concentration and emission factors, at the identified receptor locations are summarised in Table 24: Predicted 2020 NO_2 concentrations with and without construction traffic in Table 24.

Table 24: Predicted 2020 NO_2 concentrations with and without construction traffic

Receptor		Annual Mean NO_2 µg/m³ (2016 background and EF) *		Impact	Annual Mean NO_2 µg/m³ (2020 background and EF) *		Impact
		DM1	**DS1**		**DM2**	**DS2**	
1	Notting Hill Gate	**60.3**	**60.5**	Negligible	**44.1**	**44.2**	Negligible
2	Notting Hill Gate	**63.9**	**64.1**	Negligible	**46.0**	**46.1**	Negligible
3	Uxbridge Street	**49.4**	**49.5**	Negligible	37.0	37.0	Negligible
4	Hillgate Street	**50.9**	**51.0**	Negligible	37.9	38.0	Negligible
5	Uxbridge Street	**57.2**	**57.4**	Negligible	**42.0**	**42.1**	Negligible
6	Jameson Street	**50.4**	**50.5**	Negligible	37.6	37.7	Negligible
7	Jameson Street	**47.0**	**47.1**	Negligible	35.5	35.5	Negligible
8	Kensington Place	**40.9**	**41.0**	Negligible	31.8	31.9	Negligible
9	Kensington Place	**42.2**	**42.2**	Negligible	32.6	32.6	Negligible
10	Kensington Place	**45.5**	**45.6**	Negligible	34.6	34.7	Negligible
11	Kensington Place	**49.8**	**49.9**	Negligible	37.4	37.5	Negligible
12	Kensington Church Street	**60.0**	**60.3**	Negligible	**43.8**	**44.0**	Negligible
13	Kensington Church Street	**53.4**	**53.6**	Negligible	39.6	39.7	Negligible
14	Notting Hill Gate	**62.6**	**62.8**	Negligible	**45.3**	**45.4**	Negligible
15	Linden Gardens	**63.1**	**63.3**	Negligible	**45.4**	**45.5**	Negligible
16	Kensington Mall	**70.4**	**70.6**	Negligible	**50.6**	**50.7**	Negligible
17	Kensington Mall	**70.0**	**70.2**	Negligible	**50.3**	**50.4**	Negligible
18	Notting Hill Gate	**76.1**	**76.4**	Negligible	**54.7**	**54.9**	Negligible

* exceedances of the annual mean NO_2 objective are highlighted in **bold**

Based on a worst-case scenario using 2016 background concentrations and emission factors, as shown in Table 24, there is a 0.1 – 0.3µg/m³ increase in annual mean NO_2 concentrations at all receptor locations as a result of additional vehicles anticipated to be required during the construction of the Proposed Development.

The predicted magnitude of change of annual mean NO_2 concentrations is predicted to be moderate adverse for receptors on Notting Hill Gate, Kensington Church Street, Kensington Mall and Linden Gardens according to the EPUK/IAQM guidance. This is due to the very high baseline concentration before construction. The emissions from the construction traffic is not predicted to create any new exceedance.

It should also be noted that Receptors 14 and 18 are café locations with outdoor seating area, where the one-hour mean rather than the annual mean objective for NO_2 should apply. According to Defra's LAQM.TG16 Paragraph 7.91[10], exceedances of the NO_2 1-hour mean are unlikely to occur where the annual mean is below 60 µg/m³. In this case the predicted annual mean NO_2 at these locations are above 60 µg/m³ both before and during construction in this scenario, and therefore the one-hour mean objective for NO_2 is likely to be exceeded.

Based on a more optimistic scenario using 2020 background concentrations and emission factors, as shown in Table 24, there is a <0.1 – 0.2µg/m³ increase in annual mean NO_2 concentrations at all receptor locations as a result of additional vehicles anticipated to be required during the construction of the proposed development.

The predicted magnitude of change of annual mean NO_2 concentrations is predicted to be negligible for all receptors. The emissions from the construction traffic is not predicted to create any new exceedance.

With regards to Receptors 14 and 18, the predicted annual mean NO_2 concentration is predicted to be below 60 µg/m³ both before and during the construction under this more optimistic scenario. As a result, the one-hour mean NO_2 concentration objective is unlikely to be exceeded.

The scenario using 2016 background concentrations and emission factors is likely to represent absolute worst-case, as it assumes no improvement in background concentration and emissions from the vehicles travelling on the nearby roads relative to the baseline year of 2016. On the other hand, the scenario using 2020 background concentrations and emission factors may be overly optimistic, as there has been no obvious trend in improvement in the historic measured NO_2 concentration in RBKC. However, with the introduction of the Ultra Low Emission Zone in 2020, an improvement in air quality is likely to be observed, although the extent of the improvement is not yet known, especially in terms of the rate of improvement in background concentration. To provide a conservative assessment the worst-case scenario should be considered to represent possible future conditions, although the actual outcome in reality is likely to fall between the two scenarios assessed.

7.3 Operational Assessment

7.3.1 Nitrogen Dioxide (NO_2)

Dispersion modelling was undertaken of the road traffic and energy centre emissions with and without the operation of the Proposed Development. Predicted annual mean NO_2 concentrations, using 2016 and 2023 background concentration and emission factors, at the identified receptor locations are summarised in Table 25. Receptors 19 – 91 are representative of the façades of the residential aspect of the Proposed Development and are therefore only representative of exposure in the DS scenarios.

Table 25: Predicted 2023 annual mean NO_2 concentrations without and with the operation of the Proposed Development

Receptor		Annual Mean NO_2 µg/m^3 (2016 background and EF)		Impact	Annual Mean NO_2 µg/m^3 (2023 background and EF)		Impact
		DM1	DS1		DM2	DS2	
1	Notting Hill Gate	**61.0**	**61.0**	Negligible	37.0	37.0	Negligible
2	Notting Hill Gate	**64.7**	**64.7**	Negligible	38.5	38.5	Negligible
3	Uxbridge Street	**49.8**	**49.8**	Negligible	31.4	31.4	Negligible
4	Hillgate Street	**51.4**	**51.4**	Negligible	32.2	32.1	Negligible
5	Uxbridge Street	**57.8**	**57.8**	Negligible	35.3	35.3	Negligible
6	Jameson Street	**50.8**	**50.9**	Negligible	31.9	31.9	Negligible
7	Jameson Street	**47.4**	**47.4**	Negligible	30.3	30.3	Negligible
8	Kensington Place	**41.1**	**41.1**	Negligible	27.5	27.5	Negligible
9	Kensington Place	**42.4**	**42.4**	Negligible	28.1	28.1	Negligible
10	Kensington Place	**45.8**	**45.7**	Negligible	29.7	29.6	Negligible
11	Kensington Place	**50.2**	**50.1**	Negligible	31.8	31.7	Negligible
12	Kensington Church Street	**60.8**	**60.8**	Negligible	36.8	36.8	Negligible
13	Kensington Church Street	**53.9**	**54.0**	Negligible	33.5	33.5	Negligible
14	Notting Hill Gate	**63.4**	**63.4**	Negligible	37.8	37.8	Negligible
15	Linden Gardens	**63.9**	**63.9**	Negligible	38.0	38.0	Negligible
16	Kensington Mall	**71.4**	**71.5**	Negligible	**42.1**	**42.1**	Negligible
17	Kensington Mall	**71.0**	**71.0**	Negligible	**41.9**	**41.9**	Negligible
18	Notting Hill Gate	**77.2**	**77.3**	Negligible	**45.4**	**45.4**	Negligible
19	CB-CF (Front)4F	-	**40.6**	-	-	27.4	-
20	CB-CF (Front)5F	-	39.2	-	-	26.8	-
21	CB-CF (Front)6F	-	38.3	-	-	26.4	-
22	CB-CF (Front)7F	-	37.7	-	-	26.2	-
23	CB-CF (Front)8F	-	37.3	-	-	26.0	-
24	CB-CF (Front)9F	-	37.0	-	-	25.9	-
25	CB-CF (Front)10F	-	36.8	-	-	25.8	-
26	CB-CF (Front)11F	-	36.7	-	-	25.8	-
27	CB-CF (Front)12F	-	36.6	-	-	25.7	-
28	CB-CF (Front)13F	-	36.6	-	-	25.7	-
29	CB-CF (Front)14F	-	36.5	-	-	25.7	-
30	CB-CF (Front)15F	-	36.5	-	-	25.7	-
31	CB-CF (Front)16F	-	36.4	-	-	25.7	-
32	CB-CF (Front)17F	-	36.4	-	-	25.6	-
33	CB-CF (Back)4F	-	**41.1**	-	-	27.7	-
34	CB-CF (Back)5F	-	39.5	-	-	27.0	-
35	CB-CF (Back)6F	-	38.5	-	-	26.6	-
36	CB-CF (Back)7F	-	37.8	-	-	26.3	-
37	CB-CF (Back)8F	-	37.4	-	-	26.1	-
38	CB-CF (Back)9F	-	37.1	-	-	26.0	-
39	CB-CF (Back)10F	-	36.9	-	-	25.9	-
40	CB-CF (Back)11F	-	36.8	-	-	25.8	-
41	CB-CF (Back)12F	-	36.7	-	-	25.8	-
42	CB-CF (Back)13F	-	36.6	-	-	25.8	-
43	CB-CF (Back)14F	-	36.6	-	-	25.7	-
44	CB-CF (Back)15F	-	36.5	-	-	25.7	-
45	CB-CF (Back)16F	-	36.5	-	-	25.7	-
46	CB-CF (Back)17F	-	36.5	-	-	25.7	-
47	CB-EF (Front)4F	-	**40.8**	-	-	27.5	-
48	CB-EF (Front)5F	-	39.3	-	-	26.9	-
49	CB-EF (Front)6F	-	38.3	-	-	26.5	-
50	CB-EF (Front)7F	-	37.7	-	-	26.2	-
51	CB-EF (Front)8F	-	37.3	-	-	26.0	-
52	CB-EF (Front)9F	-	37.0	-	-	25.9	-
53	CB-EF (Front)10F	-	36.9	-	-	25.8	-
54	CB-EF (Front)11F	-	36.7	-	-	25.8	-
55	CB-EF (Front)12F	-	36.6	-	-	25.8	-
56	CB-EF (Front)13F	-	36.6	-	-	25.7	-
57	CB-EF (Back)4F	-	**41.0**	-	-	27.6	-
58	CB-EF (Back)5F	-	39.4	-	-	26.9	-
59	CB-EF (Back)6F	-	38.4	-	-	26.5	-
60	CB-EF (Back)7F	-	37.8	-	-	26.2	-
61	CB-EF (Back)8F	-	37.3	-	-	26.0	-
62	CB-EF (Back)9F	-	37.0	-	-	25.9	-
63	CB-EF (Back)10F	-	36.8	-	-	25.8	-
64	CB-EF (Back)11F	-	36.7	-	-	25.8	-
65	CB-EF (Back)12F	-	36.6	-	-	25.7	-
66	CB-EF (Back)13F	-	36.6	-	-	25.7	-
67	KCS1 (Front 1)1F	-	53.9	-	-	33.4	-
68	KCS1 (Front 1)2F	-	**49.7**	-	-	31.4	-
69	KCS1 (Front 1)3F	-	**46.5**	-	-	29.9	-
70	KCS1 (Front 1)4F	-	**43.9**	-	-	28.8	-
71	KCS1 (Back)1F	-	**50.7**	-	-	31.8	-
72	KCS1 (Back)2F	-	**48.2**	-	-	30.7	-
73	KCS1 (Back)3F	-	**45.8**	-	-	29.5	-

Receptor		Annual Mean NO_2 µg/m^3 (2016 background and EF)		Impact	Annual Mean NO_2 µg/m^3 (2023 background and EF)		Impact
		DM1	DS1		DM2	DS2	
74	KCS1 (Back)4F	-	**43.6**	-	-	28.6	-
75	KCS1 (Front 2)1F	-	**51.7**	-	-	32.3	-
76	KCS1 (Front 2)2F	-	**47.7**	-	-	30.4	-
77	KCS1 (Front 2)3F	-	**45.0**	-	-	29.2	-
78	KCS1 (Front 2)4F	-	**43.0**	-	-	28.3	-
79	KCS2 (Front)1F	-	**51.5**	-	-	32.3	-
80	KCS2 (Front)2F	-	**47.0**	-	-	30.1	-
81	KCS2 (Front)3F	-	**44.2**	-	-	28.8	-
82	KCS2 (Back)1F	-	**48.8**	-	-	30.9	-
83	KCS2 (Back)2F	-	**46.4**	-	-	29.8	-
84	KCS2 (Back)3F	-	**44.2**	-	-	28.8	-
85	KCS2 (End)1F	-	**49.3**	-	-	31.2	-
86	KCS2 (End)2F	-	**46.1**	-	-	29.7	-
87	KCS2 (End)3F	-	**43.7**	-	-	28.6	-
88	WPB1 (Front)1F	-	**49.1**	-	-	31.0	-
89	WPB1 (Front)2F	-	**47.3**	-	-	30.2	-
90	WPB1 (Back)1F	-	**49.5**	-	-	31.2	-
91	WPB1 (Back)2F	-	**47.6**	-	-	30.3	-

As shown in Table 25, it is predicted that there would be an increase of 0.1µg/m^3 (or less) in annual mean NO_2 concentrations at some existing receptor locations, while there would also be 0.1µg/m^3 (or less) decrease at some locations. It should also be noted that the Proposed Development does not cause any new exceedances of the annual mean NO_2 objective at these existing receptor locations. The predicted magnitude of change of annual mean NO_2 concentrations, regardless of whether 2016 or 2023 background concentration and emission factors are used, is therefore predicted to be negligible for all receptors according to EPUK/IAQM guidance.

The modelling results show that exceedance of the annual mean NO_2 concentration objective is predicted at the residential properties in the Proposed Development up to the 4th floor in the DS1 scenario (due to the very high baseline concentration), while no exceedance is predicted in the DS2 scenario. Similar to the construction traffic assessment, DS1 is likely to present an absolute worst-case scenario, with no improvement in background concentration and emissions from the vehicles travelling on the nearby roads relative to the baseline year of 2016. On the other hand, DS2 may be overly optimistic, for the same reason as provided in Section 7.2 that there has been no obvious trend in improvement in the historic measured NO_2 concentration in RBKC. To provide a conservative assessment the DS1 results should be considered to represent possible future conditions, although the actual outcome in reality is likely to fall between the two scenarios assessed.

The 17th floor level is the highest and closest to the stack where the flue gas from the energy centre are released. The background concentration has been assumed to remain the same at height as at ground floor which is considered a worst-case assessment as background concentrations are likely to decrease at height due to increased dispersion. NO_2 concentrations would increase by a maximum of 0.38µg/m^3 as a result of the energy centre emissions on this floor level. Even assuming a high background concentration, the process contribution from the energy centre is not predicted to contribute to any exceedance of the annual mean NO2 concentration objective. It is also understood that a winter garden may be provided on the 17th floor level. According to LAQM.TG(16)[10], the hourly-mean objective rather than the annual mean objective should apply to this area. Based on the modelling results, since the annual mean NO2 concentration is well below 60µg/m3 at this level, according to LAQM.TG(16) Paragraph 7.91, it is unlikely the hourly-mean objective for NO_2 will be exceeded.

As an exceedance is predicted at the Proposed Development, Section 9 of this report discusses mitigation measures that are recommended to be embedded in the design of the development to minimise exposure of future residents.

7.3.2 Particulate Matter

Dispersion modelling was undertaken for the road traffic emissions only as PM_{10} and $PM_{2.5}$ emissions from the energy centre would be negligible. The predicted annual mean PM_{10} and $PM_{2.5}$ concentrations for the DM1, DM2, DS1 and DS2 scenarios at the identified receptor locations are summarised in Table 26 and Table 27 respectively. The predicted magnitude of change of annual mean PM_{10} and $PM_{2.5}$ concentrations is predicted to be negligible for all existing receptors.

The 24-hour mean PM_{10} objective is not predicted to be exceeded at all the receptors (existing and proposed).

No exceedances are predicted at the Proposed Development for PM_{10} and $PM_{2.5}$, in either DS1 or DS2 scenarios.

Table 26 Predicted PM_{10} concentrations

Receptor		Annual Mean PM_{10} µg/m^3 (2016 background and EF)		Impact	Annual Mean PM_{10} µg/m^3 (2023 background and EF)		Impact
		DM1	DS1		DM 2	DS2	
1	Notting Hill Gate	23.8	23.8	Negligible	22.3	22.3	Negligible
2	Notting Hill Gate	23.8	23.8	Negligible	22.1	22.1	Negligible
3	Uxbridge Street	22.1	22.1	Negligible	20.8	20.8	Negligible
4	Hillgate Street	22.3	22.3	Negligible	20.9	20.9	Negligible
5	Uxbridge Street	23.2	23.2	Negligible	21.7	21.6	Negligible
6	Jameson Street	22.2	22.1	Negligible	20.8	20.8	Negligible
7	Jameson Street	21.7	21.7	Negligible	20.4	20.4	Negligible
8	Kensington Place	20.9	20.9	Negligible	19.8	19.7	Negligible

Receptor		Annual Mean PM_{10} µg/m³ (2016 background and EF)		Impact	Annual Mean PM_{10} µg/m³ (2023 background and EF)		Impact
		DM1	DS1		DM 2	DS2	
9	Kensington Place	21.1	21.0	Negligible	19.9	19.9	Negligible
10	Kensington Place	21.5	21.5	Negligible	20.2	20.2	Negligible
11	Kensington Place	22.1	22.1	Negligible	20.7	20.7	Negligible
12	Kensington Church Street	23.6	23.6	Negligible	22.0	22.0	Negligible
13	Kensington Church Street	22.6	22.6	Negligible	21.2	21.2	Negligible
14	Notting Hill Gate	-	24.2	-	-	22.5	-
15	Linden Gardens	-	23.7	-	-	22.0	-
16	Kensington Mall	-	25.3	-	-	23.5	-
17	Kensington Mall	-	25.3	-	-	23.4	-
18	Notting Hill Gate	-	26.6	-	-	24.7	-
19	CB-CF (Front)4F	-	20.8	-	-	19.7	-
20	CB-CF (Front)5F	-	20.6	-	-	19.5	-
21	CB-CF (Front)6F	-	20.5	-	-	19.5	-
22	CB-CF (Front)7F	-	20.5	-	-	19.4	-
23	CB-CF (Front)8F	-	20.4	-	-	19.4	-
24	CB-CF (Front)9F	-	20.4	-	-	19.3	-
25	CB-CF (Front)10F	-	20.4	-	-	19.3	-
26	CB-CF (Front)11F	-	20.3	-	-	19.3	-
27	CB-CF (Front)12F	-	20.3	-	-	19.3	-
28	CB-CF (Front)13F	-	20.3	-	-	19.3	-
29	CB-CF (Front)14F	-	20.3	-	-	19.3	-
30	CB-CF (Front)15F	-	20.3	-	-	19.3	-
31	CB-CF (Front)16F	-	20.3	-	-	19.3	-
32	CB-CF (Front)17F	-	20.3	-	-	19.3	-
33	CB-CF (Back)4F	-	20.8	-	-	19.7	-
34	CB-CF (Back)5F	-	20.7	-	-	19.6	-
35	CB-CF (Back)6F	-	20.5	-	-	19.5	-
36	CB-CF (Back)7F	-	20.5	-	-	19.4	-
37	CB-CF (Back)8F	-	20.4	-	-	19.4	-
38	CB-CF (Back)9F	-	20.4	-	-	19.3	-
39	CB-CF (Back)10F	-	20.4	-	-	19.3	-
40	CB-CF (Back)11F	-	20.3	-	-	19.3	-
41	CB-CF (Back)12F	-	20.3	-	-	19.3	-
42	CB-CF (Back)13F	-	20.3	-	-	19.3	-
43	CB-CF (Back)14F	-	20.3	-	-	19.3	-
44	CB-CF (Back)15F	-	20.3	-	-	19.3	-

Receptor		Annual Mean PM_{10} µg/m³ (2016 background and EF)		Impact	Annual Mean PM_{10} µg/m³ (2023 background and EF)		Impact
		DM1	DS1		DM 2	DS2	
45	CB-CF (Back)16F	-	20.3	-	-	19.3	-
46	CB-CF (Back)17F	-	20.3	-	-	19.3	-
47	CB-EF (Front)4F	-	20.8	-	-	19.7	-
48	CB-EF (Front)5F	-	20.6	-	-	19.5	-
49	CB-EF (Front)6F	-	20.5	-	-	19.5	-
50	CB-EF (Front)7F	-	20.5	-	-	19.4	-
51	CB-EF (Front)8F	-	20.4	-	-	19.4	-
52	CB-EF (Front)9F	-	20.4	-	-	19.3	-
53	CB-EF (Front)10F	-	20.4	-	-	19.3	-
54	CB-EF (Front)11F	-	20.3	-	-	19.3	-
55	CB-EF (Front)12F	-	20.3	-	-	19.3	-
56	CB-EF (Front)13F	-	20.3	-	-	19.3	-
57	CB-EF (Back)4F	-	20.8	-	-	19.7	-
58	CB-EF (Back)5F	-	20.7	-	-	19.6	-
59	CB-EF (Back)6F	-	20.5	-	-	19.5	-
60	CB-EF (Back)7F	-	20.5	-	-	19.4	-
61	CB-EF (Back)8F	-	20.4	-	-	19.4	-
62	CB-EF (Back)9F	-	20.4	-	-	19.3	-
63	CB-EF (Back)10F	-	20.4	-	-	19.3	-
64	CB-EF (Back)11F	-	20.3	-	-	19.3	-
65	CB-EF (Back)12F	-	20.3	-	-	19.3	-
66	CB-EF (Back)13F	-	20.3	-	-	19.3	-
67	KCS1 (Front 1)1F	-	22.5	-	-	21.1	-
68	KCS1 (Front 1)2F	-	21.9	-	-	20.6	-
69	KCS1 (Front 1)3F	-	21.5	-	-	20.3	-
70	KCS1 (Front 1)4F	-	21.2	-	-	20.0	-
71	KCS1 (Back)1F	-	22.1	-	-	20.8	-
72	KCS1 (Back)2F	-	21.8	-	-	20.5	-
73	KCS1 (Back)3F	-	21.4	-	-	20.2	-
74	KCS1 (Back)4F	-	21.2	-	-	20.0	-
75	KCS1 (Front 2)1F	-	22.3	-	-	20.9	-
76	KCS1 (Front 2)2F	-	21.7	-	-	20.4	-
77	KCS1 (Front 2)3F	-	21.4	-	-	20.1	-
78	KCS1 (Front 2)4F	-	21.1	-	-	19.9	-
79	KCS2 (Front)1F	-	22.3	-	-	20.9	-
80	KCS2 (Front)2F	-	21.6	-	-	20.4	-
81	KCS2 (Front)3F	-	21.3	-	-	20.1	-

Receptor		Annual Mean PM_{10} μg/m³ (2016 background and EF)		Impact	Annual Mean PM_{10} μg/m³ (2023 background and EF)		Impact
		DM1	DS1		DM 2	DS2	
82	KCS2 (Back)1F	-	21.9	-	-	20.6	-
83	KCS2 (Back)2F	-	21.6	-	-	20.3	-
84	KCS2 (Back)3F	-	21.3	-	-	20.1	-
85	KCS2 (End)1F	-	22.0	-	-	20.6	-
86	KCS2 (End)2F	-	21.5	-	-	20.3	-
87	KCS2 (End)3F	-	21.2	-	-	20.0	-
88	WPB1 (Front)1F	-	21.9	-	-	20.6	-
89	WPB1 (Front)2F	-	21.7	-	-	20.4	-
90	WPB1 (Back)1F	-	21.9	-	-	20.6	-
91	WPB1 (Back)2F	-	21.7	-	-	20.4	-

Table 27 Predicted $PM_{2.5}$ concentrations

Receptor		Annual Mean $PM_{2.5}$ μg/m³ (2016 background and EF)		Impact	Annual Mean $PM_{2.5}$ μg/m³ (2023 background and EF)		Impact
		DM1	DS 1		DM2	DS 2	
1	Notting Hill Gate	14.9	14.9	Negligible	13.3	13.3	Negligible
2	Notting Hill Gate	14.9	14.9	Negligible	13.2	13.2	Negligible
3	Uxbridge Street	13.8	13.8	Negligible	12.5	12.5	Negligible
4	Hillgate Street	13.9	13.9	Negligible	12.6	12.6	Negligible
5	Uxbridge Street	14.5	14.5	Negligible	13.0	13.0	Negligible
6	Jameson Street	13.9	13.9	Negligible	12.5	12.5	Negligible
7	Jameson Street	13.6	13.6	Negligible	12.3	12.3	Negligible
8	Kensington Place	13.1	13.1	Negligible	11.9	11.9	Negligible
9	Kensington Place	13.2	13.2	Negligible	12.0	12.0	Negligible
10	Kensington Place	13.4	13.4	Negligible	12.2	12.2	Negligible
11	Kensington Place	13.8	13.8	Negligible	12.5	12.5	Negligible
12	Kensington Church Street	14.8	14.8	Negligible	13.2	13.2	Negligible
13	Kensington Church Street	14.2	14.2	Negligible	12.7	12.7	Negligible
14	Notting Hill Gate	-	15.1	-	-	13.4	-
15	Linden Gardens	-	14.8	-	-	13.2	-

Receptor		Annual Mean $PM_{2.5}$ μg/m³ (2016 background and EF)		Impact	Annual Mean $PM_{2.5}$ μg/m³ (2023 background and EF)		Impact
		DM1	DS 1		DM2	DS 2	
16	Kensington Mall	-	15.8	-	-	14.0	-
17	Kensington Mall	-	15.8	-	-	14.0	-
18	Notting Hill Gate	-	16.6	-	-	14.6	-
19	CB-CF (Front)4F	-	13.0	-	-	11.9	-
20	CB-CF (Front)5F	-	12	-	-	11.8	-
21	CB-CF (Front)6F	-	12.8	-	-	11.8	-
22	CB-CF (Front)7F	-	12.8	-	-	11.7	-
23	CB-CF (Front)8F	-	12.8	-	-	11.7	-
24	CB-CF (Front)9F	-	12.7	-	-	11.7	-
25	CB-CF (Front)10F	-	12.7	-	-	11.7	-
26	CB-CF (Front)11F	-	12.7	-	-	11.7	-
27	CB-CF (Front)12F	-	12.7	-	-	11.7	-
28	CB-CF (Front)13F	-	12.7	-	-	11.7	-
29	CB-CF (Front)14F	-	12.7	-	-	11.7	-
30	CB-CF (Front)15F	-	12.7	-	-	11.7	-
31	CB-CF (Front)16F	-	12.7	-	-	11.7	-
32	CB-CF (Front)17F	-	12.7	-	-	11.7	-
33	CB-CF (Back)4F	-	13.0	-	-	11.9	-
34	CB-CF (Back)5F	-	12.9	-	-	11.8	-
35	CB-CF (Back)6F	-	12.8	-	-	11.8	-
36	CB-CF (Back)7F	-	12.8	-	-	11.7	-
37	CB-CF (Back)8F	-	12.8	-	-	11.7	-
38	CB-CF (Back)9F	-	12.8	-	-	11.7	-
39	CB-CF (Back)10F	-	12.7	-	-	11.7	-
40	CB-CF (Back)11F	-	12.7	-	-	11.7	-
41	CB-CF (Back)12F	-	12.7	-	-	11.7	-
42	CB-CF (Back)13F	-	12.7	-	-	11.7	-
43	CB-CF (Back)14F	-	12.7	-	-	11.7	-
44	CB-CF (Back)15F	-	12.7	-	-	11.7	-
45	CB-CF (Back)16F	-	12.7	-	-	11.7	-
46	CB-CF (Back)17F	-	12.7	-	-	11.7	-
47	CB-EF (Front)4F	-	13.0	-	-	11.9	-
48	CB-EF (Front)5F	-	12.9	-	-	11.8	-
49	CB-EF (Front)6F	-	12.8	-	-	11.8	-
50	CB-EF (Front)7F	-	12.8	-	-	11.7	-
51	CB-EF (Front)8F	-	12.8	-	-	11.7	-
52	CB-EF (Front)9F	-	12.8	-	-	11.7	-

Receptor		Annual Mean $PM_{2.5}$ µg/m³ (2016 background and EF)		Impact	Annual Mean $PM_{2.5}$ µg/m³ (2023 background and EF)		Impact
		DM1	DS 1		DM2	DS 2	
53	CB-EF (Front)10F	-	12.7	-	-	11.7	-
54	CB-EF (Front)11F	-	12.7	-	-	11.7	-
55	CB-EF (Front)12F	-	12.7	-	-	11.7	-
56	CB-EF (Front)13F	-	12.7	-	-	11.7	-
57	CB-EF (Back)4F	-	13.0	-	-	11.9	-
58	CB-EF (Back)5F	-	12.9	-	-	11.8	-
59	CB-EF (Back)6F	-	12.8	-	-	11.8	-
60	CB-EF (Back)7F	-	12.8	-	-	11.7	-
61	CB-EF (Back)8F	-	12.8	-	-	11.7	-
62	CB-EF (Back)9F	-	12.8	-	-	11.7	-
63	CB-EF (Back)10F	-	12.7	-	-	11.7	-
64	CB-EF (Back)11F	-	12.7	-	-	11.7	-
65	CB-EF (Back)12F	-	12.7	-	-	11.7	-
66	CB-EF (Back)13F	-	12.7	-	-	11.7	-
67	KCS1 (Front 1)1F	-	14.1	-	-	12.7	-
68	KCS1 (Front 1)2F	-	13.7	-	-	12.4	-
69	KCS1 (Front 1)3F	-	13.5	-	-	12.2	-
70	KCS1 (Front 1)4F	-	13.3	-	-	12.1	-
71	KCS1 (Back)1F	-	13.8	-	-	12.5	-
72	KCS1 (Back)2F	-	13.6	-	-	12.3	-
73	KCS1 (Back)3F	-	13.4	-	-	12.2	-
74	KCS1 (Back)4F	-	13.2	-	-	12.1	-
75	KCS1 (Front 2)1F	-	13.9	-	-	12.6	-
76	KCS1 (Front 2)2F	-	13.6	-	-	12.3	-
77	KCS1 (Front 2)3F	-	13.4	-	-	12.1	-
78	KCS1 (Front 2)4F	-	13.2	-	-	12.0	-
79	KCS2 (Front)1F	-	13.9	-	-	12.6	-
80	KCS2 (Front)2F	-	13.5	-	-	12.3	-
81	KCS2 (Front)3F	-	13.3	-	-	12.1	-
82	KCS2 (Back)1F	-	13.7	-	-	12.4	-
83	KCS2 (Back)2F	-	13.5	-	-	12.2	-
84	KCS2 (Back)3F	-	13.3	-	-	12.1	-
85	KCS2 (End)1F	-	13.7	-	-	12.4	-
86	KCS2 (End)2F	-	13.5	-	-	12.2	-
87	KCS2 (End)3F	-	13.3	-	-	12.1	-
88	WPB1 (Front)1F	-	13.7	-	-	12.4	-
89	WPB1 (Front)2F	-	13.5	-	-	12.3	-
90	WPB1 (Back)1F	-	13.7	-	-	12.4	-
91	WPB1 (Back)2F	-	13.6	-	-	12.3	-

7.4 Assessment of Significance

Following the guidance outlined in the EPUK/IAQM guidance, the air quality effect arising from the construction of the Proposed Development can be judged as significant under the worst-case scenario (2016 background concentration and emission factors), as a number of moderate adverse impacts are predicted. As such mitigation measures will be required.

With regards to the operation of the development, the impact from the combustion plant and operational traffic emissions associated with the Proposed Development would be negligible at all assessed receptors. Therefore, the Proposed Development would not have a significant effect on local air quality. However, the NO_2 annual mean objective could to be exceeded at the lower floors (up to 4th) of the building façade of the Proposed Development, in the worst case, and the effects on the future residents and occupants can be judged as significant, unless provision is made to reduce exposure. Mitigation measures to consider are discussed in Section 9.

8 Air Quality Neutral Assessment

The input data for the Air Quality Neutral Assessment of the Proposed Development are presented in

Table 28 for building and Table 29 for transport.

An assumption has been made regarding the likely operational pattern of the CHP and associated gas-fired boilers. Information provided by the design team demonstrates that the CHP will be in operation continuously across the year for approximately 17 hours per day (6,205 hours across the year). The energy strategy for the Proposed Development is based on the CHP providing 60% of the annual heating load and gas-fired boilers satisfying the additional load required during the notional heating season. It has been determined that all of the gas-fired boilers are likely to operate for approximately 4,137 hours of the year.

Transport data updated to the latest design of the Proposed Development has been provided by the Transport Consultants for the project.

The Proposed Development is located in Inner London and the associated parameters and calculations required in the Air Quality Neutral Assessment are based on this.

Table 28: Input data to Air Quality Neutral assessment - Building

Land use	Proposed GEA (m^2)	CHP NO_x emissions (g/s)	3 x Gas-Fired Boilers (in combination) (g/s)
Class A1+ A3	2,935	0.0054	0.03
Class B1	5,306		
Class C3	10,585		
Class D1	1,075		

Table 29: Input data to Air Quality Neutral assessment - Transport

Transport*	GEA (m^2)	NOx (kg/annum)	PM_{10} (kg/annum)
Retail (A1 + A3)	2,935	38	7
Commercial (B1)	5,306	30	5
Residential (C2- C4)	55 (number of dwellings)	18	3

*There are no emissions benchmarks for D1 land uses, therefore the assessment has instead considered benchmark trip rates as provided by the guidance.

The benchmarks from the SPG presented in Table 10 have been applied to the gross floor areas set out in

Table 28 to calculate the Building Emission Benchmarks (BEBs) and Transport Emission Benchmarks (TEBs) for each proposed land use. The overall benchmarks for the Proposed Development has then been calculated as the sum of these BEBs and TEBs. Table 30 sets out the benchmarks for the Proposed Development.

Table 30: Building and transport emission benchmarks for the Proposed Development

Land-use	BEBs	TEBs	
	NO_x (kg/annum)	NOx (kg/annum)	PM_{10} (kg/annum)
Class A1 +A3	66.3	643	115
Class B1	163.4	60	11
Class C3	277.3	31	6
Class D1	46.2	N/A	N/A
Overall BEB	**553.3**	**734**	**132**

Table 31: Total building emissions for the Proposed Development

Combustion Plant	NOx Emission Rate (g/s)	Operational hours per year	NOx (kg/annum)
CHP	0.0054	6205	120.5
3 x Gas-fired boilers	0.03	4137	390.2
Total Building Emission (kg/annum)			**510.7**

Table 32: Total transport emissions for the Proposed Development

Land Use	NOx (kg/annum)	PM10 (kg/annum)
Retail (A1 + A3)	38	7
Commercial (B1)	30	5
Residential (C3 - C4)	18	3
Total Transport Emission (kg/annum)	**110**	**16**

Table 33 shows the comparison of the TBE and BEB for the development.

Table 34 shows the comparison of the TTE and TEB for the development.

Table 33: Comparison of the TBE and BEB (kg/annum)

Pollutant	TBE	BEB	Difference
NO_x	511	553	-43

Table 34: Comparison of the TTE and TEB (kg/annum)

Pollutant	TTE	TEB	Difference
NO_x	87	734	-634
PM_{10}	16	132	-116

TBE for the Proposed Development is predicted to be below the relevant benchmarks for this development and therefore comply with the Air Quality Neutral Policy.

The TTE for the Proposed Development for retail, office and residential land uses meet the TEB for these land uses.

There is no TEB for D1 land uses, which is the land use considered for the surgery proposals as part of the development. The guidance (GLA's SPG on Sustainable Design and Construction 2014) instead provides a benchmark trip rate for D1 land uses of 65.1 trips/m^2/annum. Information provided by the transport planners suggest there are 12 trips/m^2/annum expected to be generated for the surgery. The trip rate for the surgery therefore meets the benchmark trip rate value for the surgery part of the Proposed Development.

9 Mitigation

9.1 Construction

The dust emitting activities assessed in section 6 can be greatly reduced or eliminated by applying the site specific mitigation measures for *medium risk* sites according to IAQM and GLA guidance. The following measures from the guidance are relevant and should be included in the CEMP which is to be developed and will be implemented by the contractor in relation to the development.

General

- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan, which will include measures to control other emissions, approved by the local authority.

Site Management

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

Monitoring

- Carry out regular site inspections to monitor compliance with the Dust Management Plan, record inspection results and make an inspection log available to the local authority, when asked.
- 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.
- Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it is a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

Site Maintenance

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out.

Operating vehicle/machinery and sustainable travel

- All mobile vehicles should comply with standards of the London Low Emission Zone.
- Ensure all vehicles switch off engines when stationary – no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum speed limit of 15mph on surfaced and 10mph on un-surfaced haul roads and work areas.
- Implement a Travel Plan than supports and encourages sustainable travel (public transport, cycling, walking and car-sharing). It should be noted that an interim Travel Plan has been submitted as part of the application.
- Ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport.

Operations

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

Waste management

- Avoid bonfires and burning of waste materials.

Since 1st September 2015, Non Road Mobile Machinery (NRMM) of net power between 37kW and 560kW used in London is required to meet emission standards set out in Regulation (EU) 2016/1628 of the European Parliament and of the Council [35] and its subsequent amendments.

The mitigation measures recommended for inclusion in the CEMP have been proven to be effective when implemented correctly. With these in place the effect of the Proposed Development during construction would be insignificant.

With regards to construction traffic emissions, it is recommended that HDVs used to access the site meet the most recent Euro Class regulations for HDVs (currently Euro VI). In addition it is recommended that where possible consolidation of goods is used to limit the number of vehicle trips per day. Vehicles should not idle engines on site unless necessary for operational reasons. Queuing of vehicles should be minimised by remote traffic management. With the implementation of this mitigation measures, and also taken into consideration that the assessment was based on the peak construction traffic and the construction activities are

[35] Regulation (EU) 2016/1628 of the European Parliament and of the Council , on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No 167/2013, and amending and repealing Directive 97/68/EC

temporary in nature, it is likely that the construction traffic impact will become not significant.

9.2 Operation

The assessment has concluded that the operation of the Proposed Development is likely to have a negligible impact in terms of all pollutants assessed on the chosen existing receptors. The Proposed Development is predicted to generate less traffic than the existing site, and the CHP and boilers proposed will comply with the various requirements as outlined in the Sustainable Design and Construction SPG. As a result, it is considered that there is no additional mitigation measure required.

Based on the DS1 results, in the worst case, the Proposed Development will be located in an area where the annual mean NO_2 concentration objective will be exceeded on the first 5 storeys (ground to 4^{th} floor), and the objective will be marginally below the objective on the 5^{th} floor. It is recommended that mechanical ventilation with NOx filter is provided for the residential dwellings on the lower floors (and the extent to be agreed with RBKC), with the filters changed and system maintained on a regular basis. Alternatively, for the units in the Corner Building, air could be drawn in from roof level in the building where the air quality would be expected to be better due to increased distance from road emissions. However, care is required in order to ensure air being drawn into the building at roof level is not affected by emissions from the energy centre.

10 Summary

Ove Arup & Partners Limited (Arup) has been commissioned by Notting Hill Gate KCS Ltd to undertake an air quality assessment to accompany a planning application comprising the demolition of the existing buildings and redevelopment works at Newcombe House.

The site of the Proposed Development is located in the Royal Borough of Kensington and Chelsea (RBKC) Air Quality Management Area (AQMA), which is designated due to exceedances of the annual and hourly mean NO_2 objective and the 24-hour PM_{10} objective.

The air quality effect from the on-site construction activities have been assessed using the qualitative approach described in the latest Institute of Air Quality Management (IAQM) guidance and it was concluded that with appropriate mitigation measures the on-site construction activities for the Proposed Development is unlikely to result in any significant local air quality effects.

Air quality modelling has been carried out using the ADMS-Roads dispersion model for the emissions from the construction traffic, as well as the emissions from the local road network and the proposed on-site energy centre during the operational stage. Model verification has been carried out comparing the model output with the monitored NO_2 concentration at diffusion tubes KC42 and KC59.

Depending on the assumptions made with regards to the background concentration and emission factors, a range of potential levels of impact due to construction traffic are predicted at the receptors on Notting Hill Gate, Kensington Church Street, Kensington Mall and Linden Gardens. These vary between negligible and moderate adverse, and it is anticipated that the actual outcome will between these two scenarios. However, it should also be noted that the moderate adverse impact is due to the very high baseline concentration, and no new exceedances are created due to the construction traffic from the Proposed Development. It is recommended that HDVs used to access the site meet the most recent Euro Class regulations for HDVs (currently Euro VI). In addition, it is recommended that where possible consolidation of goods is used to limit the number of vehicle trips per day. Vehicles should not idle engines on site unless necessary for operational reasons. Queuing of vehicles should be minimised by remote traffic management.

The impact from the operation of the Proposed Development on the nearby existing receptors is likely to be negligible under both the worst-case and the more optimistic scenarios. However, the annual mean NO2 concentration is predicted to be above the air quality objective (again due to the high background levels) and the Proposed Development is likely to introduce residential dwellings to an area of elevated pollutant concentration in the worst-case scenario. Based on the more optimistic scenario, no exceedance is predicted at the Proposed Development. The actual outcome during the operation of the Proposed Development is likely to fall between the two scenarios. It is recommended that mitigation measures such as the provision of Mechanical Ventilation with Heat Recovery (MVHR) system with inlet away from pollution sources, or fitted with NOx filter, should be provided to protect the future occupants from elevated levels of pollution.

The Proposed Development is air quality neutral based on the total traffic and building emissions calculated against the benchmarks derived.

Appendix A

Construction of Dust
Assessment

A1

Table A 1: Categorisation of dust emission magnitude

Dust Emission Magnitude		
Small	**Medium**	**Large**
Demolition		
• total building volume <20,000m³ • construction material with low potential for dust release (e.g. metal cladding or timber) • demolition activities <10m above ground • demolition during wetter months	• total building volume 20,000 - 50,000m³ • potentially dusty construction material • demolition activities 10 - 20m above ground level	• total building volume >50,000m³ • potentially dusty construction material (e.g. concrete) • on-site crushing and screening • demolition activities >20m above ground level
Earthworks		
• total site area <2,500m² • soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • formation of bunds <4m in height • total material moved <10,000 tonnes • earthworks during wetter months	• total site area 2,500m² - 10,000m² • moderately dusty soil type (e.g. silt) • 5 – 10 heavy earth moving vehicles active at any one time • formation of bunds 4 - 8m in height • total material moved 20,000 - 100,000 tonnes	• total site area >10,000m² • potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • >10 heavy earth moving vehicles active at any one time • formation of bunds >8m in height • total material moved >100,000 tonnes
Construction		
• total building volume <25,000 m³ • construction material with low potential for dust release (e.g. metal cladding or timber)	• total building volume 25,000 - 100,000m³ • potentially dusty construction material (e.g. concrete) • on-site concrete batching	• total building volume >100,000m³ • on-site concrete batching • sandblasting
Trackout		
• <10 HDV (>3.5t) outward movements in any one day • surface material with low potential for dust release • unpaved road length <50m	• 10 – 50 HDV (>3.5t) outward movements in any one day • moderately dusty surface material (e.g. high clay content) • unpaved road length 50 – 100m;	• >50 HDV (>3.5t) outward movements in any one day • potentially dusty surface material (e.g. high clay content) • unpaved road length >100m

A2

Table A 2: Sensitivity of the area to dust soiling effects on people and property

Receptor sensitivity	Number of receptors	Distance from the source (m)			
		< 20	< 50	< 100	< 350
High	> 100	High	High	Medium	Low
	10 – 100	High	Medium	Low	Low
	< 10	Medium	Low	Low	Low
Medium	> 1	Medium	Low	Low	Low
Low	> 1	Low	Low	Low	Low

A3

Table A 3: Sensitivity of the area to human health impacts

<table>
<tr><th rowspan="2">Receptor Sensitivity</th><th rowspan="2">Annual Mean PM10 concentration</th><th rowspan="2">Number of receptors</th><th colspan="5">Distance from the Source (m)</th></tr>
<tr><th><20</th><th><50</th><th><100</th><th><200</th><th><350</th></tr>
<tr><td rowspan="12">High</td><td rowspan="3">>32μg/m³</td><td>>100</td><td rowspan="3">High</td><td>High</td><td>High</td><td>Medium</td><td rowspan="3">Low</td></tr>
<tr><td>10-100</td><td>High</td><td>Medium</td><td rowspan="2">Low</td></tr>
<tr><td>1-10</td><td>Medium</td><td>Low</td></tr>
<tr><td rowspan="3">28-32μg/m³</td><td>>100</td><td rowspan="3">High</td><td>High</td><td>Medium</td><td rowspan="3">Low</td><td rowspan="3">Low</td></tr>
<tr><td>10-100</td><td rowspan="2">Medium</td><td rowspan="2">Low</td></tr>
<tr><td>1-10</td></tr>
<tr><td rowspan="3">24-28μg/m³</td><td>>100</td><td rowspan="2">High</td><td rowspan="2">Medium</td><td rowspan="3">Low</td><td rowspan="3">Low</td><td rowspan="3">Low</td></tr>
<tr><td>10-100</td></tr>
<tr><td>1-10</td><td>Medium</td><td>Low</td></tr>
<tr><td rowspan="3"><24μg/m³</td><td>>100</td><td>Medium</td><td rowspan="3">Low</td><td rowspan="3">Low</td><td rowspan="3">Low</td><td rowspan="3">Low</td></tr>
<tr><td>10-100</td><td rowspan="2">Low</td></tr>
<tr><td>1-10</td></tr>
<tr><td rowspan="8">Medium</td><td rowspan="2">>32μg/m³</td><td>>10</td><td>High</td><td>Medium</td><td rowspan="2">Low</td><td rowspan="2">Low</td><td rowspan="2">Low</td></tr>
<tr><td>1-10</td><td>Medium</td><td>Low</td></tr>
<tr><td rowspan="2">28-32μg/m³</td><td>>10</td><td>Medium</td><td rowspan="2">Low</td><td rowspan="2">Low</td><td rowspan="2">Low</td><td rowspan="2">Low</td></tr>
<tr><td>1-10</td><td>Low</td></tr>
<tr><td rowspan="2">24-28μg/m³</td><td>>10</td><td rowspan="2">Low</td><td rowspan="2">Low</td><td rowspan="2">Low</td><td rowspan="2">Low</td><td rowspan="2">Low</td></tr>
<tr><td>1-10</td></tr>
<tr><td rowspan="2"><24μg/m³</td><td>>10</td><td rowspan="2">Low</td><td rowspan="2">Low</td><td rowspan="2">Low</td><td rowspan="2">Low</td><td rowspan="2">Low</td></tr>
<tr><td>1-10</td></tr>
<tr><td>Low</td><td>-</td><td>>1</td><td>Low</td><td>Low</td><td>Low</td><td>Low</td><td>Low</td></tr>
</table>

A4

Table A 4: Sensitivity of the area to ecological impacts

Receptor sensitivity	Distance from the source (m)	
	< 20	< 50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

A5

Table A 5: Risk of dust impacts

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