Appendix B
Air Quality

Contents

B1 Introduction

B1.1.1 This appendix presents the policy and legislation, methodology and results of the air quality assessment.

B1.1.2 The overall approach to the air quality assessment comprises:

- A review of the existing air quality conditions at the Proposed Development and across the study area;
- An assessment of the potential changes in air quality arising from the construction and operation of the Proposed Development;
- An Air Quality Neutral assessment; and
- Formulation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

B2 Air quality policy and legislation

B2.1.1 This section presents the policy and legislation taken into account in the air quality assessment.

European Air Quality Management

B2.1.2 In 1996 the European Commission published the Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC)[1]. This Directive defined the policy framework for 12 air pollutants 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 (PM_{10}) (amongst other pollutants) in ambient air.

B2.1.3 In May 2008 the Directive 2008/50/EC[3] on ambient air quality and cleaner air for Europe came into force. This Directive consolidates the previous Directives (apart from the 4th Daughter Directive) and provides a new regulatory framework for $PM_{2.5}$ and makes provision for extended compliance deadlines for NO_2 and PM_{10}.

B2.1.4 The Directives were transposed into national legislation in England by the Air Quality Standards Regulations 2010[4]. The Secretary of State for the Environment has the duty of ensuring compliance with the air quality limit values.

Environment Act 1995

B2.1.5 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.

Air Quality Objectives and Limit Values

B2.1.6 Air quality limit values and objectives are quality standards for clean air. Some pollutants have standards expressed as annual mean 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) and others have standards expressed as 24-hour, 1-hour or 15-

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

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 the air quality standards (EU air quality limit values and national air quality objectives) for the pollutants relevant to this study (NO_2 and particulate matter).

Table 1: Air quality standards

Pollutant	Averaging period	Limit value/objective
Nitrogen dioxide (NO2)	1 hour mean	200µg/m3, not to be exceeded more than 18 times a year (99.79th percentile)
	Annual mean	40µg/m3
Fine particulate matter (PM10)	Daily mean	50µg/m3, not to be exceeded more than 35 times a year (90.4th percentile)
	Annual mean	40µg/m3
Very fine particulate matter (PM2.5)	Annual mean	25µg/m3

Dust Nuisance

B2.1.7 Dust is the generic term that the British Standard document BS 6069 (Part Two) used to describe particulate matter in the size range 1 – 75 µm (micrometres) in diameter. Dust nuisance is the result of the perception of the soiling of surfaces by excessive rates of dust deposition. Under provisions in the Environmental Protection Act 1990, dust nuisance is defined as a statutory nuisance.

B2.1.8 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).

B2.2 Planning, Policy and Guidance

National Planning Policy Framework (2019)

B2.2.1 The National Planning Policy Framework (NPPF)[6] was updated in February 2019 with the purpose of planning to achieve sustainable development. Paragraph 181 of the NPPF on air quality states that:

B2.2.2 "Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants,

[6] Ministry of Housing, Communities & Local Government, National Planning Policy Framework, February 2019

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

B2.2.3 In addition, paragraph 103 states that:

"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."

B2.2.4 Paragraph 170 discusses how planning policies and decisions should contribute to and enhance the natural and local environment. In relation to air quality, NPPF notes that this can be achieved by:

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

Planning Practice Guidance

B2.2.5 Planning Practice Guidance (PPG) on air quality to supplement the latest NPPF was updated in November 2019[7]. The guidance refers to the significance of air quality assessments to determine the impacts of proposed developments in the area and describes the role of local and neighbourhood plans with regard to air quality. It also provides a flowchart method to assist local authorities to determine how considerations of air quality fit into the development management process.

Local Air Quality Management Policy and Technical Guidance

B2.2.6 The 2016 policy guidance note from Defra, LAQM.PG(16)[8], provides additional guidance on the links between transport and air quality and guidance on the links between air quality and the land-use planning system. It summarises the main ways in which the land-use planning system can help deliver compliance

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf

[7] Ministry of Housing, Communities & Local Government, Air Quality https://www.gov.uk/guidance/air-quality--3

[8] Defra (2016) Local Air Quality Management Policy Guidance. PG(16)

with the air quality objectives. This guidance is relevant to any external organisations who may wish to engage with the local authority to assist in the delivery of their statutory duties on managing air quality.

B2.2.7 The LAQM Technical Guidance, TG(16)[9] is designed to support local authorities in carrying out their duties to review and assess air quality in their area. LAQM TG(16) is published at the UK level and is relevant to England, Scotland, Wales and Northern Ireland with the exception of London. It provides detailed guidance on how to assess the impact of measures using existing air quality tools. Where relevant, this guidance has been taken in to account in this assessment.

B2.3 Regional Policy and Guidance

The 2016 London Plan

B2.3.1 The London Plan, consolidated with alterations in 2016[10], forms part of the development strategy for the Greater London Authority (GLA) until 2036 and integrates all economic, environmental, transport and social frameworks. This has been amended to be consistent with the NPPF. Specifically, for new development proposals the London Plan looks at air quality by proposing the following measures:

- Minimise increased exposure to existing poor air quality and make provisions to address local problems of air quality, through means such as design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans;
- Promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following best practice guidance;
- Developments should be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as AQMAs);
- Ensure that where provision is needed to reduce emissions from a development, this is usually made on-site; and
- Where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations.

B2.3.2 These policies have been considered throughout this air quality assessment.

Intend to Publish London Plan 2019

B2.3.3 It is important to note that whilst the Intend to Publish London Plan 2019[11] is not adopted, it carries significant weight as the plan making process is at an advanced stage. The Examination in Public (EiP) was held between January to May 2019; following which the Panel report and recommendations were published in October 2019. The Intend to Publish version of the Plan was

9 Defra (2016) Local Air Quality Management Technical Guidance.TG(16)
10 Greater London Authority (2016) The London Plan: The Spatial Development Strategy for London Consolidated With Alterations Since 2011
11 Greater London Authority (2019) The London Plan – Intend to Publish version: The Spatial Development Strategy for Greater London

published and submitted to the Secretary of State in December 2019 and therefore the Plan is likely to be adopted in early 2020. As such, this assessment considers policies included in the Intend to Publish version of London Plan as relevant to the proposed design. Policy SI1 relates to improving air quality. In addition to the measures proposed in the London Plan (2016), the Intend to Publish version of the London Plan states:

- Large-scale development proposals subject to an Environmental Impact Assessment should consider methods of an Air Quality Positive approach;
- The development must demonstrate plans to comply with the Non-Road Mobile Machinery Low Emission Zone during the demolition and construction phase of buildings;
- Air quality assessments should be submitted unless it can be demonstrated that transport and building emissions are lower than existing use; and
- Where on-site measures to reduce emissions are not applicable, off-site measures may be acceptable.

The London Environment Strategy

B2.3.4 The London Environment Strategy (LES)[12] was published in May 2018 and sets out the Mayor's vision for London's environment in 2050. It is a strategy that brings together approaches from multiple aspects of London's environment in an integrated document. In relation to planning, the LES proposes new large-scale developments in London to be 'air quality positive'. It aims for larger development to go further than being 'air quality neutral' and implement effective design and integration to surrounding area to boost local air quality. The key aim is to ensure that emissions and exposure to pollution are reduced and air quality positive emphasises the importance of considering air quality very early in the design process.

Sustainable Design and Construction Supplementary Planning Guidance

B2.3.5 Supplementary Planning Guidance (SPG) for Sustainable Design and Construction[13] was published in April 2014 by the GLA. Section 4.3 of the SPG focuses on air pollution and provides guidance on when assessments should be undertaken and how intelligent design can help to minimise the effect of a development on local air quality. The primary way in which the guidance aims to minimise air quality impacts is by setting an air quality neutral (AQN) policy for buildings, as well as emissions standards for combustion plants and transport.

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

B2.3.6 The Control of Dust and Emissions during Construction and Demolition SPG[14] 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 NOx from construction and demolition machinery

[12] Greater London Authority (2018) The London Environment Strategy
[13] Greater London Authority (2014) Sustainable Design and Construction Supplementary Planning Guidance
[14] Greater London Authority (2014) The Control of Dust and Emissions during Construction and Demolition, Supplementary Planning Guidance

by means of a new non-road mobile machinery (NRMM) ultra-low emissions zone (ULEZ).

London Local Air Quality Management Technical Guidance

B2.3.7 The London Local Air Quality Management technical guidance (LLAQM.TG(16))[15] applies only to London's 32 boroughs (and the City of London), while LAQM.TG(16) applies to all other UK local authorities. Although the LLAQM.TG(16) technical guidance has many common elements with the updated national guidance LAQM.TG(16), it does incorporate London-specific elements of the LAQM system.

B2.3.8 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 in this assessment.

B2.4 Local Policy and Guidance

Westminster City Plan

B2.4.1 Westminster's City Plan[16] was formerly adopted on the 9th November 2016. This forms part of Westminster's development plan to provide a comprehensive local policy framework which aims to help ensure sustainable development and growth in the city. The City Plan includes 'Policy S31 Air Quality' stating:

B2.4.2 "The council will require a reduction of air pollution, with the aim of meeting the objectives for pollutants set out in the national strategy. Developments will minimise emissions of air pollution from both static and traffic generated sources. Developments that include uses that are more vulnerable to air pollution (air quality sensitive receptors) will minimise the impact of poor air quality on occupants through the design of the building and appropriate technology."

B2.4.3 This is stated by the document to be a "national and regional objective" with there to be "consideration of air pollution in the building design stage".

B2.4.4 These polices have been considered as necessary throughout the assessment.

B2.4.5 Currently the council are undertaking a complete review of the City Plan which will become the 'local plan' for Westminster and supersede this City plan and policies in the Unitary Development Plan.

Unitary Development Plan

B2.4.6 The Unitary Development plan[17] (UDP) for Westminster was approved on the 24th January 2007 with sections being 'saved' by the Secretary of State on 24th January 2010. The Westminster City Plan has updated some of the sections in

[15] Greater London Authority (2016) London Local Air Quality Management Technical Guidance TG (16)
[16] City of Westminster (November 2016), Westminster City Plan, Consolidated with all changes since November 2013
[17] City of Westminster (January 2007), Unitary Development Plan

from the UDP. Within Chapter 9: Environment Policy Env 5: Air Pollution has five main statements:

B2.4.7 "(A) The City Council will encourage new development that does not lead to an increase in local air pollution;

B2.4.8 (B) The City Council will promote measures to improve air quality, in particular encouraging developers to minimise global and local air pollution and emission of odours by:

- minimising traffic generated by developments,
- using natural ventilation systems and lighting wherever possible, using the most energy efficient forms of heating,
- air conditioning and active ventilation systems,
- careful design and siting of central heating and ventilation exhaust,
- avoiding or reducing emissions from the burning of fossil fuels,
- following the Westminster Considerate Builders' code of practice to contain dust and fumes on building sites.

B2.4.9 (C) For those developments that require air conditioning systems, the City Council will encourage use of dry rather than wet systems;

B2.4.10 (D) The City Council will monitor air pollutants, including those from motor vehicles, and seek reductions in those pollutants; and

B2.4.11 (E) When considering applications for development involving the storage or use of hazardous substances, the City Council will seek the advice of the Health and Safety Executive concerning the nature and severity of the risks presented by potential major hazards to people in the surrounding area".

Emerging Westminster City Plan 2019-2040

B2.4.12 The emerging City Plan 2019-2040[18] was published in June 2019 with formal consultation completed. It is yet to be adopted and is aimed for submission for examination by Autumn 2019.

B2.4.13 Air quality is mentioned as one of the seven objectives as part of the commitment to "*improve the health and well-being of the city's residents*". The objectives to improve air quality also aligns with one of the Council's key themes ("a healthier and greener city").

B2.4.14 Objective 7 is to:

"Improve air quality, minimise noise and other polluting impacts, and reduce carbon and water demands by minimising detrimental impacts from development."

B2.4.15 In addition to its own section, air quality is mentioned in various sections such as Housing quality, Sustainable transport, Highway access and management, Freight and servicing and Technological Innovation in transport. The council

[18] City of Westminster (2019), City Plan 2019-2040, Regulation 19 Publication Draft

has also produced an Air Quality manifesto[19] that is mentioned in the City Plan that summarises the pledges towards improving air quality in the borough.

B2.4.16 "A. The council is committed to improving air quality in the city and expects development to reduce exposure to poor air quality and maximise opportunities to improve it locally without detriment of air quality in other areas;

Air Quality Neutral and Positive

B2.4.17 B. Major developments in Opportunity Areas and Housing Renewal Areas and those subject to an Environmental Impact Assessment should achieve Air Quality Positive status;

B2.4.18 C. All other major developments and developments incorporating solid biomass boilers or Combined Heat and Power (CHP) should be at least Air Quality Neutral;

Air Quality Assessments

B2.4.19 D. Air Quality Assessments will be required for: Major developments; Proposals that include potentially air pollution generating uses or combustion-based technologies; Proposals incorporating sensitive; and All residential developments within Air Quality Focus Areas."

B2.5 Other Relevant Policy and Guidance

Institute of Air Quality Management Guidance on Assessment of Dust from Demolition and Construction (2018)

B2.5.1 The Institute of Air Quality Management (IAQM) guidance[20] 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 effects from construction activities based on the 'dust magnitude' (high, medium or low) and proximity of the proposed development to the closest receptors. The guidance recommends that once the significance of effect from construction is identified, the appropriate mitigation measures are implemented. Experience has shown that once the appropriate mitigation measures are applied, in most cases the resulting dust impacts can be reduced to negligible levels.

B2.5.2 The method outlined for dust assessment is the same as in the GLA Control of Dust and Emissions during Construction and Demolition SPG[13] and therefore both the IAQM methodology and GLA method has been considered in this assessment.

EPUK/IAQM Land-Use Planning & Development Control (2017)

B2.5.3 The 2017 Land-Use Planning & Development Control guidance document[21] produced by Environmental Protection UK (EPUK) and the IAQM provides a framework for professionals operating in the planning system to provide a

[19] City of Westminster (2018), City for All, Air Quality Manifesto
[20] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction (Version 1.1)
[21] EPUK/IAQM, (2017) Land-Use Planning & Development Control: Planning for Air Quality

means of reaching sound decisions, with regard to the air quality implications of development proposals.

B2.5.4 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.

B3 Baseline information

B3.1.1 This section sets out the baseline air quality in the vicinity of the Proposed Development.

Information sources

B3.1.2 A desk-based review of the following data sources has been undertaken to determine baseline conditions of air quality in this assessment:

- Local authority review and assessment reports and local air quality monitoring data[22,23,24,25];
- The Defra Local Air Quality Management website[26];
- The UK Air Information Resource website[27]; and
- The Environment Agency website[28].

B3.1.3 Sensitive receptors

B3.1.4 Sensitive receptors are defined as those residential properties/schools/hospitals/ businesses or areas where people may spend time that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction or operation of the Proposed Development. Receptors have been chosen at existing residential, future residential and a local primary school in the vicinity of the Proposed Development.

B3.2 Air quality management areas

B3.2.1 The Environment Act 19955 requires local authorities to review and assess air quality with respect to the objectives for seven pollutants specified in the National Air Quality Strategy. Local authorities were required to carry out an Updating and Screening Assessment (USA) of their area every three years and are now required to complete an Annual Status Report (ASR) every year. If the ASR identifies potential hotspot areas likely to exceed Air Quality Objectives (AQO), then a detailed assessment of those areas is required. Where objectives are not predicted to be met, local authorities must declare the area as an AQMA. In addition, local authorities are required to produce an Air Quality Action Plan (AQAP), which includes measures to improve air quality within the AQMA.

B3.2.2 The City of Westminster, London Borough of Lambeth (LBL), London Borough of Wandsworth (LBW) and the Royal Borough of Kensington and Chelsea (RBKC) have declared borough-wide Air Quality Management Areas

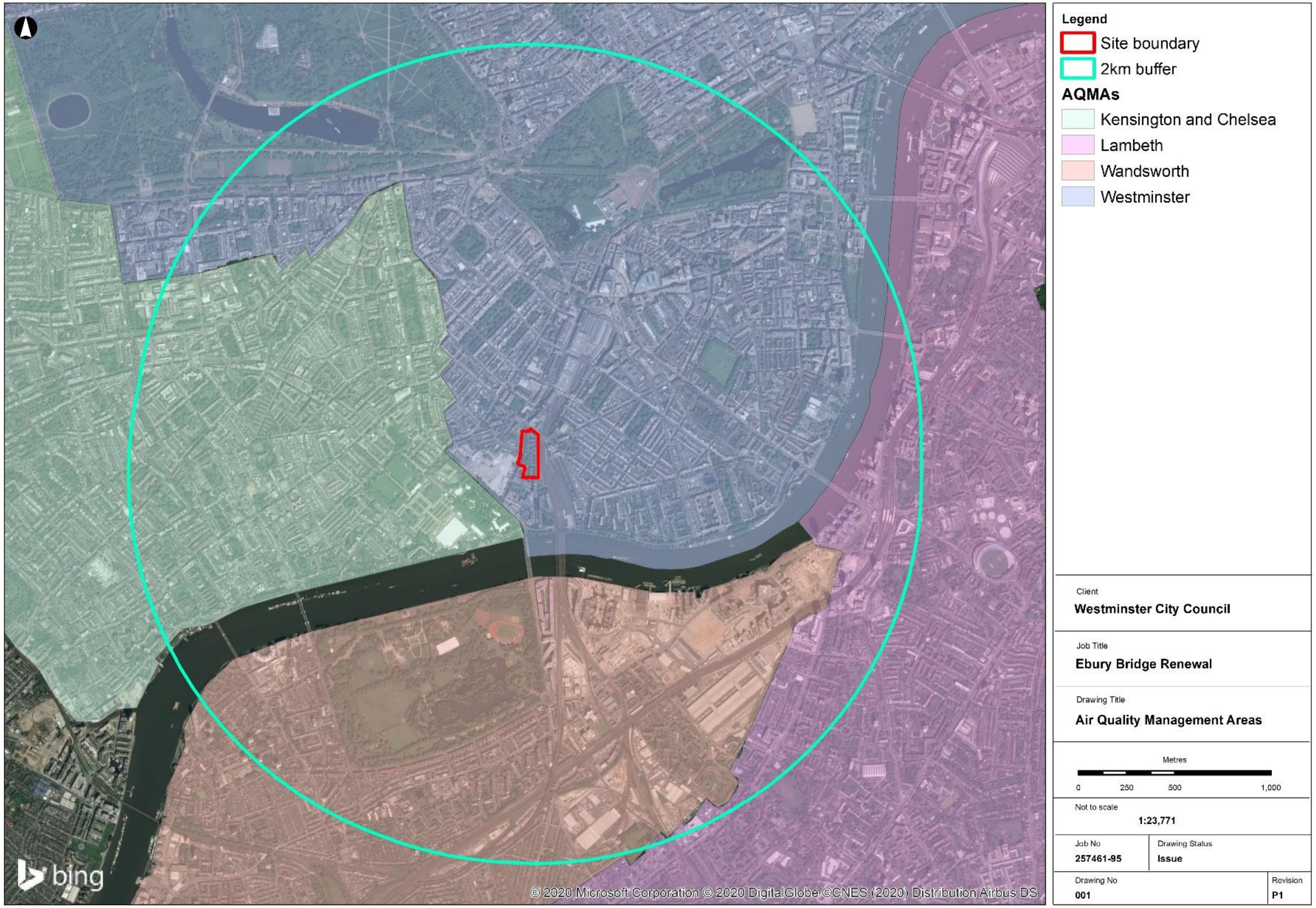
[22] City of Westminster, 2019. Annual Status Report
[23] London Borough of Wandsworth, 2018. Annual Status Report
[24] Royal Borough of Kensington and Chelsea, 2019. Annual Status Report
[25] London Borough of Lambeth, 2019. Annual Status Report
[26] Defra Local Air Quality Management website. http://laqm.defra.gov.uk/
[27] Defra, http://uk-air.defra.gov.uk
[28] Environment Agency website. https://environment.data.gov.uk/public-register/view/search-industrial-installations

(AQMAs). Further information about the Westminster AQMA is provided in the ES.

B3.2.3 The RBKC and LBL declared their AQMA in 2000 and 2007 respectively due to exceedances of the annual mean and 1-hour NO_2 objectives and the annual and daily mean PM10 objectives. The LBW declared their AQMA in 2001 for exceedances of the annual mean NO_2 objective and the daily mean PM10 objective.

B3.2.4 The locations of these AQMAs in relation to the Proposed Development are shown in Figure 1.

Figure 1: Air Quality Management Areas



B3.3 Monitoring

Automatic Monitoring

B3.3.1 Table 2 provides details regarding the automatic monitoring sites of Westminster, LBW, LBL and RBKC that are located within 2km of the Proposed Development.

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

ID	Site name	Local authority	Site type	X	Y
Horseferry Road	Horseferry Road	Westminster	Urban background	529778	178960
WAA	Thessaly Road	LBW	Roadside	529137	177249
KC3	Knightsbridge	RBKC	Kerbside	527516	179395
KC4	Kings Road Chelsea		Roadside	527267	178089
KC1	North Kensington (AURN)		Urban background/AURN	524045	181752
LB5	Vauxhall Bondway Interchange	LBL	Industrial	530317	177952
Note: AURN is Defra's Automatic Urban Rural Network.					

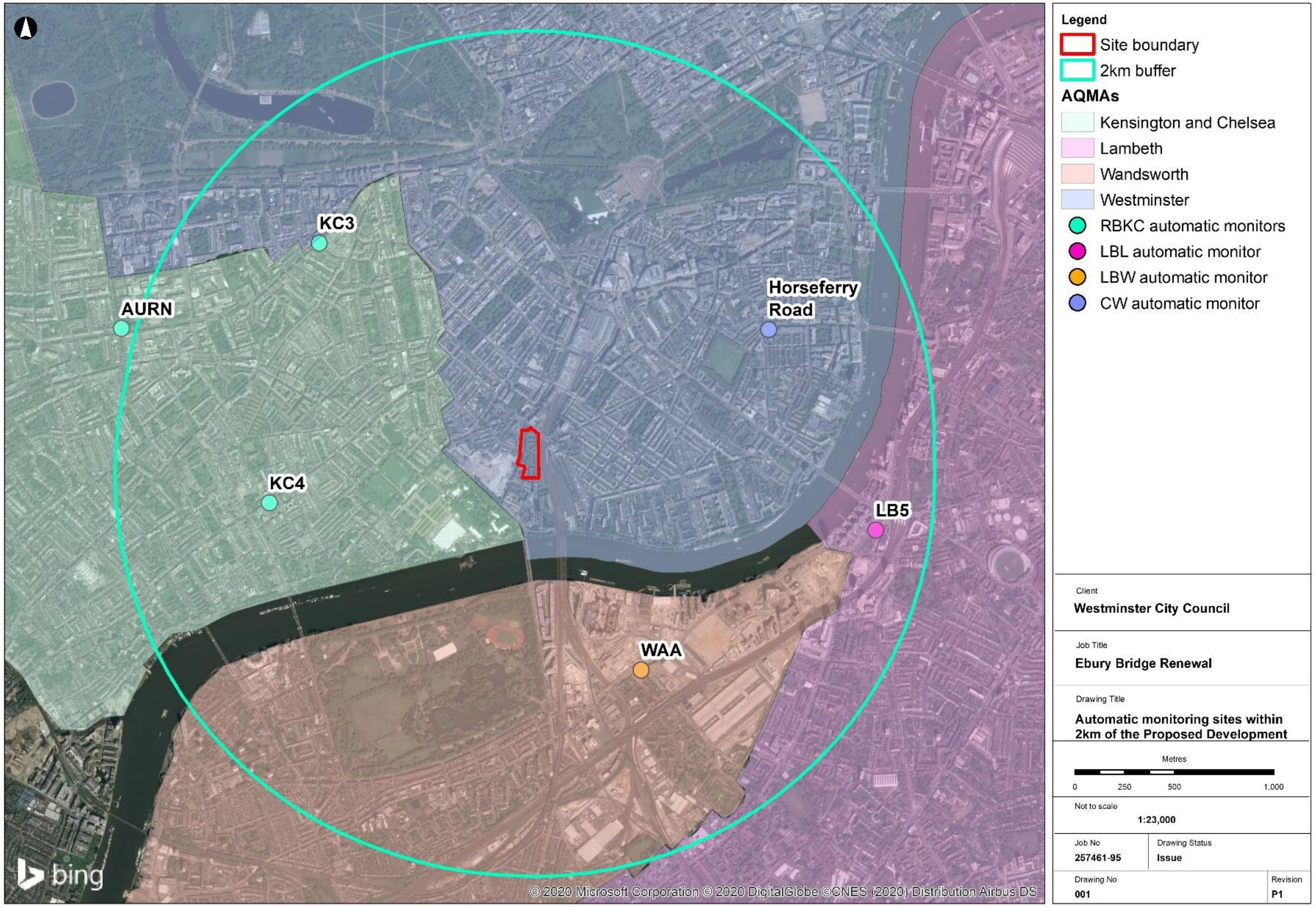
B3.3.2 The annual mean concentrations of NO_2 recorded at the above monitoring sites are shown in Table 3 below. Exceedances of the annual mean Air Quality objective (AQO) for NO_2 are shown in bold.

Table 3: Monitored concentrations of NO_2 at automatic sites

ID	X	Y	Annual mean NO_2 concentrations ($\mu g/m^3$)				
			2014	2015	2016	2017	2018
Horseferry Road	529778	178960	**46.0**	39.0	37.0	36.0	31.0
WAA	529137	177249	**47.0**	**40.0**	**40.0**	33.0	-
KC3	527516	179395	**72.0**	**71.0**	**80.0**	**66.0**	**62.8**
KC4	527267	178089	**76.0**	**73.0**	**78.0**	**63.0**	**50.4**
KC1	524045	181752	34.0	32.0	35.0	33.0	29.1
LB5	530317	177952	**71.0**	**75.0**	**65.0**	**61.0**	**51.1.0**
Air quality objective			$40\mu g/m^3$				
"-" denotes that the data is not available yet.							

B3.3.3 The locations of these automatic monitoring sites are shown below in Figure 2.

Figure 2: Automatic monitoring locations within 2km of the Proposed Development



Diffusion tube monitoring

B3.3.4 Table 4 below shows details of the diffusion tube monitoring sites within 2km of the Proposed Development from the Westminster, LBW, LBL and RBKC.

B3.3.5 Westminster does not operate any diffusion tubes. LBL do not operate any diffusion tubes within 2km of the Proposed Development.

Table 4: Details of the diffusion tube sites within 2km of the Proposed Development

ID	Site name	Site type	X	Y
LBW				
W3	Newton Preparatory School	Kerbside	528866	177024
W33	Lockington road	Urban background	528871	176943
RBKC				
KC34	Dovehouse Street	Urban centre	527164	178103
KC44	Donne Place	Urban background	527335	178810
KC48	Sloane Square	Roadside	258011	178675
KC49	Harrods	Urban centre	527516	179395
KC50	Chelsea Physic Garden (Gate)	Roadside	527726	177727
KC51	Chelsea Physic Garden (Met Station)	Urban background	527690	177800
KC52	Sloane Avenue	Roadside	527411	178659
KC54	Cromwell Rd/Natural History Museum	Roadside	526522	178968
KC56	Chelsea Old Town Hall	Roadside	527268	178089
KC57	Pavillion St/Sloane Avenue	Roadside	527889	179145
KC68	Kensington H St/Kensington Church St	Roadside	525630	179674

B3.3.6 Monitored results for these diffusion tube sites are provided below in Table 5 and show that exceedances occurred at all RBKC sites in 2017 and at the LBW site W3 from 2014 to 2016.

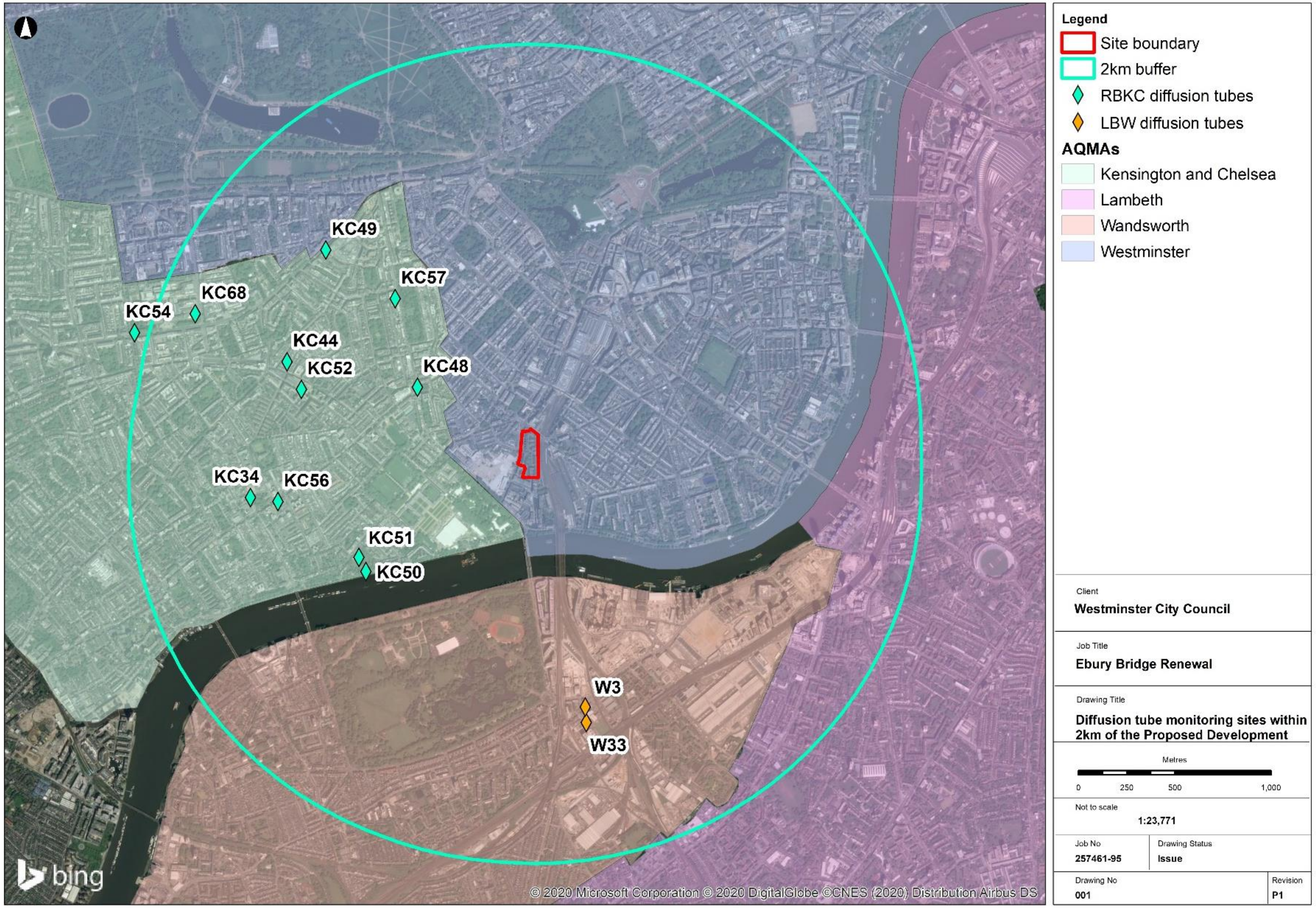
B3.3.7 The locations of these diffusion tube sites are shown below in Figure 3.

Table 5: Monitored concentrations of NO_2 at diffusion tube sites

ID	X	Y	Annual mean NO_2 concentrations (µg/m^3)				
			2014	2015	2016	2017	2018
W3	528866	177024	**60.0**	**57.0**	**63.0**	Site closed	Site closed
W33	528871	176943	N/A	N/A	N/A	36.0	34.0
KC34	527164	178103	**45.1**	**40.8**	**43.7**	**43.7**	39.0
KC44	527335	178810	**40.0**	**39.6**	**46.1**	**41.0**	35.5
KC48	258011	178675	**73.9**	**63.0**	**72.3**	**71.8**	**57.2**
KC49	527516	179395	**74.5**	**69.7**	**87.5**	*	*
KC50	527726	177727	**59.4**	**48.2**	**56.4**	**52.7**	**40.3**
KC51	527690	177800	33.3	31.6	36.2	39.5	27.7
KC52	527411	178659	**58.4**	**52.9**	**64.5**	**56.1**	**45.1**
KC54**	526522	178968	**73.7**	**62.9**	**72.5**	**70.9**	**48.7**
KC56	527268	178089	**74.4**	**63.7**	**72.7**	**68.0**	**50.9**
KC57	527889	179145	**54.4**	**43.6**	**56.2**	**57.2**	39.8
KC68	525630	179674	**52.9**	**44.6**	**51.0**	**51.9**	**40.9**
Air quality objective			40µg/m^3				

Notes:
Exceedances are shown in **bold**
N/A indicates that the site was not yet open
* Data capture below 25%
** Does not lie within 2km of the Proposed Development however kept in for comparison

Figure 3: Diffusion tube monitoring locations within 2km of the Proposed Development



B3.4 Defra background concentrations

B3.4.1 The Defra website[29] includes estimated background concentrations for NO_2, NOx, PM_{10} and $PM_{2.5}$ for each 1km by 1km OS grid square. Table 6 shows the estimated 2018 Defra background concentrations for the Ordnance Survey (OS) grid squares containing the Proposed Development and the urban background diffusion tubes.

B3.4.2 The estimated Defra background concentrations are below the air quality objectives for annual mean NO_2, PM_{10} (40µg/m^3) and for $PM_{2.5}$ (25µg/m^3).

Table 6: Defra's estimated 2018 background pollutant concentrations

Location	OS grid square		2018 annual mean concentrations (µg/m^3)			
	X	Y	NO_2	NOx	PM_{10}	$PM_{2.5}$
Proposed Development site	528500	178500	31.9	53.7	18.9	12.7
Diffusion tube KC44	527500	178500	33.3	57.8	18.5	12.6
Diffusion tube KC51	527500	177500	29.4	48.3	18.1	12.3

B3.4.3 The 2018 Defra background concentrations for the OS grid square containing the urban background monitoring sites (KC44 and KC51) within 2km of the Proposed Development were compared to determine an appropriate background concentration for use in this assessment.

B3.4.4 Although diffusion tube W33 is also an urban background diffusion tube, no 2018 data was available for comparison at the time of writing.

B3.4.5 The 2018 monitored NO2 concentration measured at the KC44 monitoring site was 35.5µg/m3, which is higher than the estimated Defra background concentration for the same grid square (33.3µg/m3). The 2018 monitored NO2 concentration measured at the KC51 monitoring site was 27.7µg/m^3, which is lower than the estimated Defra background concentration for the same grid square (29.4µg/m^3). The percentage difference between the monitored concentrations and the Defra background concentrations is provided in Table 7 below.

[29] Defra background maps, 2018, https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

Table 7: Comparison between monitored NO_2 and Defra background concentrations

Monitoring site	Estimated Defra background concentration ($\mu g/m^3$)	Measured concentration ($\mu g/m^3$)	Difference	Difference (%)
KC44	33.3	35.5	2.2	6%
KC51	29.4	27.7	-1.7	-6%

B3.5 London Atmospheric Emissions Inventory (LAEI)

B3.5.1 The LAEI website[30] includes estimated concentrations of NO_2, NOx, PM_{10} and $PM_{2.5}$ for OS grid squares with a resolution of 20m by 20m. These concentrations include the impact of major roads and are ‘total’ rather than ‘background’ concentrations. The LAEI data for the Proposed Development is shown in **Error! Reference source not found.**.

B3.5.2 Table 8 presents the estimated 2016 (latest year published) LAEI concentrations for the OS grid square in which the Proposed Development is located and the OS grid squares of the closest urban background monitoring sites.

Table 8: LAEI’s estimated 2016 pollutant concentrations

Location	2016 annual mean concentrations ($\mu g/m^3$)			
	NO_2	NOx	PM_{10}	$PM_{2.5}$
Proposed Development site	45.1	87.7	24.6	14.7
Diffusion tube KC44	44.2	84.8	23.9	14.6
Diffusion tube KC51	42.5	79.8	23.6	14.2

B3.5.3 Table 9 presents the comparison between the measured concentrations at KC44 and KC51 and the LAEI concentrations for the same location for NO_2. The NO_2 concentrations measured at the monitoring sites are lower than LAEI background concentration at the same grid square, reflecting a 25-53% difference.

[30] Greater London Authority, London Atmospheric Emissions (LAEI) 2016, https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2016

Table 9: Comparison between monitored NO_2 and LAEI pollutant concentrations

Monitoring site	Estimated LAEI background concentration ($\mu g/m^3$)	Measured concentration ($\mu g/m^3$)	Difference ($\mu g/m^3$)
KC44	44.2	35.5	-8.7
KC51	42.5	27.7	-14.8

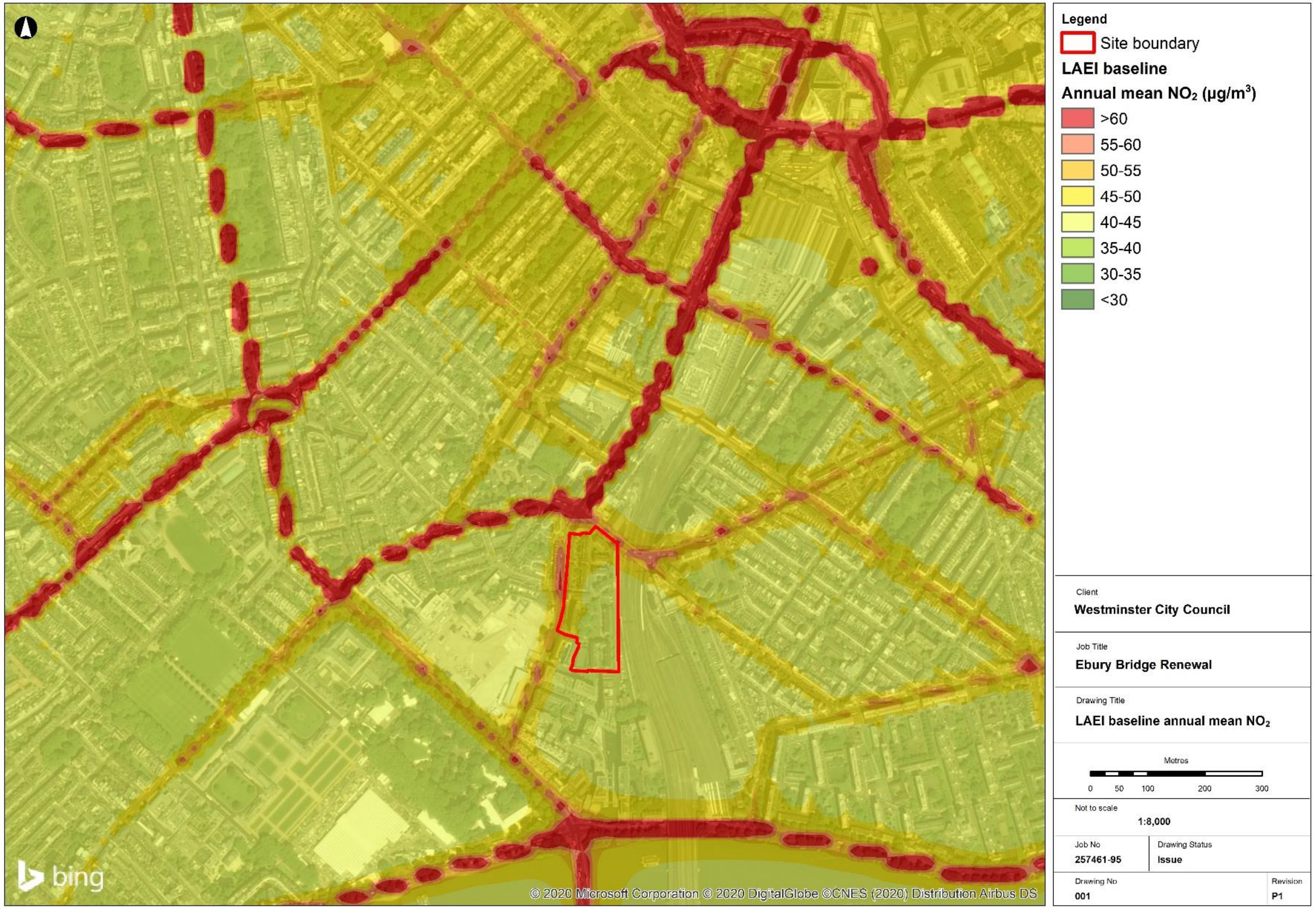
B3.5.4 Defra background concentrations were used in this assessment as road sources have been included in the detailed modelling, therefore using LAEI data would result in double counting of the concentrations.

B3.5.5 The modelled receptors are all in the same 1km by 1km OS grid square. Background concentrations used in this assessment are presented in Table 10.

Table 10: Background concentrations used for modelling

Defra backgrounds for modelled receptors in 1km by 1km grid square (528500, 178500)			
NO_x	NO_2	PM_{10}	$PM_{2.5}$
53.7	31.9	18.9	12.7

Figure 4: LAEI baseline annual mean NO_2



B4 Assessment methodology

B4.1.1 This section sets out the methodology for assessing the likely significant effects on air quality that would arise from the construction and operation of the Proposed Development.

B4.1.2 The methodology for assessing cumulative air quality effects is also described.

B4.2 Construction effects

Construction traffic assessment

B4.2.1 The traffic data consists of AADT flows for all vehicle types and for Heavy Goods Vehicles (HGVs) for each road link. Typical vehicle travelling speeds were provided and have been used in the modelling, with the exception of road links recognised as junctions and roundabouts. The modelled speeds were assumed to be 20kph at these junctions and roundabouts following Defra's LAQM.TG(16)[31] guidance (as this is considered to be representative of congested conditions).

B4.2.2 The predicted construction traffic movements and the construction traffic flow data on the local road network was provided by Arup transport consultants. The traffic data was screened using the EPUK/IAQM land-use guidance32 screening criteria for sites located in an AQMA.

B4.2.3 The criteria (based on the worst case 12-month period) were exceeded at a number of locations, indicating that detailed dispersion modelling of the road traffic emissions was necessary. Arup traffic consultants identified that the main construction traffic routes would be Ebury Bridge Road, Buckingham Palace Road and Chelsea Bridge Road.

B4.2.4 The modelled road network is illustrated in Figure 5and details of the modelled roads and traffic data used are provided in Table 11 and Table 12.

B4.2.5 The AADT flows used in the construction traffic assessment were calculated by identifying the worst 12 months during the construction period (an AADT of 96). It has been assumed that all 96 trips would be HGVs. At the time of writing it is not known what proportion of these vehicles would go north from the Proposed Development and what proportion would go south. Therefore, it has been assumed that 50% would take each route (an AADT of 48). The modelled network was stopped at the point where HGV trips would fall below the EPUK/IAQM screening thresholds.

B4.2.6 Emission rates have been calculated using the Defra Emissions Factor Toolkit (EFT) v9.033. Construction is planned in three phases (see Parameter Plan EBE-AST-XX-XX-DR-A-011102) starting mid 2021 however the dispersion

[31] Defra (2016) Local Air Quality Management Technical Guidance.TG (16)
[32] EPUK/IAQM, (2017) Land-Use Planning & Development Control: Planning for Air Quality
[33] Defra (2019) Emissions Factors Toolkit (EFT) v9.0; https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

modelling uses an emissions year of 2018 for all scenarios as a conservative approach. The road types were modelled as ‘London - Inner’.

Figure 5: Modelled road network for construction traffic assessment

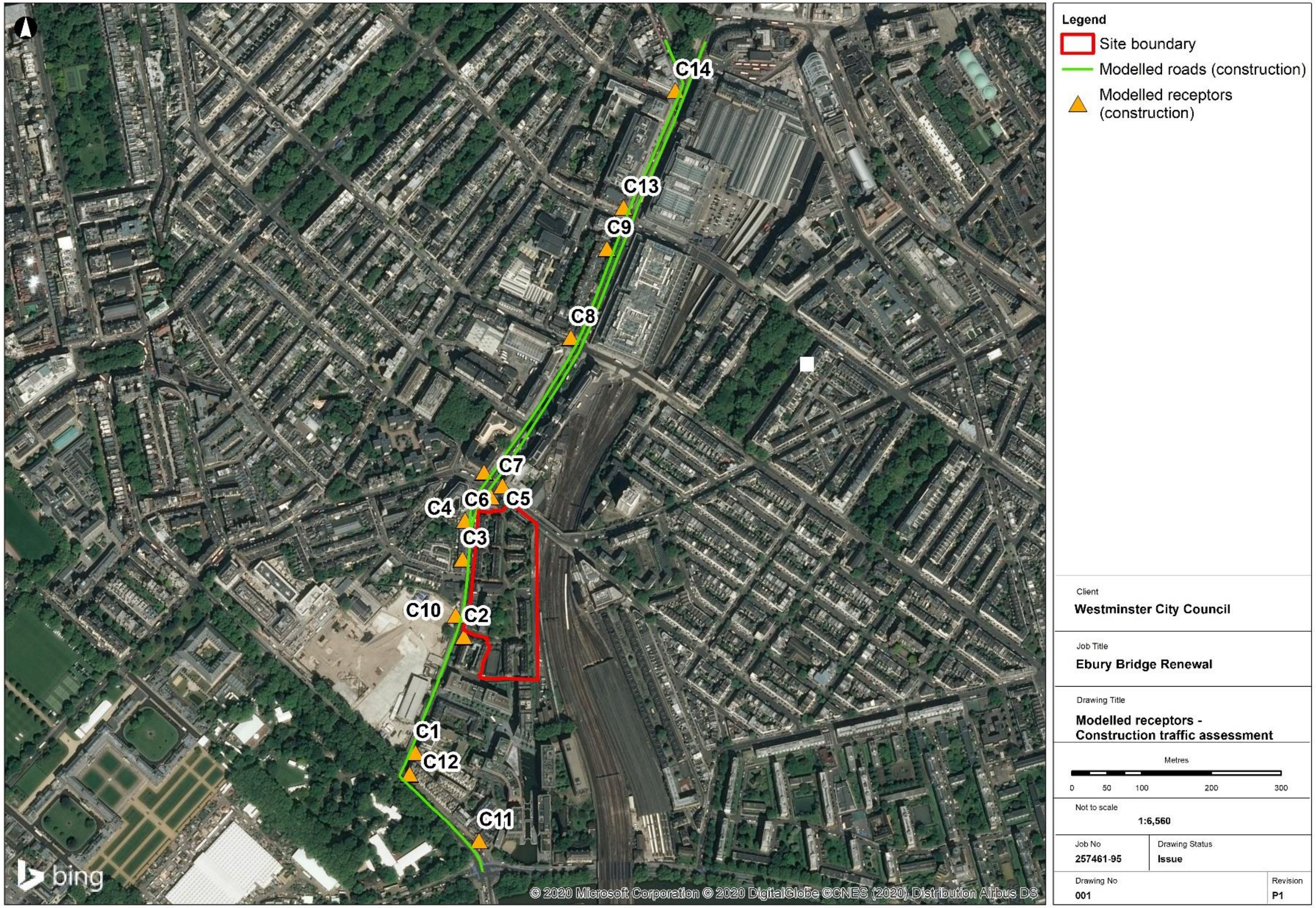


Table 11: Details of the construction modelled road network

Road ID	Air quality ID	Road name	Road width (m)	Road height (m)
2	2	Ebury Bridge Road	9	0
2	2J	Ebury Bridge Road	8	0
1	1Jb	Ebury Bridge Road	6	0
1	1Ja	Ebury Bridge Road	9	0
4a	4aJ	Buckingham Palace Road	7	0
4b	4bJ	Buckingham Palace Road	7	0
4b	4b	Buckingham Palace Road	7	0
8	8b	Buckingham Palace Road	7	0
1	1	Ebury Bridge Road	15	18
9	9J	Chelsea Bridge Road	9	0
9	9	Chelsea Bridge Road	9	0
8	8a1	Buckingham Palace Road	5	0
8	8bJa	Buckingham Palace Road	5	0
8	8b2	Buckingham Palace Road	5	0
8	8aJ	Buckingham Palace Road	7	0
4a	4a	Buckingham Palace Road	7	0
8	8a	Buckingham Palace Road	7	0
8	8bJ2	Buckingham Palace Road	7	0
4b	4bJ2	Buckingham Palace Road	7	0

Table 12: Construction traffic data

AQ ID	2018 Baseline			Do-Minimum			Construction traffic vehicles		
	24 hr AADT	%HDV	Speed (kph)	24 hr AADT	%HDV	Speed (kph)	24 hr AADT	%HDV	Speed (kph)
2	8607	14	36.5	8,970	14	36.5	49	100	36.5
2J	8607	14	20	8,970	14	20	49	100	20
1Jb	2617	13	20	2,753	13	20	25	100	20
1Ja	2617	13	20	2,753	13	20	25	100	20
4aJ	6118	18	20	6,190	18	20	25	100	20
4bJ	6907	14	20	6,979	14	20	25	100	20
4b	6907	14	28.6	6,979	14	28.6	25	100	28.6
8b	13570	16	30.1	13,606	16	30.1	25	100	30.1
1	5234	13	27.8	5,506	13	27.8	49	100	27.8
9J	11520	10	20	12,245	9	20	49	100	20
9	11520	10	48.3	12,245	9	48.3	49	100	48.3
8a1	13570	16	30.1	13,606	16	30.1	25	100	30.1
8bJa	13570	16	20	13,606	16	20	25	100	20
8b2	13570	16	30.1	13,606	16	30.1	25	100	30.1
8aJ	13570	16	20	13,606	16	20	25	100	20
4a	6118	18	31.5	6,190	18	31.5	25	100	31.5
8a	13570	16	30.1	13,606	16	30.1	25	100	30.1
8bJ2	13570	16	20	13,606	16	20	25	100	20
4bJ2	6907	14	20	6,979	14	20	25	100	20

Sensitive receptors

B4.2.7 The modelling was undertaken to calculate predicted concentrations where sensitive receptors are located. Sensitive receptors are defined as those residential properties/schools/hospitals/businesses or areas where people may spend time that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction of the Proposed Development.

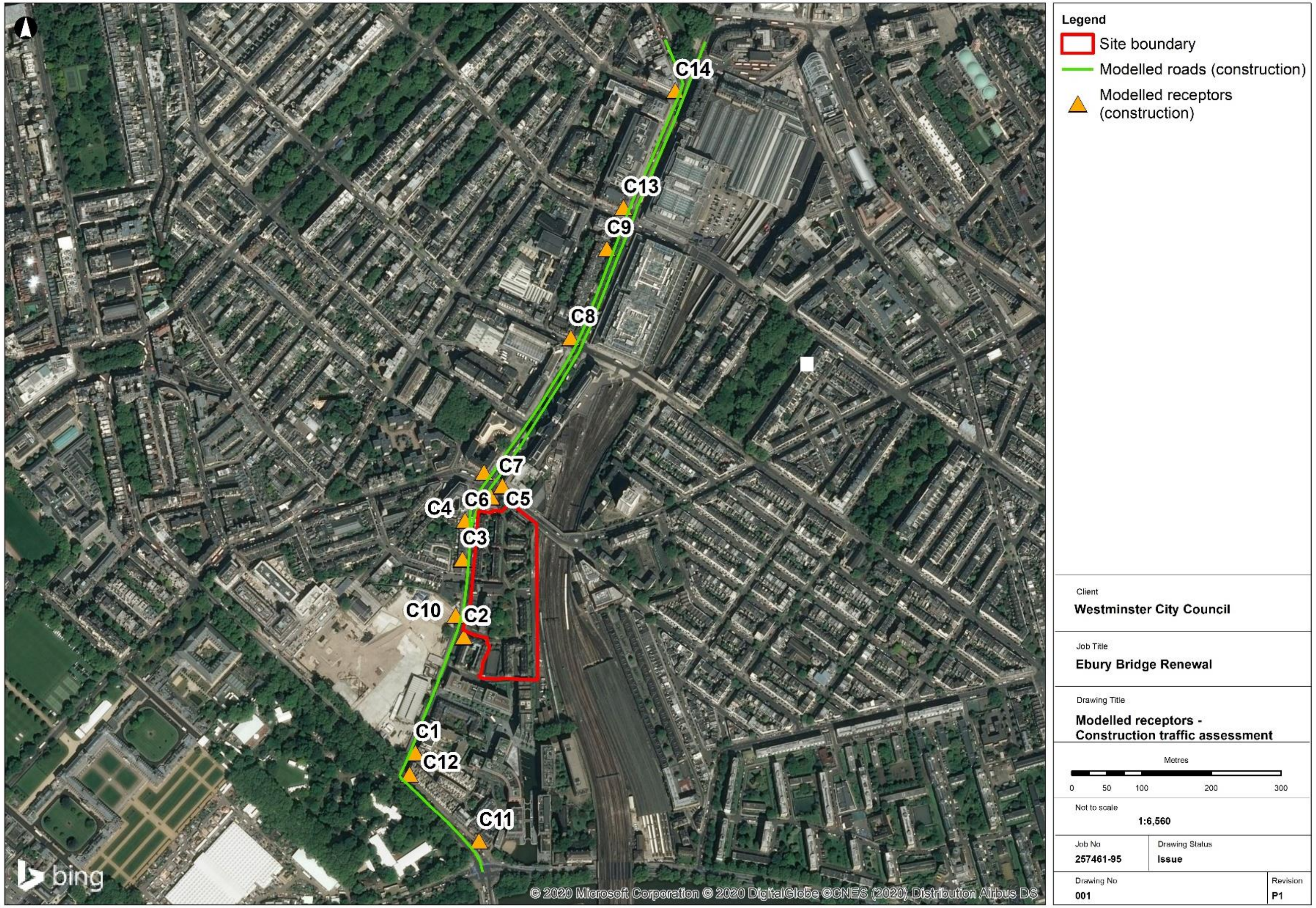
B4.2.8 A desktop study was undertaken in order to identify representative sensitive receptors along the roads in the vicinity of the Proposed Development that required specific consideration during the construction assessment. Details of modelled construction sensitive receptors are presented in Table 14 with locations shown in Figure 6.

B4.2.9 Receptors were modelled at heights representative of population exposure (1.5m) and at additional heights to represent the different floor levels of the residential buildings. Some receptors were modelled at a height of 1m where basement flats had windows opening at street level.

Table 13: Construction phase sensitive receptors

ID	X	Y	Description	Modelled heights (m)
C1	528446	178109	Ebury Bridge Road - Wellington Buildings	1.5, 5, 8.5, 12
C2	528516	178275	Ebury Bridge Road - Cheylesmore House	1.5, 5, 8.5, 12, 15.5, 19
C3	528514	178387	Ebury Bridge Road - by The Rising Sun pub	1.5, 5, 8.5
C4	528518	178442	Ebury Bridge Road - by Ranelagh Cottages	1.5, 5, 8.5
C5	528555	178476	Corner of Ebury Bridge Road and Ebury Bridge	1.5, 5, 8.5, 12
C6	528571	178491	Corner of Ebury Bridge Road and Buckingham Palace Road	8, 11.5, 15, 18.5, 22, 25.5, 29
C7	528545	178511	Corner of Buckingham Palace Road and Pimlico Road	1.5, 5, 8.5, 12, 15.5, 19, 22.5, 26, 29.5
C8	528669	178703	Corner of Buckingham Palace Road and Elizabeth Street	1.5, 5, 8.5
C9	528721	178831	Buckingham Palace Road	1.5, 5, 8.5
C10	528504	178306	Chelsea Barracks	1.5, 5
C11	528538	177983	The Lister Hospital, Chelsea Bridge Road	1, 4.5, 8, 11.5, 15, 18.5
C12	528438	178079	Corner of Chelsea Bridge Road	1, 4.5, 8, 11.5, 15, 18.5, 22
C13	528745	178890	Corner of Buckingham Palace Road and Eccleston Street	5, 8.5,12, 15.5, 19
C14	528819	179057	Corner of Buckingham Palace Road and Lower Belgrave Street	10.5, 14, 17.5, 21, 24.5

Figure 6: Modelled construction sensitive receptors



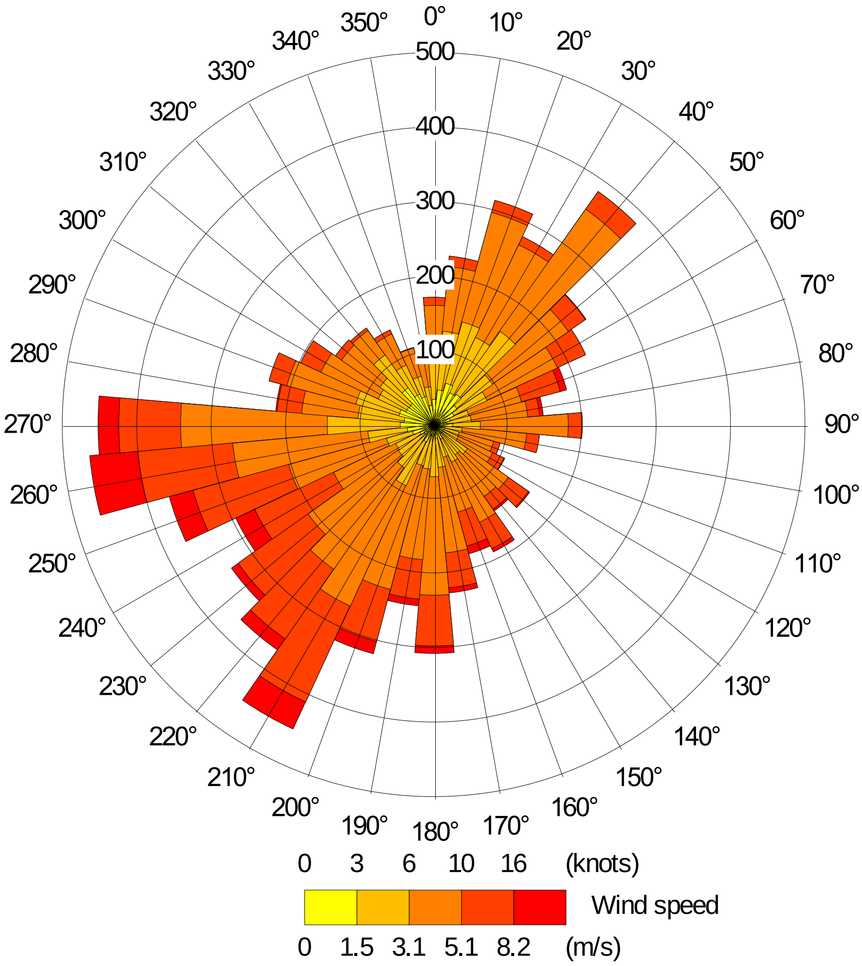
Dispersion modelling setup

B4.2.10 This section details the inputs and set-up for the traffic dispersion modelling. The model ADMS-Roads (version 4.1) was used for the assessment.

Meteorological data

B4.2.11 The meteorological data used in this assessment were measured at London Heathrow Airport meteorological station. The data were collected over the period 1 January 2018 to 31 December 2018 (inclusive). London Heathrow Airport is located approximately 21km south-west of the Proposed Development. This meteorological site was chosen as it is the most representative site for the Proposed Development.

Figure 7: Wind rose for London Heathrow Airport 2018



B4.2.12 Most dispersion models for road traffic emissions do not use meteorological data when there are calm wind conditions, as dispersion of air pollutants is more difficult to calculate in these circumstances. ADMS-Roads treats wind speeds less than 0.75m/s (at 10m) by setting the wind speed to 0.75m/s and uses the wind direction from the most recent past hour for which wind speed is greater than 0.75m/s. Defra's LAQM.TG(16)[31] guidance recommends 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 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 90%.

B4.2.13 Hourly sequential observation data was used in this assessment. The dataset includes 8,558 lines of usable hourly data, out of a total of 8,760 lines of data. This corresponds to 97.7% of the year. This is above the 90% threshold and so meets the requirements of the Defra guidance and is adequate for the dispersion modelling. Figure 7 shows the wind rose for London Heathrow Airport for 2018. It can be seen that the predominant wind direction is from the south-west.

Other input parameters

B4.2.14 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 1.5 (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 is urban and is considered to be represented in the model with the description “Cities, woodland” with a corresponding surface roughness of 1.0m. The surface roughness value used for the meteorological station site was 0.2m corresponding to “Agricultural areas (min)”.

B4.2.15 The minimum Monin-Obukhov length is a model parameter that describes the extent to which the urban heat island effect limits stable atmospheric conditions. A Monin-Obukhov length of 30m has been used in this dispersion modelling assessment. It is suggested in ADMS-Roads that this length is suitable for “Cities and large towns”. The same Monin-Obukhov length was used for the meteorological station site.

NOx to NO_2 Conversion

B4.2.16 The dispersion model predicts NOx concentrations which comprise nitric oxide (NO) and nitrogen dioxide (NO_2). NOx is emitted from combustion processes, primarily as NO with a small percentage of NO_2. The emitted NO reacts with oxidants in the air (mainly ozone) to form NO2. NO2 is associated with effects on human health. The air quality standards for the protection of human health are based on NO2 rather than total NOx or NO.

B4.2.17 LAQM.TG(16)[31] details an approach for calculating the roadside conversion of NOx to NO2. This approach takes into account the difference between ambient NOx concentrations with and without the Proposed Development, the concentration of ozone and the different proportions of primary NO2 emissions in different years. This approach is available as a spreadsheet calculator, with the most up-to-date version being version 7.1, released in April 2019[34].

B4.2.18 Using the calculator, a suitable NOx: NO_2 conversion has been applied to the modelled roadside NOx concentrations in order to determine the impact of the NOx emissions on ambient concentrations of NO_2.

[34] Defra NOx to NO_2 calculator (version 7.1), https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

Model verification

B4.2.19 Model verification refers to the comparison of modelled and measured pollutant concentrations at the same locations to determine the performance of the model. Should the majority of model results for NO2 be within ±25% of the measured values and there is no systematic over or under-prediction of concentrations, then the LAQM.TG(16)[31] 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 NO2 concentrations to provide a better agreement.

B4.2.20 The model verification is based on the operational baseline model, as this contains a greater model extent and additional roads.

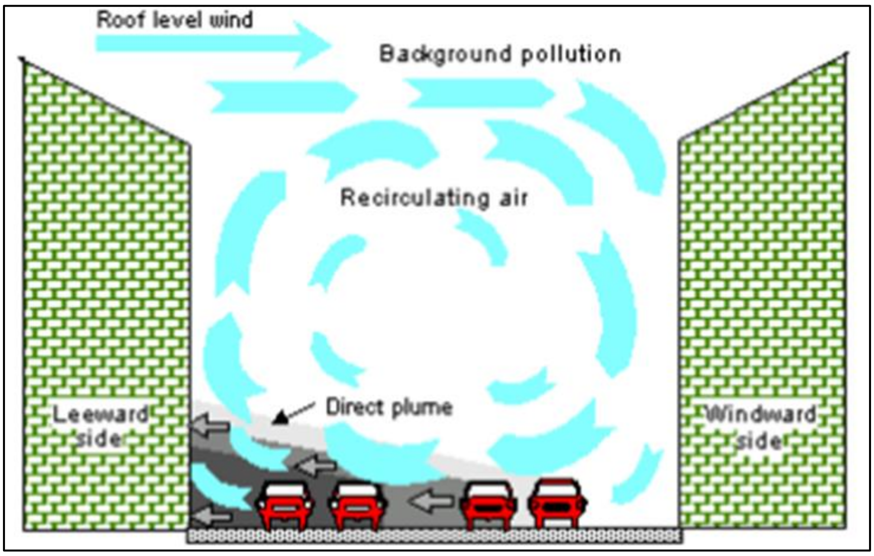
B4.2.21 The outcome of the model verification is reported in Appendix B7.

Street canyons and road height

B4.2.22 The existing urban streetscape can create street canyons. The street canyon effect can impact dispersion within the canyon, such as increasing concentrations on the leeside of the road (see Figure 8). The ADMS-Roads model is able to model the impacts of street canyons.

B4.2.23 A street canyon has been included in this assessment on the northern section of Ebury Bridge Road (Model ID 1).

Figure 8: Conventional street canyon air flow[35]



Significance Criteria

B4.2.24 The 2017 EPUK/IAQM guidance note ‘Land-Use Planning & Development Control’[32] provides an approach to determining the air quality impacts resulting

[35] Berkowicz, R. (2000) A Simple Model for Urban Background Pollution - https://link.springer.com/article/10.1023%2FA%3A1006466025186

from a Proposed Development and the overall significance of local air quality effects arising from a Proposed Development.

B4.2.25 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 NO2, PM10, and PM2.5 objectives. The change is then examined in relation to the predicted total pollutant concentrations in the assessment year and its relationship with the annual mean NO2, PM10, and PM2.5 objectives.

B4.2.26 The assessment framework for determining impact descriptors at each of the assessed receptors is shown in Table 14.

Table 14: Impact descriptors

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

B4.2.27 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, whilst also taking other factors into account, such as:

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

B4.2.28 Professional judgement should be used to determine the overall significance of effects of the Proposed Development. In circumstances where the impact of Proposed Development can be judged at an isolated receptor, it is likely that a ‘moderate’ or ‘substantial’ impact would give rise to a significant effect and a ‘negligible’ or ‘slight’ impact would not result in a significant effect.

B4.3 Operational effects

Operational traffic assessment

B4.3.1 The traffic data provided by Arup transport consultants consists of AADT flows for all vehicle types and for HGVs for each road link.

B4.3.2 The traffic data was screened using the EPUK/IAQM land-use guidance[32] screening criteria for sites located within an AQMA.

B4.3.3 The criteria were exceeded along Ebury Bridge Road indicating that detailed dispersion modelling of the road traffic emissions was necessary.

B4.3.4 The modelled road network is illustrated in Figure 9 and details of the modelled roads and traffic data used are provided in Table 15 and Table 16.

B4.3.5 Although not all road links were screened into the assessment, all road links where data was provided was used for the assessment to provide a full assessment of local pollutant concentrations during the operational phase.

B4.3.6 The traffic data provided for the baseline year was 2019 however the latest year of local authority monitoring for use in the model verification is 2018. It has been confirmed by the transport consultants that background traffic growth is not expected in Central London, therefore the 2019 data is considered representative for 2018.

B4.3.7 The same process for model set-up (junctions, speeds and emission factors) has been used as described in the construction traffic assessment section.

Figure 9: Modelled road network for operational traffic assessment

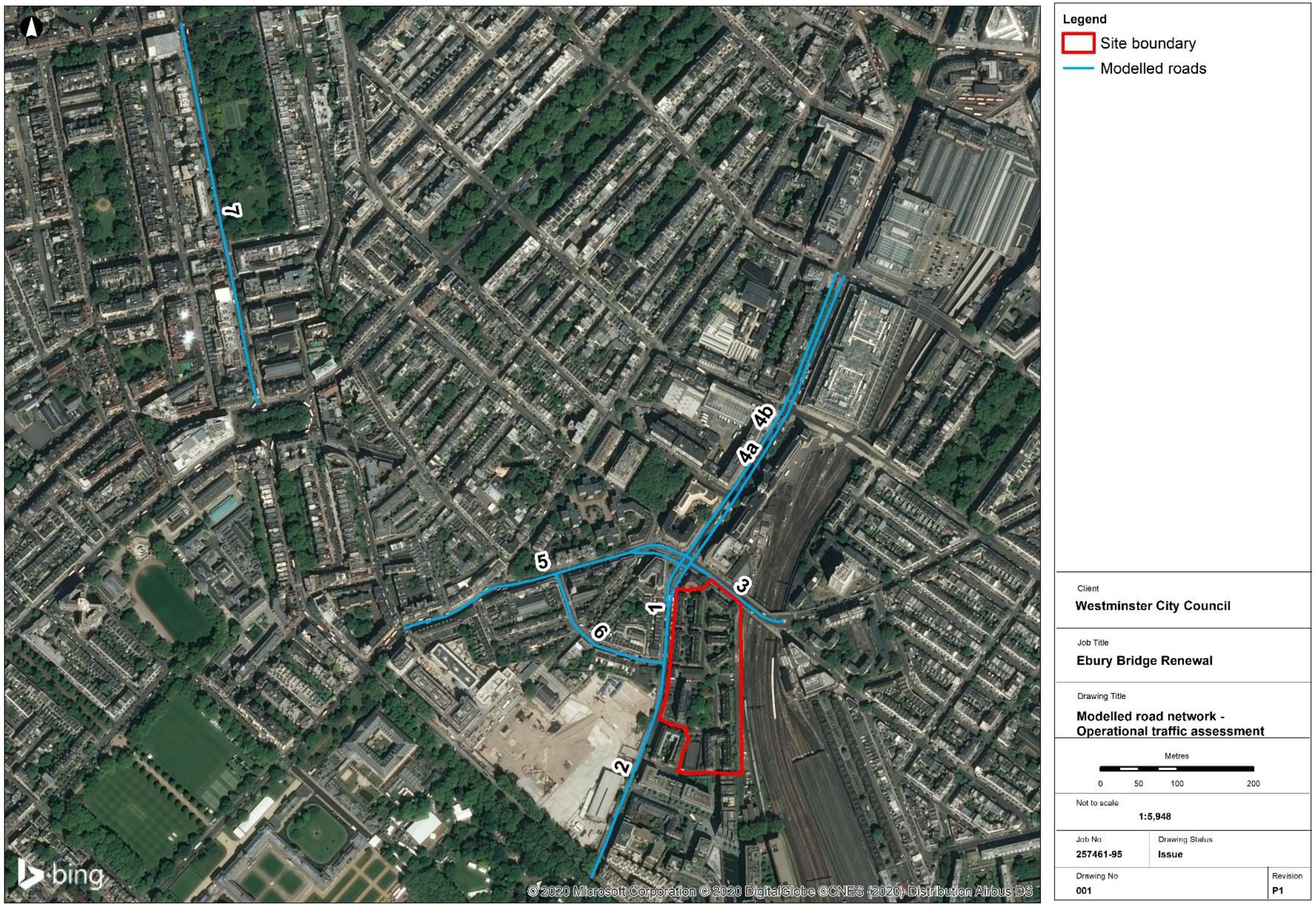


Table 15: Details of the modelled road network

Road ID	Air quality ID	Road name	Road width (m)	Road height (m)
2	2	Ebury Bridge Road	9	0
2	2J	Ebury Bridge Road	8	0
1	1Jb	Ebury Bridge Road	6	0
1	1Ja	Ebury Bridge Road	9	0
6	6Jb	St Barnabas Street	7	0
6	6	St Barnabas Street	7	0
5	5	Pimlico Road	7	0
5	5Jb	Pimlico Road	5	0
5	5Ja	Pimlico Road	8	0
4a	4aJ	Buckingham Palace Road	7	0
4b	4bJ1	Buckingham Palace Road	7	0
8	8b	Buckingham Palace Road	7	0
8	8a	Buckingham Palace Road	7	0
3	3J	Ebury Bridge	10	0
3	3	Ebury Bridge	10	0
6	6Ja	St Barnabas Street	7	0
7	7J	Sloane Street	11	0
7	7	Sloane Street	11	0
1	1	Ebury Bridge Road	15	18
4a	4a	Buckingham Palace Road	7	0
4b	4bJ	Buckingham Palace Road	7	0
4b	4b	Buckingham Palace Road	7	0
8	8aJ	Buckingham Palace Road	7	0

Table 16: Operational traffic data

AQ ID	2018* Baseline			2028 Do-Minimum			2028 Do-Something		
	24 hr AADT	%HDV	Speed (kph)	24 hr AADT	%HDV	Speed (kph)	24 hr AADT	%HDV	Speed (kph)
2	8,607	14	36.5	8,970	14	36.5	9,182	14	36.5
2J	8,607	14	20	8,970	14	20	9,182	14	20
1Jb	2,617	13	20	2,753	13	20	2,818	13	20
1Ja	2,617	13	20	2,753	13	20	2,818	13	20
6Jb	1,722	10	20	1,813	10	20	1,857	10	20
6	1,722	10	28.0	1,813	10	28.0	1,857	10	28.0
5	10,671	13	31.6	10,832	13	31.6	10,871	13	31.6
5Jb	5,336	13	20	5,416	13	20	5,435	13	20
5Ja	5,336	13	20	5,416	13	20	5,435	13	20
4aJ	6,118	18	20	6,190	18	20	6,211	18	20
4bJ1	6,907	14	20	6,979	14	20	7,003	14	20
8b	13,570	16	30.1	13,606	16	30.1	13,617	16	30.1
8a	13,570	16	30.1	13,606	16	30.1	13,617	16	30.1
3J	12,641	13	20	12,783	13	20	12,829	13	20
3	12,641	13	33.9	12,783	13	33.9	12,829	13	33.9
6Ja	1,722	10	20	1,813	10	20	1,857	10	20
7J	12,253	12	20	12,294	12	20	12,294	12	20
7	12,253	12	32.5	12,294	12	32.5	12,294	12	32.5
1	5,234	13	27.8	5,506	13	27.8	5,637	13	27.8
4a	6,118	18	31.5	6,190	18	31.5	6,211	18	31.5
4bJ	6,907	14	20	6,979	14	20	7,003	14	20
4b	6,907	14	28.6	6,979	14	28.6	7,003	14	28.6

AQ ID	2018* Baseline			2028 Do-Minimum			2028 Do-Something		
	24 hr AADT	%HDV	Speed (kph)	24 hr AADT	%HDV	Speed (kph)	24 hr AADT	%HDV	Speed (kph)
8aJ	13,570	16	20	13,606	16	20	13,617	16	20

*2019 traffic data representative of 2018 traffic flows for Central London

Sensitive receptors

B4.3.8 Sensitive receptors were selected following the same methodology as the construction traffic assessment.

B4.3.9 Receptors have also been added at the Proposed Development location to determine if future sensitive receptors at the Proposed Development would be exposed to air pollution concentrations above the AQOs during operation. Details of operational sensitive receptors are presented in Table 16 with locations shown in **Error! Reference source not found.**.

B4.3.10 Receptors were modelled at heights representative of population exposure (1.5m) and at additional heights to represent the different floor levels of the residential buildings. Some receptors were modelled at a height of 0-1m where basement flats had windows opening at street level.

Figure 10: Modelled operational sensitive receptors

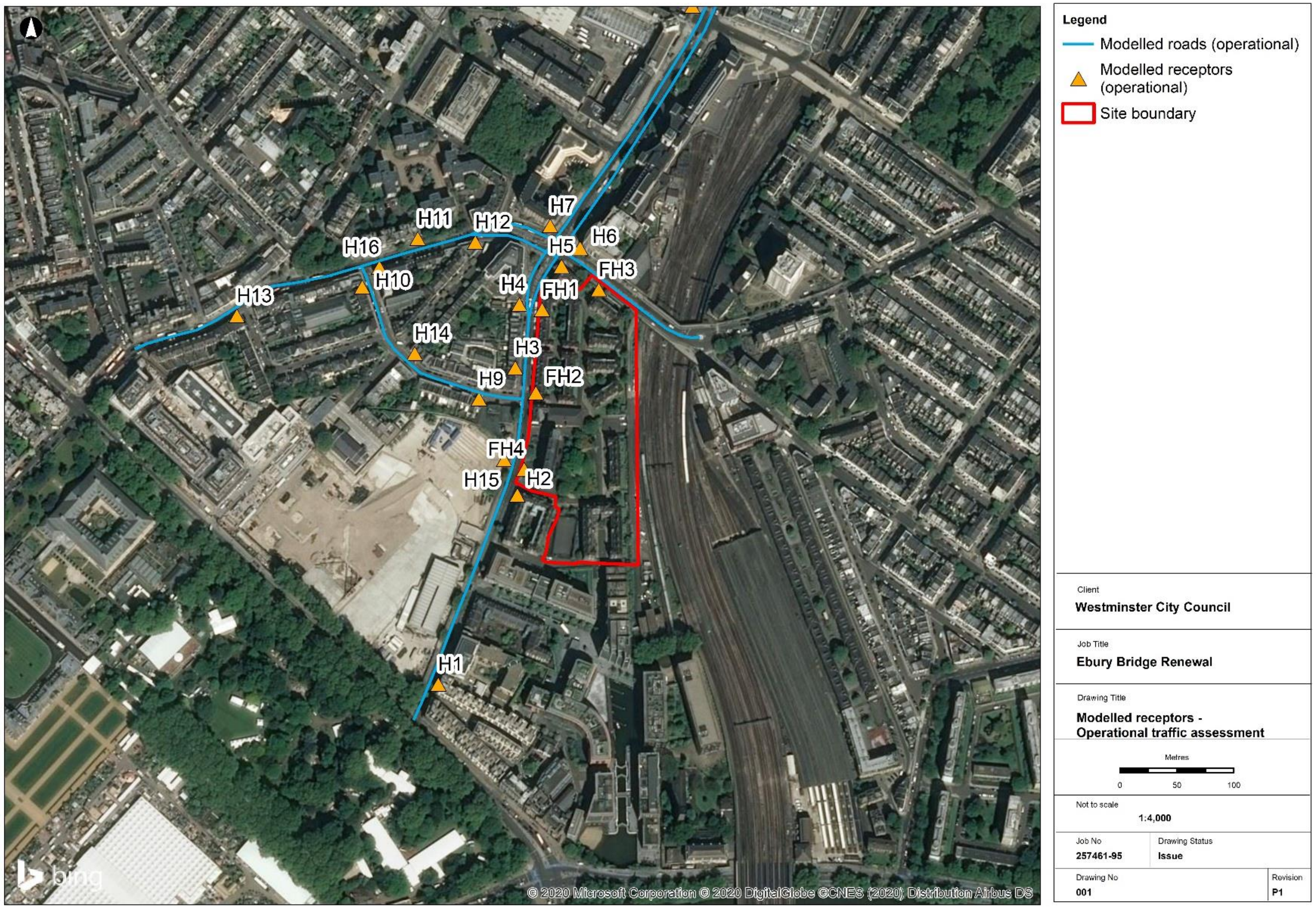


Table 17: Operational sensitive receptors

ID	X	Y	Description	Modelled heights (m)
H1	528446	178109	Ebury Bridge Road - Wellington Buildings	1.5, 5, 8.5, 12
H2	528516	178275	Ebury Bridge Road - Cheylesmore House	1.5, 5, 8.5, 12, 15.5, 19
H3	528514	178387	Ebury Bridge Road - by The Rising Sun pub	1.5, 5, 8.5
H4	528518	178442	Ebury Bridge Road - by Ranelagh Cottages	1.5, 5, 8.5
H5	528555	178476	Corner of Ebury Bridge Road and Ebury Bridge	1.5, 5, 8.5, 12
H6	528571	178491	Corner of Ebury Bridge Road and Buckingham Palace Road	8, 11.5, 15, 18.5, 22, 25.5, 29
H7	528545	178511	Corner of Buckingham Palace Road and Pimlico Road	1.5, 5, 8.5, 12, 15.5, 19, 22.5, 26, 29.5
H8	528669	178703	Corner of Buckingham Palace Road and Elizabeth Street	1.5, 5, 8.5
H9	528482	178359	St Barnabas Street	1.5, 5
H10	528380	178457	Corner of St Barnabas Street and Pimlico Road	1.5, 5, 8.5
H11	528429	178500	Pimlico Road	5, 8.5, 12
H12	528479	178497	Flats above No11 Pimlico Road	5, 8.5, 12
H13	528270	178432	Corner of Pimlico Road and Bloomfield Terrace	5, 8.5
H14	528426	178399	Corner of St Barnabas Street and Ranelagh Grove	0, 3.5, 7
H15	528504	178306	Chelsea Barracks	1.5, 5
H16	528395	178475	St Barnabas Primary School	1.5, 5
H17	528721	178831	Buckingham Palace Road	1.5, 5, 8.5
FH1	528538	178438	Ebury Bridge Road - Future receptor	1.5, 5, 8.5, 12, 15.5, 19, 22.5, 26
FH2	528532	178365	Ebury Bridge Road - Future receptor	1.5, 5, 8.5, 12, 15.5, 19, 22.5, 26
FH3	528587	178455	Ebury Bridge Road - Future receptor	1.5, 5, 8.5, 12, 15.5, 19, 22.5, 26
FH4	528522	178298	Ebury Bridge Road - Future receptor	1.5, 5, 8.5, 12, 15.5, 19, 22.5, 26

B4.4 Cumulative effects

B4.4.1 Cumulative effects have been taken into account throughout the air quality assessment by including traffic flows from committed developments, in addition to the traffic data associated with the Proposed Development.

B5 Assumptions and limitations

B5.1 Assumptions

B5.1.1 In addition to the assumptions outlined in the ES, all other assumptions that were made during the air quality assessment are listed below:

- The emissions from NRMM have been scoped out, as it is assumed that all NRMM would meet the relevant emissions standards as detailed in the aforementioned GLA construction SPG36 and consequently the emissions would not give rise to likely significant effects on local air quality;
- The impacts of Part A and Part B processes are represented in the Defra background concentrations that were used in the assessment;
- Modelled road speeds were 20kph for all junctions and roundabouts (to represent congested conditions) unless the speeds provided were less than 20kph;
- All necessary committed development was included in the traffic data provided detailed in Table 12 and Table 16; and
- To reduce uncertainty, impacts on air quality during construction and operation in 2028 have been modelled using 2018 vehicle emissions and 2018 background concentrations which represents a conservative scenario as improvements are likely during the period between 2018 and when the full development is completed in 2028.

B5.2 Limitations

B5.2.1 Air quality dispersion modelling has inherent limitations and areas of uncertainty, which are listed below:

- Traffic data used in the model;
- Traffic emissions data;
- Simplifications in model algorithms and empirical relationships that are used to simulate complex physical and chemical processes in the atmosphere;
- Background concentrations[37]; and
- Meteorological data[38].

B5.2.2 In order to verify that the assessment is robust despite the above limitations, model verification is undertaken. Details of this are provided in sections B4.2.19 to B4.2.21.

[36] Greater London Authority (2014) Sustainable Design and Construction Supplementary Planning Guidance
[37] Defra background maps, 2018, Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html
[38] Heathrow Airport meteorological data 2018

B6 Air quality neutral methodology

B6.1.1 An Air Quality Neutral (AQN) assessment has been undertaken as required by the Sustainable Design and Construction SPG36. As stated in the SPG, “developments that do not exceed these benchmarks will be considered to avoid any increase in NOx and PM emissions across London as a whole and therefore be air quality neutral”.

B6.1.2 Transport Emission Benchmarks (TEBs) have been set for NOx and PM10 according to the land-use classes of the Proposed Development. These are presented in Table 18. NOx and PM10 emissions (kg/annum) for each land-use class in the Proposed Development are calculated and summed to give the Total Transport Emissions (TTE). The TEBs for the Proposed Development are then subtracted from the TTE for the Proposed Development.

B6.1.3 The SPG notes that it was not possible to derive benchmarks for each land-use type, which includes D1. As it is not possible to derive a TEB, a comparison has been made based on the trip rates. Similarly, to the TEBs, if the trip rate comparison is lower for the Proposed Development no mitigation is required.

B6.1.4 Benchmark trip rates have been set for each land-use type and each area of London: Central Activity Area (CAZ), inner and outer. These are presented in Table 19.

B6.1.5 In order to calculate the emissions from the Proposed Development, the following information is required:

- Gross floor area (GFA) (m2); and
- Proposed Development trip rates (trips/m^2/annum).

B6.1.6 Should the outcome of the difference between the benchmark and the development trip rate be negative, this indicates that the transport emissions from the development are within the benchmark, and no mitigation or offsetting would be required.

B6.1.7 Building Emission Benchmarks (BEBs) have not been used as the Proposed Development does not include a combustion plant.

B6.1.8 Details of the AQN assessment can be found in section B10.

Table 18: Transport Emissions Benchmarks (TEBs)

Land-use	**CAZ**	**Inner**	**Outer**
NOx (g/m²/annum)			
Retail (A1)	169	219	249
Office (B1)	1.27	11.4	68.5
NOx (g/dwelling/annum)			
Residential (C3)	234	558	1,553
PM_{10} (g/m²/annum)			
Retail (A1)	29.3	39.3	42.9
Office (B1)	0.22	2.05	11.8
PM_{10} (g/dwelling/annum)			
Residential (C3)	40.7	100	267

Table 19: Benchmark trip rates (trips/m²/annum) for land-use classes

Land-use	**CAZ**	**Inner**	**Outer**
Retail (A3)	153	137	170
Retail (A4)	2.0	8.0	-
Retail (A5)	-	32.4	590
Commercial (B2)	-	15.6	18.3
Commercial (B8)	-	5.5	6.5
Residential (C1)	1.9	5.0	6.9
Residential (C2)	-	3.8	19.5
Institutional (D1)	0.07	65.1	46.1
Institutional (D2)	5.0	22.5	49.0
Other (Sui Generis)	-	-	-

B7 Model verification

B7.1.1 This section sets out the results of the model verification undertaken for baseline year 2018 for the air quality assessment.

B7.1.2 Model verification was carried out using the NO2 monitoring data from the RBKC diffusion tube KC57. This is a diffusion tube, roadside monitoring site, located along the modelled road network. The location of this verification site is shown in **Error! Reference source not found.**.

B7.1.3 Monitoring data for 2018 at this diffusion tube site was obtained from the RBKC ASR[24] and compared with modelled concentrations at the same location. The monitoring site was modelled at a height of 2m rather than the stated height in the ASR[24] (2.4m) after a site visit to confirm the site location. The model verification was undertaken following the methodology described in LAQM.TG(16)[9]. The model slightly underpredicted at the model verification site.

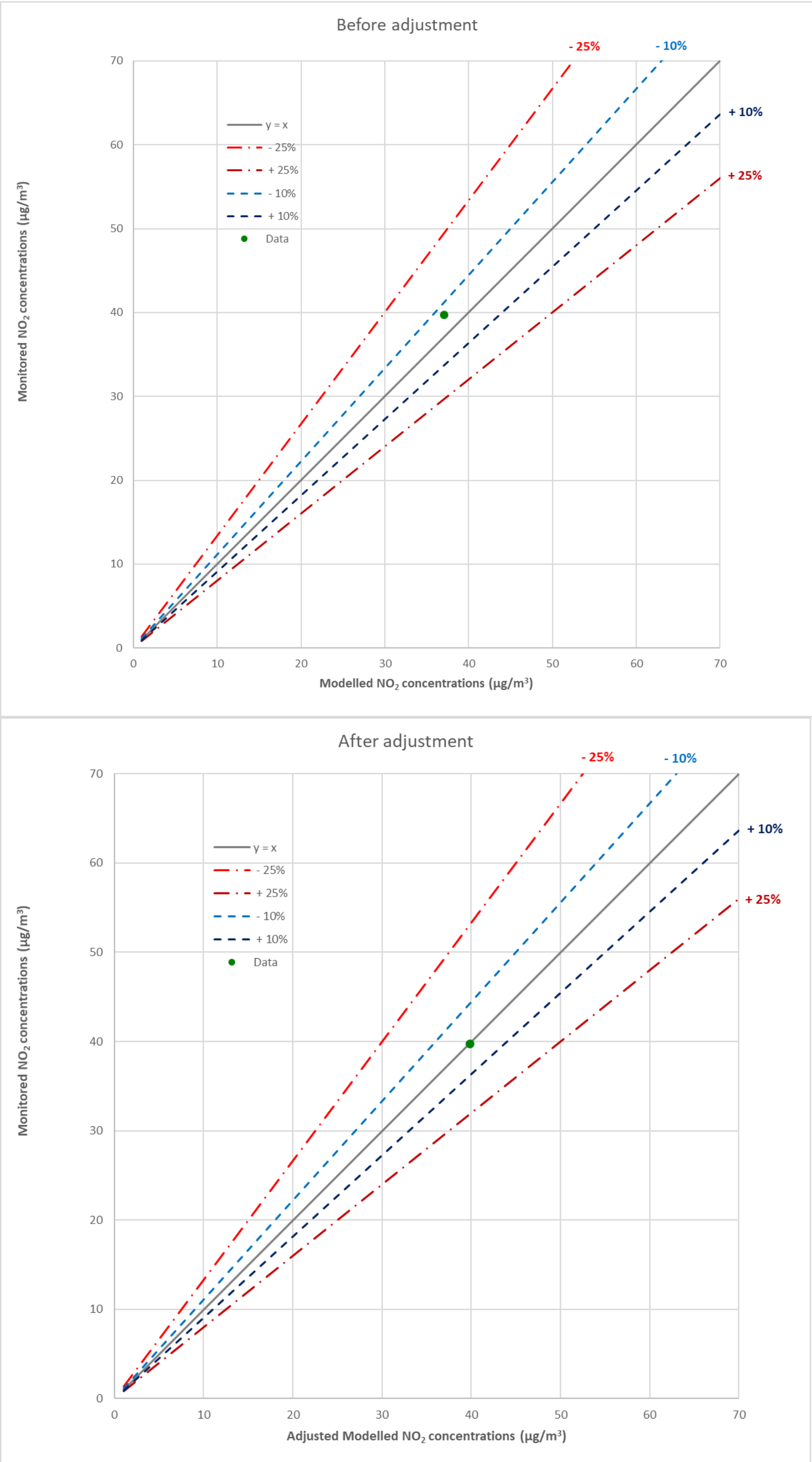
B7.1.4 A comparison of monitored and modelled annual mean NO2 concentrations for 2018 before and after adjustment are presented in Table 20 with the graphical representation shown in Figure 11. The percentage difference between the monitored and modelled results before adjustment is -6.7%, indicating that the site is within the recommended guideline stated in LAQM.TG(16) of ±25%. However as only one site was used for verification and the model was slightly unpredicting as a conservative assumption modelled results were adjusted.

B7.1.5 As a conservative approach to the model underpredicting, an adjustment factor of 2.116 was calculated and applied to all modelled NOx concentrations (for the construction and operational results), to increase the resulting NO_2 concentrations.

Table 20: Comparison of modelled and monitored annual mean NO_2 concentrations

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
Before adjustment					
KC57	Roadside	34.5	39.8	37.0	-6.9%
After adjustment					
KC57	Roadside	34.5	39.8	39.8	0.0%

Figure 11: Monitored and modelled 2018 annual mean NO_2 concentrations before and after adjustment



B8 Construction assessment results

B8.1 Model results for NO_2

B8.1.1 The predicted annual mean concentrations of NO_2 for all the construction assessment scenarios at each receptor is presented in Table 21. The construction results are explained in the ES Chapter.

Table 21: Predicted annual mean NO_2 concentrations for the construction traffic assessment

ID	Height (m)	Base 2018 NO_2 (µg/m^3)	DM NO_2 (µg/m^3)	DS NO_2 (µg/m^3)	Change (DS - DM)	Impact descriptor
C1	1.5	44.2	44.5	44.7	0.2	Moderate adverse
C1	5	38.0	38.1	38.2	0.1	Negligible
C1	8.5	34.7	34.8	34.8	<0.1	Negligible
C1	12	33.5	33.5	33.5	<0.1	Negligible
C2	1.5	39.1	39.3	39.4	0.1	Negligible
C2	5	36.3	36.4	36.4	<0.1	Negligible
C2	8.5	34.2	34.3	34.3	<0.1	Negligible
C2	12	33.3	33.4	33.4	<0.1	Negligible
C2	15.5	32.9	32.9	33.0	0.1	Negligible
C2	19	32.7	32.7	32.7	<0.1	Negligible
C3	1.5	38.9	39.1	39.2	0.1	Negligible
C3	5	35.6	35.7	35.8	0.1	Negligible
C3	8.5	34.1	34.1	34.2	0.1	Negligible
C4	1.5	38.9	39.1	39.3	0.2	Slight adverse
C4	5	36.0	36.1	36.1	<0.1	Negligible
C4	8.5	34.3	34.3	34.3	<0.1	Negligible
C5	1.5	41.0	41.2	41.4	0.2	Moderate adverse
C5	5	37.6	37.6	37.7	0.1	Negligible
C5	8.5	35.0	35.1	35.1	<0.1	Negligible
C5	12	33.8	33.9	33.9	<0.1	Negligible
C6	8	35.5	35.6	35.6	<0.1	Negligible
C6	11.5	34.0	34.1	34.1	<0.1	Negligible
C6	15	33.4	33.4	33.4	<0.1	Negligible
C6	18.5	33.0	33.0	33.0	<0.1	Negligible
C6	22	32.7	32.7	32.8	0.1	Negligible
C6	25.5	32.6	32.6	32.6	<0.1	Negligible
C6	29	32.4	32.4	32.5	0.1	Negligible
C7	1.5	41.5	41.6	41.7	0.1	Negligible
C7	5	38.0	38.1	38.2	0.1	Negligible
C7	8.5	35.2	35.3	35.3	<0.1	Negligible

ID	Height (m)	Base 2018 NO_2 (μg/m³)	DM NO_2 (μg/m³)	DS NO_2 (μg/m³)	Change (DS - DM)	Impact descriptor
C7	12	33.9	33.9	34.0	0.1	Negligible
C7	15.5	33.3	33.3	33.3	<0.1	Negligible
C7	19	32.9	32.9	33.0	0.1	Negligible
C7	22.5	32.7	32.7	32.7	<0.1	Negligible
C7	26	32.5	32.6	32.6	<0.1	Negligible
C7	29.5	32.4	32.4	32.4	<0.1	Negligible
C8	1.5	47.2	47.3	47.4	0.1	Negligible
C8	5	41.7	41.7	41.8	0.1	Negligible
C8	8.5	37.2	37.2	37.2	<0.1	Negligible
C9	1.5	52.3	52.4	52.5	0.1	Negligible
C9	5	45.0	45.1	45.1	<0.1	Negligible
C9	8.5	39.0	39.0	39.1	0.1	Negligible
C10	1.5	39.8	40.1	40.2	0.1	Negligible
C10	5	36.2	36.3	36.4	0.1	Negligible
C11	1	43.9	44.2	44.3	0.1	Negligible
C11	4.5	39.6	39.8	39.9	0.1	Negligible
C11	8	35.3	35.4	35.4	<0.1	Negligible
C11	11.5	33.4	33.4	33.4	<0.1	Negligible
C11	15	32.7	32.7	32.7	<0.1	Negligible
C11	18.5	32.4	32.4	32.4	<0.1	Negligible
C12	1	46.5	46.8	47.0	0.2	Moderate adverse
C12	4.5	40.1	40.3	40.5	0.2	Slight adverse
C12	8	35.1	35.2	35.2	<0.1	Negligible
C12	11.5	33.4	33.4	33.4	<0.1	Negligible
C12	15	32.8	32.8	32.8	<0.1	Negligible
C12	18.5	32.5	32.5	32.5	<0.1	Negligible
C12	22	32.4	32.4	32.4	<0.1	Negligible
C13	5	47.5	47.6	47.7	0.1	Negligible
C13	8.5	39.7	39.7	39.7	<0.1	Negligible
C13	12	36.1	36.1	36.1	<0.1	Negligible
C13	15.5	34.4	34.4	34.5	0.1	Negligible
C13	19	33.5	33.5	33.5	<0.1	Negligible
C14	10.5	36.7	36.7	36.7	<0.1	Negligible
C14	14	34.5	34.5	34.5	<0.1	Negligible
C14	17.5	33.4	33.5	33.5	<0.1	Negligible
C14	21	32.9	32.9	32.9	<0.1	Negligible
C14	24.5	32.6	32.6	32.6	<0.1	Negligible

B8.2 Model results for PM_{10}

B8.2.1 The predicted annual mean concentrations of PM_{10} for the construction scenario at each receptor are given in Table 22.

Table 22: Predicted annual mean PM_{10} concentrations (µg/m^3) for the construction traffic assessment

ID	Height (m)	Base 2018 PM_{10} (µg/m^3)	DM PM_{10} (µg/m^3)	DS PM_{10} (µg/m^3)	Change (DS - DM)	Impact descriptor
C1	1.5	19.9	20.0	20.0	<0.1	Negligible
C1	5	19.4	19.4	19.4	<0.1	Negligible
C1	8.5	19.1	19.1	19.2	0.1	Negligible
C1	12	19.0	19.0	19.0	<0.1	Negligible
C2	1.5	19.5	19.5	19.5	<0.1	Negligible
C2	5	19.3	19.3	19.3	<0.1	Negligible
C2	8.5	19.1	19.1	19.1	<0.1	Negligible
C2	12	19.0	19.0	19.0	<0.1	Negligible
C2	15.5	19.0	19.0	19.0	<0.1	Negligible
C2	19	19.0	19.0	19.0	<0.1	Negligible
C3	1.5	19.4	19.5	19.5	<0.1	Negligible
C3	5	19.2	19.2	19.2	<0.1	Negligible
C3	8.5	19.1	19.1	19.1	<0.1	Negligible
C4	1.5	19.4	19.4	19.4	<0.1	Negligible
C4	5	19.2	19.2	19.2	<0.1	Negligible
C4	8.5	19.1	19.1	19.1	<0.1	Negligible
C5	1.5	19.5	19.5	19.6	0.1	Negligible
C5	5	19.3	19.3	19.3	<0.1	Negligible
C5	8.5	19.1	19.1	19.1	<0.1	Negligible
C5	12	19.1	19.1	19.1	<0.1	Negligible
C6	8	19.2	19.2	19.2	<0.1	Negligible
C6	11.5	19.1	19.1	19.1	<0.1	Negligible
C6	15	19.0	19.0	19.0	<0.1	Negligible
C6	18.5	19.0	19.0	19.0	<0.1	Negligible
C6	22	19.0	19.0	19.0	<0.1	Negligible
C6	25.5	19.0	19.0	19.0	<0.1	Negligible
C6	30	19.0	19.0	19.0	<0.1	Negligible
C7	1.5	19.6	19.6	19.6	<0.1	Negligible
C7	5	19.3	19.3	19.3	<0.1	Negligible
C7	8.5	19.1	19.2	19.2	<0.1	Negligible
C7	12	19.1	19.1	19.1	<0.1	Negligible
C7	15.5	19.0	19.0	19.0	<0.1	Negligible
C7	19	19.0	19.0	19.0	<0.1	Negligible
C7	22.5	19.0	19.0	19.0	<0.1	Negligible
C7	26	19.0	19.0	19.0	<0.1	Negligible

ID	Height (m)	Base 2018 PM_{10} ($\mu g/m^3$)	DM PM_{10} ($\mu g/m^3$)	DS PM_{10} ($\mu g/m^3$)	Change (DS - DM)	Impact descriptor
C7	29.5	19.0	19.0	19.0	<0.1	Negligible
C8	1.5	20.1	20.1	20.1	<0.1	Negligible
C8	5	19.6	19.6	19.7	0.1	Negligible
C8	8.5	19.3	19.3	19.3	<0.1	Negligible
C9	1.5	20.6	20.6	20.6	<0.1	Negligible
C9	5	19.9	19.9	19.9	<0.1	Negligible
C9	1.5	19.4	19.4	19.4	<0.1	Negligible
C10	5	19.6	19.6	19.6	<0.1	Negligible
C10	8.5	19.3	19.3	19.3	<0.1	Negligible
C11	5	19.9	20.0	20.0	<0.1	Negligible
C11	8.5	19.6	19.6	19.6	<0.1	Negligible
C11	12	19.2	19.2	19.2	<0.1	Negligible
C11	5	19.0	19.0	19.0	<0.1	Negligible
C11	8.5	19.0	19.0	19.0	<0.1	Negligible
C11	12	19.0	19.0	19.0	<0.1	Negligible
C12	5	20.2	20.2	20.2	<0.1	Negligible
C12	8.5	19.6	19.6	19.6	<0.1	Negligible
C12	0	19.2	19.2	19.2	<0.1	Negligible
C12	3.5	19.0	19.0	19.0	<0.1	Negligible
C12	7	19.0	19.0	19.0	<0.1	Negligible
C12	1.5	19.0	19.0	19.0	<0.1	Negligible
C12	5	19.0	19.0	19.0	<0.1	Negligible
C13	1.5	20.1	20.1	20.2	0.1	Negligible
C13	5	19.5	19.5	19.5	<0.1	Negligible
C13	1.5	19.2	19.2	19.2	<0.1	Negligible
C13	5	19.1	19.1	19.1	<0.1	Negligible
C13	8.5	19.0	19.0	19.0	<0.1	Negligible
C14	1.5	19.3	19.3	19.3	<0.1	Negligible
C14	5	19.1	19.1	19.1	<0.1	Negligible
C14	8.5	19.0	19.0	19.0	<0.1	Negligible
C14	12	19.0	19.0	19.0	<0.1	Negligible
C14	15.5	19.0	19.0	19.0	<0.1	Negligible

B8.3 Model results for $PM_{2.5}$

B8.3.1 The predicted annual mean concentrations of $PM_{2.5}$ for the construction scenario at each receptor are given in Table 23. Table 23: Predicted annual mean $PM_{2.5}$ concentrations for the construction traffic assessment

ID	Height (m)	Base 2018 $PM_{2.5}$ (µg/m^3)	DM $PM_{2.5}$ (µg/m^3)	DS $PM_{2.5}$ (µg/m^3)	Change (DS - DM)	Impact descriptor
C1	1.5	13.3	13.4	13.4	<0.1	Negligible
C1	5	13.0	13.0	13.0	<0.1	Negligible
C1	8.5	12.9	12.9	12.9	<0.1	Negligible
C1	12	12.8	12.8	12.8	<0.1	Negligible
C2	1.5	13.1	13.1	13.1	<0.1	Negligible
C2	5	12.9	12.9	12.9	<0.1	Negligible
C2	8.5	12.8	12.8	12.8	<0.1	Negligible
C2	12	12.8	12.8	12.8	<0.1	Negligible
C2	15.5	12.8	12.8	12.8	<0.1	Negligible
C2	19	12.8	12.8	12.8	<0.1	Negligible
C3	1.5	13.0	13.1	13.1	<0.1	Negligible
C3	5	12.9	12.9	12.9	<0.1	Negligible
C3	8.5	12.8	12.8	12.8	<0.1	Negligible
C4	1.5	13.0	13.0	13.0	<0.1	Negligible
C4	5	12.9	12.9	12.9	<0.1	Negligible
C4	8.5	12.8	12.8	12.8	<0.1	Negligible
C5	1.5	13.1	13.1	13.1	<0.1	Negligible
C5	5	13.0	13.0	13.0	<0.1	Negligible
C5	8.5	12.9	12.9	12.9	<0.1	Negligible
C5	12	12.8	12.8	12.8	<0.1	Negligible
C6	8	12.9	12.9	12.9	<0.1	Negligible
C6	11.5	12.8	12.8	12.8	<0.1	Negligible
C6	15	12.8	12.8	12.8	<0.1	Negligible
C6	18.5	12.8	12.8	12.8	<0.1	Negligible
C6	22	12.8	12.8	12.8	<0.1	Negligible
C6	25.5	12.7	12.7	12.7	<0.1	Negligible
C6	30	12.7	12.7	12.7	<0.1	Negligible
C7	1.5	13.1	13.1	13.1	<0.1	Negligible
C7	5	13.0	13.0	13.0	<0.1	Negligible
C7	8.5	12.9	12.9	12.9	<0.1	Negligible
C7	12	12.8	12.8	12.8	<0.1	Negligible
C7	15.5	12.8	12.8	12.8	<0.1	Negligible
C7	19	12.8	12.8	12.8	<0.1	Negligible
C7	22.5	12.8	12.8	12.8	<0.1	Negligible
C7	26	12.7	12.7	12.7	<0.1	Negligible
C7	29.5	12.7	12.7	12.7	<0.1	Negligible

ID	Height (m)	Base 2018 $PM_{2.5}$ (µg/m^3)	DM $PM_{2.5}$ (µg/m^3)	DS $PM_{2.5}$ (µg/m^3)	Change (DS - DM)	Impact descriptor
C8	1.5	13.4	13.4	13.5	0.1	Negligible
C8	5	13.2	13.2	13.2	<0.1	Negligible
C8	8.5	13.0	13.0	13.0	<0.1	Negligible
C9	1.5	13.7	13.7	13.7	<0.1	Negligible
C9	5	13.3	13.3	13.3	<0.1	Negligible
C9	1.5	13.0	13.0	13.0	<0.1	Negligible
C10	5	13.1	13.1	13.1	<0.1	Negligible
C10	8.5	12.9	12.9	12.9	<0.1	Negligible
C11	5	13.3	13.4	13.4	<0.1	Negligible
C11	8.5	13.1	13.1	13.1	<0.1	Negligible
C11	12	12.9	12.9	12.9	<0.1	Negligible
C11	5	12.8	12.8	12.8	<0.1	Negligible
C11	8.5	12.8	12.8	12.8	<0.1	Negligible
C11	12	12.7	12.7	12.7	<0.1	Negligible
C12	5	13.5	13.5	13.5	<0.1	Negligible
C12	8.5	13.1	13.2	13.2	<0.1	Negligible
C12	0	12.9	12.9	12.9	<0.1	Negligible
C12	3.5	12.8	12.8	12.8	<0.1	Negligible
C12	7	12.8	12.8	12.8	<0.1	Negligible
C12	1.5	12.7	12.7	12.7	<0.1	Negligible
C12	5	12.7	12.7	12.7	<0.1	Negligible
C13	1.5	13.5	13.5	13.5	<0.1	Negligible
C13	5	13.1	13.1	13.1	<0.1	Negligible
C13	1.5	12.9	12.9	12.9	<0.1	Negligible
C13	5	12.8	12.8	12.8	<0.1	Negligible
C13	8.5	12.8	12.8	12.8	<0.1	Negligible
C14	1.5	12.9	12.9	12.9	<0.1	Negligible
C14	5	12.8	12.8	12.8	<0.1	Negligible
C14	8.5	12.8	12.8	12.8	<0.1	Negligible
C14	12	12.8	12.8	12.8	<0.1	Negligible
C14	15.5	12.7	12.7	12.8	0.1	Negligible

B9 Operational assessment results

B9.1 Model results for NO_2

B9.1.1 The predicted annual mean concentrations of NO_2 for the operational assessment scenario (2018 Baseline, 2028 DM and 2028 DS) at each receptor are presented in Table 24. The operational results are explained in the ES Chapter.

Table 24: Predicted annual mean NO_2 concentrations for the operational traffic assessment

ID	Height (m)	Base 2018 NO_2 (µg/m^3)	DM 2028 NO_2 (µg/m^3)	DS 2028 NO_2 (µg/m^3)	Change (DS - DM)	Impact descriptor
H1	1.5	42.3	42.6	42.8	0.2	Moderate adverse
H1	5	36.5	36.6	36.7	0.1	Negligible
H1	8.5	33.7	33.7	33.8	0.1	Negligible
H1	12	32.9	32.9	32.9	<0.1	Negligible
H2	1.5	39.3	39.5	39.6	0.1	Negligible
H2	5	36.5	36.6	36.7	0.1	Negligible
H2	8.5	34.4	34.4	34.5	0.1	Negligible
H2	12	33.5	33.5	33.5	<0.1	Negligible
H2	15.5	33.0	33.1	33.1	<0.1	Negligible
H2	19	32.8	32.8	32.8	<0.1	Negligible
H3	1.5	40.3	40.5	40.6	0.1	Negligible
H3	5	36.9	37.0	37.1	0.1	Negligible
H3	8.5	35.1	35.1	35.2	0.1	Negligible
H4	1.5	41.3	41.5	41.6	0.1	Negligible
H4	5	38.1	38.2	38.2	<0.1	Negligible
H4	8.5	35.8	35.9	35.9	<0.1	Negligible
H5	1.5	51.0	51.2	51.3	0.1	Negligible
H5	5	42.7	42.8	42.9	0.1	Negligible
H5	8.5	37.0	37.0	37.1	0.1	Negligible
H5	12	34.7	34.7	34.7	<0.1	Negligible
H6	8	37.8	37.9	37.9	<0.1	Negligible
H6	11.5	35.0	35.0	35.0	<0.1	Negligible
H6	15	33.8	33.8	33.8	<0.1	Negligible
H6	18.5	33.2	33.2	33.2	<0.1	Negligible
H6	22	32.8	32.8	32.8	<0.1	Negligible
H6	25.5	32.6	32.6	32.6	<0.1	Negligible
H6	30	32.4	32.4	32.4	<0.1	Negligible
H7	1.5	48.7	48.9	48.9	<0.1	Negligible
H7	5	42.0	42.1	42.1	<0.1	Negligible
H7	8.5	36.9	36.9	37.0	0.1	Negligible
H7	12	34.6	34.7	34.7	<0.1	Negligible

ID	Height (m)	Base 2018 NO_2 (µg/m^3)	DM 2028 NO_2 (µg/m^3)	DS 2028 NO_2 (µg/m^3)	Change (DS - DM)	Impact descriptor
H7	15.5	33.6	33.6	33.6	<0.1	Negligible
H7	19	33.1	33.1	33.1	<0.1	Negligible
H7	22.5	32.7	32.7	32.7	<0.1	Negligible
H7	26	32.5	32.5	32.5	<0.1	Negligible
H7	29.5	32.4	32.4	32.4	<0.1	Negligible
H8	1.5	46.7	46.8	46.8	<0.1	Negligible
H8	5	41.2	41.2	41.2	<0.1	Negligible
H8	8.5	36.7	36.7	36.7	<0.1	Negligible
H9	1.5	37.2	37.3	37.4	0.1	Negligible
H9	5	35.5	35.6	35.6	<0.1	Negligible
H10	1.5	40.4	40.5	40.5	<0.1	Negligible
H10	5	37.2	37.3	37.3	<0.1	Negligible
H10	8.5	34.8	34.9	34.9	<0.1	Negligible
H11	5	37.5	37.6	37.6	<0.1	Negligible
H11	8.5	34.8	34.8	34.8	<0.1	Negligible
H11	12	33.7	33.7	33.8	0.1	Negligible
H12	5	39.5	39.5	39.6	0.1	Negligible
H12	8.5	35.5	35.5	35.5	<0.1	Negligible
H12	12	34.1	34.1	34.1	<0.1	Negligible
H13	5	37.7	37.7	37.7	<0.1	Negligible
H13	8.5	34.3	34.3	34.3	<0.1	Negligible
H14	0	36.0	36.1	36.2	0.1	Negligible
H14	3.5	35.3	35.4	35.5	0.1	Negligible
H14	7	34.4	34.5	34.5	<0.1	Negligible
H15	1.5	40.3	40.5	40.7	0.2	Slight adverse
H15	5	36.6	36.7	36.8	0.1	Negligible
H16	1.5	48.1	48.3	48.3	<0.1	Negligible
H16	5	38.6	38.7	38.7	<0.1	Negligible
H17	1.5	47.4	47.4	47.4	<0.1	Negligible
H17	5	40.9	40.9	40.9	<0.1	Negligible
H17	8.5	36.0	36.1	36.1	<0.1	Negligible
FH1	1.5	41.8	42.0	42.1	0.1	Negligible
FH1	5	38.6	38.7	38.8	0.1	Negligible
FH1	8.5	36.1	36.1	36.2	0.1	Negligible
FH1	12	34.6	34.7	34.7	<0.1	Negligible
FH1	15.5	33.7	33.8	33.8	<0.1	Negligible
FH1	19	33.2	33.2	33.2	<0.1	Negligible
FH1	22.5	32.8	32.8	32.8	<0.1	Negligible
FH1	26	32.5	32.5	32.6	0.1	Negligible

ID	Height (m)	Base 2018 NO_2 (µg/m^3)	DM 2028 NO_2 (µg/m^3)	DS 2028 NO_2 (µg/m^3)	Change (DS - DM)	Impact descriptor
FH2	1.5	40.1	40.3	40.4	0.1	Negligible
FH2	5	37.1	37.2	37.3	0.1	Negligible
FH2	8.5	34.9	35.0	35.0	<0.1	Negligible
FH2	12	34.0	34.0	34.0	<0.1	Negligible
FH2	15.5	33.4	33.4	33.4	<0.1	Negligible
FH2	19	33.0	33.0	33.0	<0.1	Negligible
FH2	22.5	32.7	32.7	32.8	0.1	Negligible
FH2	26	32.5	32.5	32.5	<0.1	Negligible
FH3	1.5	45.4	45.6	45.6	<0.1	Negligible
FH3	5	39.5	39.6	39.7	0.1	Negligible
FH3	8.5	36.0	36.1	36.1	<0.1	Negligible
FH3	12	34.5	34.5	34.5	<0.1	Negligible
FH3	15.5	33.6	33.6	33.6	<0.1	Negligible
FH3	19	33.1	33.1	33.1	<0.1	Negligible
FH3	22.5	32.8	32.8	32.8	<0.1	Negligible
FH3	26	32.5	32.5	32.5	<0.1	Negligible
FH4	1.5	40.0	40.3	40.4	0.1	Negligible
FH4	5	36.7	36.8	36.9	0.1	Negligible
FH4	8.5	34.5	34.5	34.6	0.1	Negligible
FH4	12	33.6	33.6	33.6	<0.1	Negligible
FH4	15.5	33.1	33.1	33.1	<0.1	Negligible
FH4	19	32.8	32.8	32.8	<0.1	Negligible
FH4	22.5	32.6	32.6	32.6	<0.1	Negligible
FH4	26	32.5	32.5	32.5	<0.1	Negligible

B9.2 Model results for PM_{10}

B9.2.1 The predicted annual mean concentrations of PM_{10} for the operational scenario at each receptor are given in Table 25.

Table 25: Predicted annual mean PM_{10} concentrations for the operational traffic assessment

ID	Height (m)	Base 2018 PM_{10} (µg/m^3)	DM 2028 PM_{10} (µg/m^3)	DS 2028 PM_{10} (µg/m^3)	Change (DS - DM)	Impact descriptor
H1	1.5	19.7	19.8	19.8	<0.1	Negligible
H1	5	19.3	19.3	19.3	<0.1	Negligible
H1	8.5	19.1	19.1	19.1	<0.1	Negligible
H1	12	19.0	19.0	19.0	<0.1	Negligible
H2	1.5	19.5	19.5	19.6	0.1	Negligible
H2	5	19.3	19.3	19.3	<0.1	Negligible
H2	8.5	19.1	19.1	19.1	<0.1	Negligible

ID	Height (m)	Base 2018 PM_{10} (μg/m^3)	DM 2028 PM_{10} (μg/m^3)	DS 2028 PM_{10} (μg/m^3)	Change (DS - DM)	Impact descriptor
H2	12	19.0	19.0	19.0	<0.1	Negligible
H2	15.5	19.0	19.0	19.0	<0.1	Negligible
H2	19	19.0	19.0	19.0	<0.1	Negligible
H3	1.5	19.6	19.6	19.6	<0.1	Negligible
H3	5	19.3	19.3	19.3	<0.1	Negligible
H3	8.5	19.1	19.2	19.2	<0.1	Negligible
H4	1.5	19.6	19.6	19.6	<0.1	Negligible
H4	5	19.3	19.4	19.4	<0.1	Negligible
H4	8.5	19.2	19.2	19.2	<0.1	Negligible
H5	1.5	20.3	20.3	20.3	<0.1	Negligible
H5	5	19.7	19.7	19.7	<0.1	Negligible
H5	8.5	19.3	19.3	19.3	<0.1	Negligible
H5	12	19.1	19.1	19.1	<0.1	Negligible
H6	8	19.3	19.3	19.3	<0.1	Negligible
H6	11.5	19.1	19.1	19.1	<0.1	Negligible
H6	15	19.1	19.1	19.1	<0.1	Negligible
H6	18.5	19.0	19.0	19.0	<0.1	Negligible
H6	22	19.0	19.0	19.0	<0.1	Negligible
H6	25.5	19.0	19.0	19.0	<0.1	Negligible
H6	30	19.0	19.0	19.0	<0.1	Negligible
H7	1.5	20.1	20.1	20.1	<0.1	Negligible
H7	5	19.6	19.6	19.6	<0.1	Negligible
H7	8.5	19.3	19.3	19.3	<0.1	Negligible
H7	12	19.1	19.1	19.1	<0.1	Negligible
H7	15.5	19.0	19.0	19.0	<0.1	Negligible
H7	19	19.0	19.0	19.0	<0.1	Negligible
H7	22.5	19.0	19.0	19.0	<0.1	Negligible
H7	26	19.0	19.0	19.0	<0.1	Negligible
H7	29.5	19.0	19.0	19.0	<0.1	Negligible
H8	1.5	20.1	20.1	20.1	<0.1	Negligible
H8	5	19.6	19.6	19.6	<0.1	Negligible
H8	8.5	19.3	19.3	19.3	<0.1	Negligible
H9	1.5	19.3	19.3	19.3	<0.1	Negligible
H9	5	19.2	19.2	19.2	<0.1	Negligible
H10	1.5	19.6	19.6	19.6	<0.1	Negligible
H10	5	19.3	19.3	19.3	<0.1	Negligible
H10	8.5	19.1	19.1	19.1	<0.1	Negligible
H11	5	19.3	19.3	19.4	0.1	Negligible
H11	8.5	19.1	19.1	19.1	<0.1	Negligible
H11	12	19.1	19.1	19.1	<0.1	Negligible

ID	Height (m)	Base 2018 PM_{10} (µg/m^3)	DM 2028 PM_{10} (µg/m^3)	DS 2028 PM_{10} (µg/m^3)	Change (DS - DM)	Impact descriptor
H12	5	19.5	19.5	19.5	<0.1	Negligible
H12	8.5	19.2	19.2	19.2	<0.1	Negligible
H12	12	19.1	19.1	19.1	<0.1	Negligible
H13	5	19.4	19.4	19.4	<0.1	Negligible
H13	8.5	19.1	19.1	19.1	<0.1	Negligible
H14	0	19.2	19.2	19.2	<0.1	Negligible
H14	3.5	19.2	19.2	19.2	<0.1	Negligible
H14	7	19.1	19.1	19.1	<0.1	Negligible
H15	1.5	19.6	19.6	19.7	0.1	Negligible
H15	5	19.3	19.3	19.3	<0.1	Negligible
H16	1.5	20.3	20.3	20.3	<0.1	Negligible
H16	5	19.4	19.4	19.4	<0.1	Negligible
H17	1.5	20.2	20.2	20.2	<0.1	Negligible
H17	5	19.6	19.6	19.6	<0.1	Negligible
H17	8.5	19.2	19.2	19.2	<0.1	Negligible
FH1	1.5	19.6	19.6	19.6	<0.1	Negligible
FH1	5	19.4	19.4	19.4	<0.1	Negligible
FH1	8.5	19.2	19.2	19.2	<0.1	Negligible
FH1	12	19.1	19.1	19.1	<0.1	Negligible
FH1	15.5	19.0	19.1	19.1	<0.1	Negligible
FH1	19	19.0	19.0	19.0	<0.1	Negligible
FH1	22.5	19.0	19.0	19.0	<0.1	Negligible
FH1	26	19.0	19.0	19.0	<0.1	Negligible
FH2	1.5	19.6	19.6	19.6	<0.1	Negligible
FH2	5	19.3	19.3	19.3	<0.1	Negligible
FH2	8.5	19.1	19.1	19.2	0.1	Negligible
FH2	12	19.1	19.1	19.1	<0.1	Negligible
FH2	15.5	19.0	19.0	19.0	<0.1	Negligible
FH2	19	19.0	19.0	19.0	<0.1	Negligible
FH2	22.5	19.0	19.0	19.0	<0.1	Negligible
FH2	26	19.0	19.0	19.0	<0.1	Negligible
FH3	1.5	20.0	20.0	20.0	<0.1	Negligible
FH3	5	19.5	19.5	19.5	<0.1	Negligible
FH3	8.5	19.2	19.2	19.2	<0.1	Negligible
FH3	12	19.1	19.1	19.1	<0.1	Negligible
FH3	15.5	19.0	19.0	19.0	<0.1	Negligible
FH3	19	19.0	19.0	19.0	<0.1	Negligible
FH3	22.5	19.0	19.0	19.0	<0.1	Negligible
FH3	26	19.0	19.0	19.0	<0.1	Negligible
FH4	1.5	19.6	19.6	19.6	<0.1	Negligible

ID	Height (m)	Base 2018 PM_{10} ($\mu g/m^3$)	DM 2028 PM_{10} ($\mu g/m^3$)	DS 2028 PM_{10} ($\mu g/m^3$)	Change (DS - DM)	Impact descriptor
FH4	5	19.3	19.3	19.3	<0.1	Negligible
FH4	8.5	19.1	19.1	19.1	<0.1	Negligible
FH4	12	19.0	19.0	19.0	<0.1	Negligible
FH4	15.5	19.0	19.0	19.0	<0.1	Negligible
FH4	19	19.0	19.0	19.0	<0.1	Negligible
FH4	22.5	19.0	19.0	19.0	<0.1	Negligible
FH4	26	19.0	19.0	19.0	<0.1	Negligible

B9.3 Model results for $PM_{2.5}$

B9.3.1 The predicted annual mean concentrations of $PM_{2.5}$ for the operational scenario at each receptor are given in Table 26.

Table 26: Predicted annual mean $PM_{2.5}$ concentrations for the operational traffic assessment

ID	Height (m)	Base 2018 $PM_{2.5}$ ($\mu g/m^3$)	DM 2028 $PM_{2.5}$ ($\mu g/m^3$)	DS 2028 $PM_{2.5}$ ($\mu g/m^3$)	Change (DS - DM)	Impact descriptor
H1	1.5	13.2	13.2	13.2	<0.1	Negligible
H1	5	12.9	12.9	12.9	<0.1	Negligible
H1	8.5	12.8	12.8	12.8	<0.1	Negligible
H1	12	12.8	12.8	12.8	<0.1	Negligible
H2	1.5	13.1	13.1	13.1	<0.1	Negligible
H2	5	12.9	12.9	13.0	0.1	Negligible
H2	8.5	12.8	12.8	12.8	<0.1	Negligible
H2	12	12.8	12.8	12.8	<0.1	Negligible
H2	15.5	12.8	12.8	12.8	<0.1	Negligible
H2	19	12.8	12.8	12.8	<0.1	Negligible
H3	1.5	13.1	13.1	13.1	<0.1	Negligible
H3	5	12.9	13.0	13.0	<0.1	Negligible
H3	8.5	12.9	12.9	12.9	<0.1	Negligible
H4	1.5	13.1	13.1	13.1	<0.1	Negligible
H4	5	13.0	13.0	13.0	<0.1	Negligible
H4	8.5	12.9	12.9	12.9	<0.1	Negligible
H5	1.5	13.6	13.6	13.6	<0.1	Negligible
H5	5	13.2	13.2	13.2	<0.1	Negligible
H5	8.5	12.9	12.9	12.9	<0.1	Negligible
H5	12	12.8	12.8	12.8	<0.1	Negligible
H6	8	13.0	13.0	13.0	<0.1	Negligible
H6	11.5	12.9	12.9	12.9	<0.1	Negligible
H6	15	12.8	12.8	12.8	<0.1	Negligible
H6	18.5	12.8	12.8	12.8	<0.1	Negligible

ID	Height (m)	Base 2018 $PM_{2.5}$ (µg/m^3)	DM 2028 $PM_{2.5}$ (µg/m^3)	DS 2028 $PM_{2.5}$ (µg/m^3)	Change (DS - DM)	Impact descriptor
H6	22	12.8	12.8	12.8	<0.1	Negligible
H6	25.5	12.7	12.7	12.7	<0.1	Negligible
H6	30	12.7	12.7	12.7	<0.1	Negligible
H7	1.5	13.5	13.5	13.5	<0.1	Negligible
H7	5	13.2	13.2	13.2	<0.1	Negligible
H7	8.5	12.9	12.9	12.9	<0.1	Negligible
H7	12	12.8	12.8	12.8	<0.1	Negligible
H7	15.5	12.8	12.8	12.8	<0.1	Negligible
H7	19	12.8	12.8	12.8	<0.1	Negligible
H7	22.5	12.8	12.8	12.8	<0.1	Negligible
H7	26	12.7	12.7	12.7	<0.1	Negligible
H7	29.5	12.7	12.7	12.7	<0.1	Negligible
H8	1.5	13.4	13.4	13.4	<0.1	Negligible
H8	5	13.1	13.1	13.1	<0.1	Negligible
H8	8.5	12.9	12.9	12.9	<0.1	Negligible
H9	1.5	13.0	13.0	13.0	<0.1	Negligible
H9	5	12.9	12.9	12.9	<0.1	Negligible
H10	1.5	13.1	13.1	13.1	<0.1	Negligible
H10	5	13.0	13.0	13.0	<0.1	Negligible
H10	8.5	12.9	12.9	12.9	<0.1	Negligible
H11	5	13.0	13.0	13.0	<0.1	Negligible
H11	8.5	12.9	12.9	12.9	<0.1	Negligible
H11	12	12.8	12.8	12.8	<0.1	Negligible
H12	5	13.1	13.1	13.1	<0.1	Negligible
H12	8.5	12.9	12.9	12.9	<0.1	Negligible
H12	12	12.8	12.8	12.8	<0.1	Negligible
H13	5	13.0	13.0	13.0	<0.1	Negligible
H13	8.5	12.8	12.8	12.8	<0.1	Negligible
H14	0	12.9	12.9	12.9	<0.1	Negligible
H14	3.5	12.9	12.9	12.9	<0.1	Negligible
H14	7	12.8	12.8	12.8	<0.1	Negligible
H15	1.5	13.1	13.2	13.2	<0.1	Negligible
H15	5	12.9	13.0	13.0	<0.1	Negligible
H16	1.5	13.6	13.6	13.6	<0.1	Negligible
H16	5	13.0	13.0	13.0	<0.1	Negligible
H17	1.5	13.5	13.5	13.5	<0.1	Negligible
H17	5	13.1	13.1	13.1	<0.1	Negligible
H17	8.5	12.9	12.9	12.9	<0.1	Negligible
FH1	1.5	13.2	13.2	13.2	<0.1	Negligible
FH1	5	13.0	13.0	13.0	<0.1	Negligible

ID	Height (m)	Base 2018 $PM_{2.5}$ (µg/m^3)	DM 2028 $PM_{2.5}$ (µg/m^3)	DS 2028 $PM_{2.5}$ (µg/m^3)	Change (DS - DM)	Impact descriptor
FH1	8.5	12.9	12.9	12.9	<0.1	Negligible
FH1	12	12.8	12.8	12.8	<0.1	Negligible
FH1	15.5	12.8	12.8	12.8	<0.1	Negligible
FH1	19	12.8	12.8	12.8	<0.1	Negligible
FH1	22.5	12.8	12.8	12.8	<0.1	Negligible
FH1	26	12.7	12.7	12.7	<0.1	Negligible
FH2	1.5	13.1	13.1	13.1	<0.1	Negligible
FH2	5	13.0	13.0	13.0	<0.1	Negligible
FH2	8.5	12.9	12.9	12.9	<0.1	Negligible
FH2	12	12.8	12.8	12.8	<0.1	Negligible
FH2	15.5	12.8	12.8	12.8	<0.1	Negligible
FH2	19	12.8	12.8	12.8	<0.1	Negligible
FH2	22.5	12.8	12.8	12.8	<0.1	Negligible
FH2	26	12.7	12.7	12.7	<0.1	Negligible
FH3	1.5	13.4	13.4	13.4	<0.1	Negligible
FH3	5	13.1	13.1	13.1	<0.1	Negligible
FH3	8.5	12.9	12.9	12.9	<0.1	Negligible
FH3	12	12.8	12.8	12.8	<0.1	Negligible
FH3	15.5	12.8	12.8	12.8	<0.1	Negligible
FH3	19	12.8	12.8	12.8	<0.1	Negligible
FH3	22.5	12.8	12.8	12.8	<0.1	Negligible
FH3	26	12.7	12.7	12.7	<0.1	Negligible
FH4	1.5	13.1	13.1	13.2	0.1	Negligible
FH4	5	13.0	13.0	13.0	<0.1	Negligible
FH4	8.5	12.8	12.8	12.8	<0.1	Negligible
FH4	12	12.8	12.8	12.8	<0.1	Negligible
FH4	15.5	12.8	12.8	12.8	<0.1	Negligible
FH4	19	12.8	12.8	12.8	<0.1	Negligible
FH4	22.5	12.8	12.8	12.8	<0.1	Negligible
FH4	26	12.7	12.7	12.7	<0.1	Negligible

B10 Air Quality Neutral Assessment

B10.1 Air Quality Neutral assessment results

B10.1.1 The following sections describe the calculation of the benchmarks discussed in the Air Quality Neutral (AQN) assessment method in section B6. The calculation of emissions from the Proposed Development are then compared to these benchmark values.

B10.1.2 In order to assess the Development against the 'air quality neutral' policy, the Total Transport Emissions (TTEs) from the Proposed Development and the emission benchmarks have been calculated. These have been calculated for the main land-use classes. A comparison of the two has then been undertaken to derive the outcome of the assessment and establish whether the TTEs of the Proposed Development are within the benchmark, or, if not, whether on/off site mitigation measures or offsetting may be required.

B10.1.3 Building Emission Benchmarks (BEBs) have not been used as the Proposed Development does not include a combustion plant.

B10.1.4 The land-uses at the Proposed Development are: retail (A1), commercial (B1), living accommodation (C3/4), non-residential institutions (D1) and assembly and leisure (D2).

B10.1.5 The input data for the AQN transport assessment of the Proposed Development are presented in Table 27. These are:

- Gross floor area (GFA) (m2); and
- Development trip rates (trips/m^2/annum).

B10.1.6 The trip generation rates for the Proposed Development were provided by Arup transport consultants.

B10.1.7 The GFA has been based on the Gross Internal Area (GIA) for all land-use types from the area schedule of the Proposed Development.

Table 27: GFA and development trip rates for Proposed Development

Land-use	GFA (m^2)	Number of dwellings	Development trip rates (trips/m^2/annum)
Retail (A1 - A5)	1,730	-	1
Commercial (B1)	350	-	2
Residential (C3 – C4)	-	758	293
Institutional (D1)	553	-	1
Institutional (D2)	395	-	1

B10.1.8 The benchmark trip rates and Transport Emissions Benchmarks (TEB) depend on the location of the site; the Proposed Development is located in the Central Activity Area (CAZ). The CAZ benchmark trip rates for the various land-use classes for the Proposed Development are shown in Table 28 and the corresponding TEB are shown in Table 29.

Table 28: Benchmark trip rates for the Proposed Development

Land-use	Benchmark trip rates (trips/m^2/annum)
Retail (Class A1)	n/a
Commercial (Class B1)	n/a
Residential (Class C3-C4)	n/a
Institutional (Class D1)	0.07
Institutional (Class D2)	5.0

Table 29: TEB for the Proposed Development (g/dwelling/annum or g/m^2/annum)

Land-use	NOx (g/m^2/annum)	PM_{10} (g/dwelling/annum)
Retail (Class A1)	169	29.3
Commercial (Class B1)	1.27	0.22
Residential (Class C3-C4)	234	40.7
Institutional (Class D1)	n/a	n/a
Institutional (Class D2)	n/a	n/a

B10.1.9 The calculated Proposed Development TEB for land-use classes A1, B1, and C3-C4 are shown in Table 30 as kg/annum. The Total Transport Emissions (TTE) have been calculated using the number of residential dwellings; average distance travelled by car per trip and emission factors for CAZ.

Table 30: Calculation of the TTE and TEB for land-use classes A1-A5, B1, and C3-C4 (kg/annum)

Land-use	NOx (kg/annum)		PM_{10} (kg/annum)	
	TTE	TEB	TTE	TEB
Retail (Class A1)	9	292	2	51
Commercial (Class B1)	1	0	0	0
Residential (Class C3 - C4)	403	177	70	31
Total	**413**	**470**	**72**	**82**
Difference (TTE-TBE)	**-57**		**-10**	
Outcome	**Within benchmark**		**Within benchmark**	

B10.1.10 The institutional land-use class (D1 and D2) assessment is based on development trip rates. The benchmark trip rates and development trip rates for land-use classes D1 and D2 are compared in Table 31.

Table 31: Comparison of the benchmark trip rates and the development trip generation rates (trips/m^2/annum) for class D1 and D2

Land-use	Benchmark trip rates (trips/m^2/annum)	Development trip rate (trips/m^2/annum)	Difference (trips/m^2/annum)
Institutional (Class D1)	0.07	1.00	0.9
Institutional (Class D2)	5.00	0.99	-4.0
Total	**5.07**	**1.98**	**-3.09**
Outcome	**Within benchmark**		

B10.2 Summary of Air Quality Neutral Assessment

B10.2.1 The AQN benchmarks for the Proposed Development have been calculated and compared with the planned emissions.

B10.2.2 The total development trip rates (Table 31) and total transport emissions (Table 30) for the land-use classes in the Proposed Development are within the relevant total traffic emissions benchmarks.

B10.2.3 Overall, the AQN assessment complies with the AQN policy and indicates that no further mitigation is required.

B11 Email to EHO

B11.1.1 An email detailing methodology and receptor selection was sent to the WCC Environmental Health Officer (EHO) on 1st October 2019, but no reply was received.

From: [redacted]
[redacted] [redacted]westminster.gov.uk
Cc: [redacted]
Subject: Proposed development - Ebury Bridge Road
Date: 01 October 2019 16:45:15
Attachments: SiteBoundary.JPG
image001.jpg

Hi [redacted],

We are currently working on the air quality section of the Environmental Impact Assessment for the proposed development in Westminster at Ebury Bridge Road. I have attached a JPEG of the redline boundary we are considering.

Our proposed methodology for the air quality assessment is outlined below. We would like to address any comments or queries that you may have at this stage and so would be grateful for your feedback.

- A baseline assessment will be undertaken to determine existing air quality in the area using available findings from the Westminster City Council review and assessment process and data available from London Air and the Defra UK-Air Website;
- Appropriate mitigation measures for construction dust will be deployed, based on the assumption that the site will have a ‘High Risk’ of dust soiling and human health impacts. With the effective implementation of these mitigation measures, the residual effect from construction dust should be “not significant”. In light of this, a qualitative assessment of dust emissions during the construction phase of the development will not be undertaken;
- It is expected that the amount of HGVs travelling to and from the site will exceed the 25 AADT screening criteria as set out in the IAQM planning guidance. As a result, a detailed assessment using dispersion modelling will be undertaken for construction traffic;
- The IAQM criteria for traffic are not expected to be exceeded for operational traffic and therefore an assessment of operational impacts resulting from the proposed development will not be carried out;
- At present, there is on-site energy provision being planned, and hence there may be some combustion processes on site, which will be included in this assessment;
- The GLA’s Air Quality Neutral requirements will be considered for transport emissions, with transport emissions benchmarks for all developments in the Greater London area as part of the Sustainable Design and Construction SPG;
- Mitigation measures will be recommended for both the construction and operational phases, should they be required;
- The phasing for the proposed development is currently under review, but once complete this will be considered in terms of the choice of receptors and assessment scenarios when carrying out the assessments. Cumulative impacts (from the different phases of the development, and other consented developments in the area) will also be considered and included as appropriate; and
- We propose to use meteorological data from Heathrow Airport from 2018 for the assessment.

I would be grateful if you could please send through any comments on the above methodology as soon as possible so that we can commence with our assessment.

Please don't hesitate to contact me if you have any queries.

[redacted]

[redacted]

Arup
[redacted]
www.arup.com