

Report

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TEMPLE

LEADERS IN ENVIRONMENT,
PLANNING & SUSTAINABILITY.

**Report for – UCLH Charity
Middlesex Hospital Annex
Air quality assessment**



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1.0 Introduction

Temple Group Ltd (Temple) has undertaken an air quality assessment for a proposed housing-led mixed-use development at Middlesex Annex, on behalf of University College London Hospitals Charity (UCLHC).

This assessment details the likely receptors and potential effects of the proposed development in regard to air quality. A baseline assessment of local air quality has been undertaken to establish existing and historic air quality conditions at the development site and in the local area. The assessment considers the potential for air quality impacts from the proposed development during construction, from both fugitive dust and construction traffic, and during operation, from operational traffic and fixed plant sources.

2.0 Legislation and policy

2.1 National policy

2.1.1 Air Quality Strategy

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland¹ (AQS) sets the framework for government policy on air quality in the UK. The AQS sets out air quality standards and objectives to be achieved (shown in Table 2.1) and introduces a policy framework for tackling fine particles. In setting air quality objectives, due account was taken of health and socio-economic cost-benefit factors, together with consideration of the practicalities of achieving such targets. Air quality objective levels are set out in legislation in the Air Quality (England) Regulations 2000², as amended³.

Although achievement of air quality objectives is not a statutory requirement, they reflect statutory limits outlined in The Air Quality Standards Regulations 2010⁴, which require the Secretary of State to achieve EU limit values set out in EU Ambient Air Quality Directives^{5 6}.

Table 2.1 Relevant UK air quality objectives for the purpose of the assessment

Pollutant	Air quality objective levels	Measured as	Dates to be achieved and maintained thereafter
Nitrogen dioxide (NO ₂)	200 µg/m ³ , not to be exceeded more than 18 times per year	1-hour mean	31 December 2005
	40 µg/m ³	Annual mean	31 December 2005
Particles (PM ₁₀)	50 µg/m ³ , not to be exceeded more than 35 times per year	24-hour mean	31 December 2004
	40 µg/m ³	Annual mean	31 December 2004

2.1.2 The Environment Act 1995

The Environment Act 1995⁷, specifically Sections 82-84, requires all local authorities to carry out periodic reviews of air quality within their administrative areas. This review and assessment process now follows a phased approach, whereby local authorities only undertake a level of assessment that is commensurate with the risk of an air quality objective

1 Department of the Environment, Food and Rural Affairs, et al, 2007, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Volume 1 s.l, s.n.

2 The Air Quality (England) Regulations 2000 (2000 No. 928)

3 The Air Quality (England) (Amendment) Regulations 2002 (2002 No. 3043)

4 The Air Quality Standards Regulations 2010, (2010 No. 1001). London: HMSO.

5 The European Parliament and the Council of the European Union, 2008, Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air and cleaner air for Europe. Official Journal of the European Union L152/2 11.6.2008.

6 The European Parliament and the Council of the European Union, 2004, Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air. (Fourth Daughter Directive). Official Journal of the European Union L23/3 26.1.2005.

7 Environment Act 1995, Part IV Air Quality.

being exceeded. The aim of this review process is to assess whether the AQS objectives are likely to be achieved. Areas where objectives are likely to be exceeded are to be declared air quality management areas (AQMAs) by the local authorities.

2.1.3 The Clean Air Act 1993

The Clean Air Act 1993⁸ controls small combustion plants under 20MW net rated thermal input. Plants above 366kW total input require the local authority to approve the chimney height.

2.1.4 National Planning Policy Framework and Planning Practice Guidance

The National Planning Policy Framework (NPPF)⁹ was published on the 27th March 2012. Paragraph 124 of the NPPF states, *“Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new Development in Air Quality Management Areas is consistent with the local air quality action plan.”*

The Planning Practice Guidance (PPG)¹⁰ supports the NPPF and was first published online in 2014. It *“provides guiding principles on how planning can take into account the impact of new development on air quality”*. This guidance highlights the role of the local air quality management (LAQM) regime in pursuing national air quality objectives and its implications for planning. It also includes recommendations on how detailed an air quality assessment should be or how impacts on air quality can be mitigated.

2.2 Regional and local policy

2.2.1 The London Plan

The London Plan¹¹ defines the spatial development strategy for strategic planning in Greater London. It deals with issues that are of strategic importance to Greater London. Policy 7.14 (A) states:

“The Mayor recognises the importance of tackling air pollution and improving air quality to London’s development and the health and wellbeing of its people. He will work with strategic partners to ensure that the spatial, climate change, transport and design policies of this plan support implementation of his Air Quality and Transport strategies to achieve reductions in pollutant emissions and minimize public exposure to pollution.”

The London Plan provides a broad overarching policy for authorities in Greater London and provides a basis and direction for local policies. Regarding planning decisions, Policy 7.14 (B) states:

“Development proposals should:

⁸ Clean Air Act 1993, Chapter 11.

⁹ National Planning Policy Framework (2012), DCLG.

¹⁰ Planning Practice Guidance (PPG) – Air Quality, (2014), DCLG. Online guidance available at: <http://planningguidance.communities.gov.uk/blog/guidance/air-quality/>

¹¹ Greater London Authority, 2015, The London Plan: The Spatial Development Strategy for Greater London Consolidated with Alterations since 2011, Greater London Authority, London.

“a) minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3)

“b) promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils’ ‘The control of dust and emissions from construction and demolition’ [now superseded by planning guidance in the GLA and London Councils’ ‘The control of dust and emissions during construction and demolition’

“c) be at least ‘air quality neutral’ and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAs))

“d) ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches

“e) where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations. Permission should only be granted if no adverse air quality impacts from the biomass boiler are identified.”

The London Plan Sustainable Design and Construction Supplementary Planning Guidance (SD&C SPG)¹² includes guidance on how boroughs can take forward the ‘air-quality-neutral’ approach set out in the London Plan. It identifies emission benchmarks that have been produced for buildings’ operation and for transport across London, based on the latest technology. The Air Quality Neutral Planning Support document¹³, produced by Air Quality Consultants and Environ, further defines these emission benchmarks.

2.2.2 The London Air Quality Strategy

The current version of the Mayor’s Air Quality Strategy (MAQS)¹⁴ was published in 2010. Its overarching objective is *“to reduce air pollution in London so that the health of Londoners is improved [by achieving] the European Union (EU) air quality limit values as soon as possible. This will also achieve compliance with nationally prescribed air quality standards and objectives, as required by the GLA Act.”*

This strategy commits to the continuation of measures to improve air quality identified in the 2002 MAQS and sets out thirteen policy measures including:

- *“Promoting technological change and cleaner vehicles;*
- *“Reducing emissions from construction and demolition sites;*

¹² Greater London Authority, 2014, Sustainable Design and Construction, The London Plan Supplementary Planning Guidance, Greater London Authority, London.

¹³ Air Quality Consultants, Environ. 2013. Air Quality Neutral Planning Support: GLA 80371

¹⁴ Cleaning the Air – The Mayor’s Air Quality Strategy. 2010.

- *“Energy efficient buildings;*
- *“Encouraging innovation; and*
- *“Monitoring progress and reporting.”*

2.2.3 Camden planning policy

Camden Council’s adopted planning documents include policies relevant to air quality.

The Core Strategy was adopted in November 2010¹⁵. Policy CS16 states:

“The Council will seek to improve health and well-being in Camden. We will:

“...

“e) recognise the impact of poor air quality on health and implement Camden’s Air Quality Action Plan which aims to reduce air pollution levels.”

Camden’s development policy DP32 (air quality and Camden’s Clear Zone) states:

“The Council will require air quality assessments where development could potentially cause significant harm to air quality.

“Mitigation measures will be expected in developments that are located in areas of poor air quality. The Council will also only grant planning permission for development in the Clear Zone region that significantly increases travel demand where it considers that appropriate measures to minimise the transport impact of development are incorporated. We will use planning conditions and legal agreements to secure Clear Zone measures to avoid, remedy or mitigate the impacts of development schemes in the Central London Area.”

Camden Council’s *Camden Planning Guidance (CPG) 6 Amenity*¹⁶ sets out when an air quality assessment is required and the elements required to be set out within an air quality assessment.

The Council’s Local Plan has not been adopted at the time of this assessment.

2.2.4 London Borough of Camden Air Quality Action Plan

Following the designation of the whole of the borough of Camden as an AQMA, the Council published an air quality action plan (AQAP) in 2002 to promote better air quality conditions within the Borough. The current AQAP¹⁷ covers the period 2016-18. It details initiatives that Camden Council will deliver to improve air quality.

The key objectives of the AQAP are to:

- *“Encourage reductions in fossil fuel use, the adoption of clean fuels and low emission technology and promote energy efficiency.*
- *“Raise awareness about air quality in Camden and promote lifestyle changes which can help reduce levels of air pollution and minimise exposure to air pollution.*
- *“Improve the health and well-being of the local population, including those that work and visit Camden.*

¹⁵ Camden Council. 2010. Camden Development Policies (adoption version). Camden Local Development Framework

¹⁶ Camden Council (undated). Camden Planning Guidance: CPG6 Amenity. Available at <http://www.camden.gov.uk/ccm/content/environment/planning-and-built-environment/two/planning-policy/supplementary-planning-documents/camden-planning-guidance.en> (site accessed 8/12/2016)

¹⁷ Camden Council (2016), Camden’s Clean Air Action Plan 2016-2018

- *“Work in partnership with national and regional bodies, and with local public and private organisations, to foster and drive improvements in air quality.*
- *“Lead by example and reduce NO₂ and PM₁₀ emissions associated with the Council’s own buildings and transport services.*
- *“Ensure actions which serve to reduce NO₂ and PM₁₀ emissions complement actions to mitigate CO₂ emissions.”*

The AQAP has actions relating to:

- monitoring air quality in Camden;
- reducing emissions from buildings and new developments;
- reducing emissions from transport;
- raising awareness of air quality; and
- lobbying and partnership working.

2.3 Technical standards and guidance

2.3.1 Land-Use Planning & Development Control: Planning for Air Quality

Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have developed a procedure for assessing the significance of changes in traffic volume on local air quality in their guidance document, ‘*Land-Use Planning & Development Control: Planning for Air Quality*’¹⁸. The procedure is designed to assess potential impacts resulting from changes in road use, including realignment, expansion and increased traffic flow. It can also be used to assess the potential air quality impacts of future CHP or boilers. An assessment of impacts from the development has been carried out in accordance with the EPUK methodology.

2.3.2 Guidance on the Assessment of Dust from Construction and Demolition

The IAQM has produced guidance on the assessment of air quality impacts from construction activities¹⁹. This guidance provides a framework for assessing the risk of dust effects that may arise and suggests appropriate dust and air emissions mitigation measures for sites according to the level of risk.

The Greater London Authority (GLA) and London Councils produced supplementary planning guidance on controlling dust and emissions during construction and demolition in 2014²⁰. The guidance identifies mitigation measures for a range of different sites. This guidance is widely referred to in assessments of construction impacts in and outside London.

¹⁸ Moorcroft and Barrowcliffe. et al. (2015) Land-use Planning & Development Control: Planning for Air Quality. Environmental Protection UK and the Institute of Air Quality Management, London

¹⁹ Holman et al (2014). IAQM Guidance on the assessment of dust from demolition and construction (Version1.1), Institute of Air Quality Management, London.

²⁰ GLA & London Councils (2014), The Control of Dust and Emissions during Construction and Demolition - Supplementary Planning Guidance

2.3.3 Local Air Quality Management: Technical Guidance LAQM.TG(16) / LLAQM.TG(16)

The Defra technical guidance notes LAQM.TG(16)²¹ and LLAQM.TG(16)²² provide guidance to local authorities for undertaking the local review and assessment process.

2.3.4 Sustainable Design and Construction: Supplementary Planning Guidance (GLA)

The London Plan Sustainable Design and Construction Supplementary Planning Guidance (SD&C SPG)²³ includes guidance on how boroughs can take forward the ‘air quality neutral’ approach set out in the London Plan. It identifies emission benchmarks that have been produced for buildings’ operation and for transport across London, based on the latest technology. The Air Quality Neutral Planning Support document²⁴, produced by Air Quality Consultants and Environ, further defines these emission benchmarks.

²¹ Department for Environment, Food and Rural Affairs. 2016. Local Air Quality Management: Technical Guidance LAQM.TG(16)

²² Department for Environment, Food and Rural Affairs. 2016. London Local Air Quality Management: Technical Guidance LLAQM.TG(16)

²³ Greater London Authority, 2014, Sustainable Design and Construction, The London Plan Supplementary Planning Guidance, Greater London Authority, London.

²⁴ Air Quality Consultants, Environ. 2013. Air Quality Neutral Planning Support: GLA 80371

3.0 Method

3.1 Air quality assessment method for roads and boilers

Road traffic is a primary source of emissions to air. The combustion of fuel in vehicles leads to a number of harmful by-products which can affect air quality in the vicinity of roads. Areas with high traffic volumes or near to major roads often experience elevated pollutant levels, particularly in the form of nitrogen dioxide (NO₂) and fine particles (PM₁₀). Stationary sources, such as boilers and CHP plant, can also be important.

The preliminary scoping stage of the EPUK guidance¹⁸ involves the identification of impacts of the local area on the development. This takes into account any potential exposure that future residents or users may experience as a result of emissions from the locality. Background and future baseline air quality are taken into account, and the presence and proximity of AQMAs, heavily-trafficked roads and any other sources of odour or dust are used as indicators of exceedances.

The impact of the development on the local area is also identified. This is undertaken in two stages. The first stage details simple criteria to scope out small developments. The Stage 1 criteria are:

“A) If any of the following apply:

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

“B) coupled with any of the following:

- *“the development has more than 10 parking spaces;*
- *“the development will have a centralised energy facility or other centralised combustion process.”*

If the criteria under both A) and B) are not met then there is no requirement to carry out an air quality assessment for the impact of the development on the local area, and the impacts can be considered to have insignificant effects.

The second stage provides more guidance on whether an air quality assessment is likely to be required to assess the impacts of a development on the local area. If criteria are met, this assessment may be required to be either a simple assessment or a detailed assessment, but this is not determined by the screening criteria. Criteria include:

- a change in road alignment of five metres or more, within an AQMA;
- light-duty-vehicle (LDV) annual average daily traffic (AADT) flows changing by 100 AADT or more, within or adjacent to an AQMA, or 500 AADT or more elsewhere;
- heavy-duty-vehicle (HDV) flows changing by 25 AADT or more, within or adjacent to an AQMA, or 100 AADT elsewhere;
- inclusion of a combustion process of any size where stack height and location do not allow sufficient dispersion of pollutants.

If none of the criteria in the second stage are triggered there is no requirement to carry out a further air quality assessment for the impact of the development on the local area, and the impacts can be considered to have insignificant effects.

For the proposed development, traffic flows during construction and operation are not expected to meet the trigger criteria above, so no further assessment of traffic has been undertaken. As there is a centralised heating system, the likely air quality impacts of this combustion process have been assessed further.

3.1.1 Pollutants

The potential for impacts from nitrogen dioxide (NO₂), particles (PM₁₀) and dust was considered. For combustion sources, only NO₂ was assessed, as PM₁₀ emissions from boilers are considered negligible. For construction, dust impacts (including consideration of PM₁₀ health effects) were assessed.

3.1.2 Study area

For construction dust, the area considered was in line with the IAQM guidance document¹⁹. For combustion processes, an area extending 250m in each direction from the stack was assessed in order to capture the highest pollutant contributions from the boiler.

3.1.3 Model selection

The EPUK screening assessment criteria and the ADMS-Roads Extra detailed dispersion model were used to assess direct effects from boilers on local air quality during operation.

Background pollution concentrations were taken from the Defra UK Air Quality Archive. Meteorological data for input to the model were taken from London Heathrow.

Concentrations of NO₂ were predicted at a number of locations in the vicinity of the proposed development. The receptors chosen include those that are representative of worst-case exposure locations in the modelled study area.

3.1.4 Assessment scenarios

Predictions of NO₂ have been made for the operational year 2020 with and without the proposed development.

3.2 Significance criteria

The potential impacts of the proposed development have been described and assessed by comparing estimated pollutant concentrations with the air quality objectives (Table 2.1) and appropriate criteria for determining significance.

In addition to the air quality objectives, the EPUK¹⁸ guidance descriptors for magnitude of impact have been used, primarily because they consider effects in terms of the magnitude of change from existing concentrations and also relative to the air quality objectives. The impact magnitudes have been used to determine the significance of effects.

3.2.1 Impact magnitude

The EPUK¹⁸ guidance document provides an example of criteria for describing impacts as a result of a development. In the absence of other specific guidance, it forms the basis for this assessment.

Table 3.1 shows the impact descriptors that take account of the percentage change in concentration relative to the air quality objective and the annual mean concentration at the receptor during the assessment year.

Table 3.1 Air quality impact descriptors for changes to annual mean NO₂ and PM₁₀ concentrations at a receptor

Long-term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2 - 5	6 - 10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76 – 94% of AQAL	Negligible	Slight	Moderate	Moderate
95 – 102% of AQAL	Slight	Moderate	Moderate	Substantial
103 – 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

The overall significance of predicted changes in local air quality, including background pollutant concentrations, has been established through the consideration of the following factors:

- the existing and future air quality in the absence of the development;
- duration (temporary or long term);
- reversibility (reversible or permanent);
- 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.

The impact descriptors used in this air quality assessment relate to the national air quality objectives i.e. the air quality assessment levels used are the air quality objectives, Table 2.1.

3.3 Construction dust assessment method

Potential air emissions from demolition and construction activities, particularly in the form of dust, are an issue in the UK. This is further emphasised in large conurbations such as London, where existing air pollution is already high.

Key sources of air pollution from construction sites include:

- dust created by demolition and crushing activities;
- earth-moving and remediation activities;
- general construction activities, which may include, concrete mixing, cutting, grinding etc. and;
- dust and exhaust emissions from haulage vehicles on site and on local roads.

Given the variability of construction sites and the range of activities undertaken, making an accurate assessment of the dust and air pollutants generated is not always feasible or practicable. Instead, a more qualitative assessment is undertaken to examine potential areas of concern and identify the best practicable means (BPM) for eliminating, minimising and mitigating potential emissions.

The Institute of Air Quality Management's (IAQM) '*Guidance on the assessment of dust from demolition and construction*'¹⁹ and the Greater London Authority (GLA) Supplementary Planning Guidance (SPG) document²⁰ '*The control of dust and emissions from construction and demolition*' provide useful information on managing and mitigating construction dust emissions. These documents have been used as the basis for assessing potential impacts from the proposed development.

This assessment identifies potential works that may generate dust and incorporates a list of appropriate mitigation measures to control them.

3.4 Air-quality-neutral assessment

The GLA Sustainable Design and Construction SPG¹² sets out standards which major developments²⁵ must meet to be considered air quality neutral. Comparison with these standards was made in order to determine whether the proposed development was within the benchmarks required to avoid any increase in emissions across London as a whole, and therefore to be considered air quality neutral. Total building emissions and transport emissions for the appropriate land-use classes have been calculated and compared against the benchmarks.

In addition, the emissions standards set out in the Sustainable Design and Construction SPG were considered, in order to determine whether the boilers within the proposed development will meet the NO_x emission standard of <40 mg NO_x/kWh and if emissions will be compliant with emission standards corresponding to the baseline NO₂ levels in the local area.

²⁵ As defined in the London Plan.

4.0 Baseline conditions

4.1 London Borough of Camden review and assessment information

Camden Council completed its first statutory review and assessment of air quality in 2001. This assessment concluded that the national air quality objectives for carbon monoxide, benzene, 1,3-butadiene, lead and sulphur dioxide were not at risk of being exceeded. It was found that the national air quality objectives for annual mean NO₂ and annual and 24-hour mean PM₁₀ would not be met within Camden by the relevant deadlines.²⁶

In 2000, the Council designated the whole of the London Borough of Camden an air quality management area (AQMA). The proposed development is, therefore, within this designated AQMA.

The fourth round of updating and screening assessments, undertaken by Camden Council in 2009, identified that the borough no longer exceeded the air quality objectives for PM₁₀, but continued to exceed the annual mean objective for NO₂. Subsequent review and assessment and progress reports have confirmed these findings. The most recent report available at the time of writing this document confirmed that the air quality management area should remain in place throughout the borough.²⁷

4.2 Local monitoring

Camden Council and Defra undertake continuous monitoring at a number of locations within the Borough; Westminster City Council also undertakes continuous monitoring nearby. The nearest continuous monitoring locations to the site are as follows:

- Bloomsbury (Camden), approximately 0.8km east of the application site. This monitors NO₂, PM₁₀, PM_{2.5}, SO₂ and O₃ and is an urban background site.
- Euston Road (Camden), approximately 1km north-east of the application site. This monitors NO₂, PM₁₀ and PM_{2.5} and is a roadside site.
- Holborn (Camden), approximately 1.2km east-southeast of the application site. This monitors NO₂ and is a kerbside site.
- Shaftesbury Avenue (Camden), approximately 0.9km south-east of the application site. This monitors NO₂ and PM₁₀ and is a roadside site.
- Oxford Street (Westminster), approximately 1.2km west of the application site. This monitors NO₂ and PM₁₀ and is a kerbside site.
- Marylebone Road (Westminster), approximately 1.2km west-northwest of the application site. This monitors NO_x, PM₁₀, PM_{2.5}, CO, O₃ and SO₂ and is a kerbside site.

The roadside and kerbside monitoring locations above are not representative of the application site, which is some distance away from main roads. The measured concentrations at these sites are well in excess of those anticipated at the application site and include

²⁶ Watson, K, & Lyle P. 2012. Air Quality Updating and Screening Assessment for London Borough of Camden, Camden Council.

²⁷ Lyle P (2014), 2014 Air Quality Progress Report for London Borough of Camden, Camden Council, available from www.camden.gov.uk

substantial exceedances of annual and one-hour NO₂ standards. These sites are not, therefore, considered further in this assessment. Measured concentrations at Bloomsbury are considered broadly representative of likely concentrations at the application site.

Camden Council also monitors NO₂ concentrations using diffusion tubes. The diffusion tubes are located across the borough at roadside and background locations.

The locations of the nearest air quality monitoring sites are shown in Appendix A

Table 4.1 shows monitoring results from the London Bloomsbury urban background automatic monitoring site. The NO₂ annual mean has been exceeded at this monitoring location in recent years; the trend in annual mean NO₂ is downwards in recent years. The NO₂ one-hour mean objective was met in all reported years. The annual and 24-hour PM₁₀ mean objectives have been met at this monitoring location in recent years.

Table 4.1 Annual mean concentrations at Camden Bloomsbury monitoring location

Year	Concentration NO ₂ (µg/m ³)	No of 1-hour exceedences NO ₂	Concentration PM ₁₀ (µg/m ³)	No of 24-hour exceedences PM ₁₀
2011	50	0	23	17
2012	55	1	19	10
2013	51	0	18	3
2014	50 (data capture below 90%)	Data capture below 90%	20	10
2015	48	0	Data capture below 90%	Data capture below 90%
<i>Objective</i>	<i>40</i>	<i>18</i>	<i>40</i>	<i>35</i>

- Note, exceedences of the air quality objectives are shown in **bold**.
- Source: londonair.org.uk

NO₂ diffusion tube results at locations nearest to the site are shown in Table 4.2. The results indicate that NO₂ concentrations have exceeded the annual mean objective (40 µg/m³) in all recent years at Tavistock Gardens. At Wakefield Gardens, the results indicate that NO₂ concentrations have exceeded the annual mean objective in 2011 and 2013. At the time of undertaking the assessment, 2015 data were not available from Camden Council online reports.

Table 4.2 Annual mean NO₂ concentrations at background diffusion tube sites (µg/m³)

Location	Distance from site	2010	2011	2012	2013	2014	NO ₂ Objective
CA10 Tavistock Gardens	760m north-east	52	48	40	49	47	40
CA6 Wakefield Gardens	1.3km north-east	34	46	39	40	36	40

- Note, exceedences of the air quality objectives are shown in **bold**.
- Source: Camden Council Updating and Screening Assessment 2015

The results of roadside NO₂ diffusion tube monitoring at locations nearest to the site are shown in Table 4.3. The results indicate that NO₂ concentrations have exceeded the annual mean objective (40 µg/m³) in all recent years at all the locations.

Table 4.3 Annual mean NO₂ concentrations at roadside diffusion tube sites (µg/m³)

Location	Distance from site	2010	2011	2012	2013	2014	NO ₂ Objective
CA21 – Bloomsbury Street	650m south-east	41	77	72	76	81	40
CA4 – Euston Road	1.3km north-east	82	93	82	108	90	40
CA20 – Brill Place	1.5 north-east	54	51	50	49	52	40

- Note, exceedences of the air quality objectives are shown in **bold**.
- Source: Camden Council Updating and Screening Assessment 2015

4.3 London Atmospheric Emissions Inventory

The LAEI²⁸ and associated pollution maps, produced by the GLA, provide detailed estimates of pollution levels Londonwide. The 2016 update indicates modelled pollutant concentrations for 2013, 2020, 2025 and 2030. Modelled pollutant concentrations corresponding to the facades of the proposed development on Cleveland Street are shown below in Table 4.4. These locations are representative of the highest concentrations for future receptors within the proposed development, due to their proximity to the road.

Table 4.4 Modelled pollution levels at the proposed development, taken from London Atmospheric Emissions Inventory pollution maps (µg/m³)

Pollutant	2013	2020	2025	2030	NO ₂ / PM ₁₀ Objective
NO ₂	49.5	32.7	28.5	27.0	40
NO _x	89.4	47.9	39.3	35.8	N/A
PM ₁₀	28.6	26.3	25.8	25.9	40

4.4 Pollutant background concentrations

Background concentrations of NO_x, NO₂ and PM₁₀ were obtained from Defra's UK Air Quality Archive²⁹ for the 1 km x 1 km grid square for the development, which is located within the grid square 529500, 181500. These background maps are available for each year up to 2030. Background NO_x, NO₂ and PM₁₀ concentrations for 2015, 2018 (the first year of construction) and 2020 (operational year) are shown in Table 4.5.

Table 4.5 Background pollutant concentrations at Proposed Development Location from the UK Air Quality Archive

Pollutant	2015 (µg/m ³)	2018 (µg/m ³)	2020 (µg/m ³)
NO ₂	48.6	43.9	40.8
NO _x	92.3	81.0	73.4
PM ₁₀	22.8	22.0	21.5

²⁸ GLA (2016), London Atmospheric Emissions Inventory 2013.

²⁹ Defra Background mapping data for local authorities – 2013 <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2013>

4.5 Overall baseline

Monitoring data indicate that the annual NO₂ objective is currently likely to be exceeded at roadside locations in the vicinity of the proposed development. LAEI modelled maps indicate that the highest NO₂ concentration at the site is currently predicted to exceed the NO₂ annual mean objective at facades close to Cleveland Road and potentially at other on-site locations. Since emissions from road vehicles are decreasing, due to tighter European emissions standards, NO₂ concentrations at the site are expected to decrease in future years.

According to LAEI maps, the annual NO₂, one-hour mean NO₂, annual PM₁₀ and 24-hour mean PM₁₀ objectives are not likely to be exceeded at the development site once the proposed development becomes operational in 2020. However, according to Defra background maps, the annual NO₂ objective is likely still to be exceeded at the development site in 2020.

5.0 Assessment

5.1 Construction phase

5.1.1 Construction traffic

Construction vehicles entering and leaving the proposed development and plant operating on the site have the potential to contribute to local air pollution, particularly in respect of NO₂ and PM₁₀.

The mean traffic generation over the construction period is expected to be fewer than 25 heavy duty vehicles daily. It is, therefore, anticipated that the impact of construction vehicles entering and leaving the site will be negligible.

5.1.2 Construction dust

Specific management controls will be required to reduce the potential for dust impacts on the adjacent residential and commercial units from the proposed development. The level of dust management required is determined by the outcome of a dust risk assessment; this has been undertaken for the proposed development.

Screening

An assessment of construction dust effects is normally required if there are:

- human receptors within 350 m of the site boundary, or within 50 m of the route used by construction vehicles on a public highway, up to 500 m from the site entrance; or
- ecological receptors within 50 m of the site boundary; or within 50 m of the route used by construction vehicles on a public highway, up to 500 m from the site entrance.

If these criteria are not met, it can be assumed that the level of risk from dust amenity will be negligible and any effects will not be significant.

As human receptors are within 350 m of the site boundary of the proposed development, a dust risk assessment has been undertaken. Ecological receptors are not present within 50 m of the site boundary and have been screened out of this assessment.

Demolition

The dust emission class for demolition has been determined through taking into account the total building volume and type of building material to be demolished.

Approximately 4,200 m² of existing floor area will be demolished. The volume of the building to be demolished will be approximately 12,000 m³; this, combined with the potentially dusty nature of the material for demolition, indicates that the dust emissions class is likely to be small.

Earthworks

The total site area of the proposed development is approximately 3,000 m². According to the British Geological Survey³⁰ the soil material found at the site is sand and gravel, with lenses of silt, clay or peat, which has a potentially moderately dusty nature when dry. The dust emissions class from earthworks is likely to be medium.

Construction

The total building volume to be constructed will be approximately 10,000 m³. Materials with a high potential for dust release, such as concrete and brickwork, will be used on site. Based on this, the emissions category for this activity is likely to be small.

Track-out

Site access and egress is expected to take place to the west of the site. Likely track-out routes from the site will be along Cleveland Street or New Cavendish Street. There will be an estimated maximum of 10 to 20 one-way vehicle movements from the site per day, putting the likely emission magnitude as medium.

Risk of dust impacts

The surrounding area has a high density of residential properties, as well as university buildings. These are considered to have a high sensitivity to dust soiling and health effects. Between 10 and 100 residential properties are located within 20 m of the proposed development.

Using the IAQM guidance, the sensitivity of the surrounding area has been determined for dust soiling effects and health effects. This is shown in Table 5.1. The sensitivity to dust soiling has been found to be high due to the close proximity of residential properties to the site. The sensitivity to health effects has been found to be high for demolition, earthworks and construction operations due to the proximity of residential properties, combined with the predicted 2013 LAEI PM₁₀ background concentration of 28.6 µg/m³.

In order to determine the risk of dust soiling and health effects from track-out, 500 m of the length of the likely site exit route along the public highway has been assessed. The number of high-sensitivity receptors within 20 m of the route is estimated to be greater than 100; therefore the sensitivity to dust soiling and health effects is likely to be high.

Table 5.1 Sensitivity of the surrounding area

Potential impact	Sensitivity of the surrounding area			
	Demolition	Earthworks	Construction	Track-out
Dust soiling	High	High	High	High
Health effects	High	High	High	High

The risk of dust impacts derived from the different on-site activities is shown in Table 5.2.

³⁰ British Geological Survey – Geology of Britain viewer. Available at: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

Table 5.2 Summary – Dust risk from site activities

Potential impact	Risk of dust impacts			
	Demolition	Earthworks	Construction	Track-out
Dust soiling	Medium	Medium	Low	Medium
Health effects	Medium	Medium	Low	Medium

The overall dust risk from the site is medium for dust soiling effects and medium for health effects, due to the scale of operations and high density of sensitive receptors in the surrounding area, combined with the high ambient concentration of PM₁₀.

All activities have the potential to give rise to disamenity dust and health effects. Common disamenity dust effects may include the soiling of neighbouring windows, cars and road signs.

Mitigation measures will help to negate some of the potentially negative air quality impacts resulting from the proposed development and will avoid significant dust effects. This is further discussed in Section 7.1.

5.2 Operational phase

5.2.1 Operational traffic

The proposed development will be car-free and controlled parking zones are in operation in the surrounding area. Traffic associated with the operation of the proposed development is not expected to meet the criteria for further assessment in Section 3.1 and impacts will therefore be negligible.

5.2.2 Boiler emissions

The dispersion of emissions from two boiler stacks within the proposed development has been modelled with ADMS-Roads Extra, in order to determine the impact of the boiler plant on local ambient concentrations of nitrogen dioxide at selected sensitive receptors. The effect of potential building downwash has been included by incorporating building downwash into the model runs. Building dimensions of the proposed development and surrounding relevant buildings have been integrated into the model. Due to the proposed development's having uneven roof heights and the ADMS software's being unable to model irregular building shapes, the building has been split into ten separate rectangular buildings for modelling purposes; these are included in Table 5.3.

Table 5.3 Building dimension inputs.

Building number	Coordinates	Height (m)	Length / Diameter (m)	Width (m)	Angle (*)
Building 1 (Main north tower)	529279.8 / 181839.8	24	35.6	18.0	55
Building 2	529277.3 / 181790.9	12	21.1	5.8	55

(South house)					
Building 3 (West house)	529252.8 / 181828.8	12	21.1	5.8	55
Building 4 (Centre house)	529268.6 / 181811.5	14	11.9	25.5	55
Building 5 (Astor College)	529319.1 / 181859.5	24	9.6	59.6	59
Building 6 (Medical research centre)	529268.6 / 181872.2	24	72.4	15.4	57
Building 7 (East block – east building)	529302.8 / 181829.5	14	8.6	24.2	55
Building 8 (East block – west building)	529283.8 / 181816.5	14	8.6	24.2	55
Building 9 (East block – south building)	529297.8 / 181816.5	14	14.2	7.8	55
Building 10 (patio)	529290.9 / 181826.6	6	13.2	16	55

Boiler specifications

The boiler stacks are located on the roof of the main north tower building, and have a height of three metres from the roof, as confirmed by the energy consultant (Arup). The NO_x emission release was assumed to be 50 per cent NO₂. The emission release was chosen as appropriate with reference to the EPUK CHP guidance³¹, which states that the percentage of NO₂ at the point of emission from a combustion process is less than 10 per cent, as the remaining emissions are typically made up of nitric oxide (NO). Between the

³¹ EPUK, 2012, Combined Heat and Power: Air Quality Guidance for Local Authorities

point of emission and receptor locations, further atmospheric reactions may result in the creation of NO₂ from NO. Concentrations of 50 per cent NO₂ have been chosen as a conservative estimate, representative of these further atmospheric reactions.

The details of the boilers modelled in this assessment are shown in Table 5.8, based on specifications provided by the energy consultant. The boilers to be used have not been confirmed, but for this assessment it has been assumed that the boilers will be two Hoval UltraGas 575 units. The percentage loading is based on anticipated energy demand.

Table 5.4 Boiler emissions.

Specifications	Hoval UltraGas 575 x 2
Exhaust volume flow rate	0.244 Nm ³ /h
Exhaust stack diameter	300 mm
Exhaust temperature	71 °C
NOx emission rate	0.0102 g/s
Percentage loading	1.4 %

Table 5.5 shows the modelled monthly boiler load, based on two Hoval UltraGas 575 boilers.

Table 5.5 Modelled boiler load

Month	Equivalent percentage of full load
Jan	2.6%
Feb	2.3%
Mar	2.0%
Apr	1.2%
May	0.8%
Jun	0.7%
Jul	0.7%
Aug	0.7%
Sep	0.7%
Oct	1.0%
Nov	1.7%
Dec	2.2%
Mean	1.4%

Receptors

Sensitive existing receptors, such as residential properties, have been selected where the public is regularly present and likely to be exposed to air pollutants. Sixteen existing residential properties 2 hospitals, 1 school, 1 nursery and 4 receptors at student accommodation have been selected in the vicinity of the proposed development. Results are presented in Table 5.6.

In addition, the floors corresponding to the proposed dwellings in the development to be built have been assessed for their suitability as residential properties when the development is complete and operational. The relevant floor level facades around the proposed development have been assessed. Predicted annual mean pollutant concentrations at these modelled locations are presented in Table 5.7. The meteorological year with the highest NO₂ contributions and impacts (2012) has been reported. The results from all the modelled years have been included in Appendix C.

Table 5.6 Estimated annual mean NO₂ (µg/m³) at existing receptors near to the proposed development.

Recept or Number ³²	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)	Impact descriptor
R1.0	12 Tottenham St, Fitzrovia, London W1T 4RE	Residential	529466, 181843	4.5	40.80	40.80	Negligible
R1.1	12 Tottenham St, Fitzrovia, London W1T 4RE	Residential	529466, 181843	7.5	40.80	40.80	Negligible
R1.2	12 Tottenham St, Fitzrovia, London W1T 4RE	Residential	529466, 181843	10.5	40.80	40.80	Negligible
R1.3	12 Tottenham St, Fitzrovia, London W1T 4RE	Residential	529466, 181843	13.5	40.80	40.80	Negligible
R2.0	168 New Cavendish St, Fitzrovia, London W1W 6YX	Residential	529202, 181841	4.5	40.80	40.80	Negligible
R2.1	168 New Cavendish St, Fitzrovia, London W1W 6YX	Residential	529202, 181841	7.5	40.80	40.80	Negligible
R2.2	168 New Cavendish St, Fitzrovia, London W1W 6YX	Residential	529202, 181841	10.5	40.80	40.80	Negligible
R3.0	56 Maple St, Fitzrovia, London W1T 6HW	Residential	529142, 181948	4.5	40.80	40.80	Negligible
R3.1	56 Maple St, Fitzrovia, London W1T 6HW	Residential	529142, 181948	7.5	40.80	40.80	Negligible
R3.2	56 Maple St, Fitzrovia, London W1T 6HW	Residential	529142, 181948	10.5	40.80	40.80	Negligible
R4.0	18-24 Fitzroy St, Fitzrovia, London W1T 4BN	Student halls	529255, 181998	4.5	40.80	40.80	Negligible
R4.1	18-24 Fitzroy St, Fitzrovia, London W1T 4BN	Student halls	529255, 181998	7.5	40.80	40.80	Negligible
R4.2	18-24 Fitzroy St, Fitzrovia, London W1T 4BN	Student halls	529255, 181998	10.5	40.80	40.80	Negligible
R4.3	18-24 Fitzroy St, Fitzrovia, London W1T 4BN	Student halls	529255, 181998	13.5	40.80	40.80	Negligible

³² Receptors have been named as "Rn.z", where n is the receptor number and z stands for different heights assessed at the same address location .

Recept or Number 32	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)	Impact descriptor
R4.4	18-24 Fitzroy St, Fitzrovia, London W1T 4BN	Student halls	529255, 181998	16.5	40.80	40.80	Negligible
R5.0	54 Whitfield St, Fitzrovia, London W1T 4ER	Nursery	529433, 181904	1.5	40.80	40.80	Negligible
R6.0	66 Charlotte St, Fitzrovia, London W1T 4QF	Residential	529387, 181802	4.5	40.80	40.80	Negligible
R6.1	66 Charlotte St, Fitzrovia, London W1T 4QF	Residential	529387, 181802	7.5	40.80	40.80	Negligible
R6.2	66 Charlotte St, Fitzrovia, London W1T 4QF	Residential	529387, 181802	10.5	40.80	40.80	Negligible
R7.0	Mortimer Market Centre, Mortimer Market, Capper St, Fitzrovia, London WC1E 6JD	Hospital	529447, 182063	1.5	37.07	37.07	Negligible
R7.1	Mortimer Market Centre, Mortimer Market, Capper St, Fitzrovia, London WC1E 6JD	Hospital	529447, 182063	4.5	37.07	37.07	Negligible
R7.2	Mortimer Market Centre, Mortimer Market, Capper St, Fitzrovia, London WC1E 6JD	Hospital	529447, 182063	7.5	37.07	37.07	Negligible
R7.3	Mortimer Market Centre, Mortimer Market, Capper St, Fitzrovia, London WC1E 6JD	Hospital	529447, 182063	10.5	37.07	37.07	Negligible
R7.4	Mortimer Market Centre, Mortimer Market, Capper St, Fitzrovia, London WC1E 6JD	Hospital	529447, 182063	13.5	37.07	37.07	Negligible
R8.0	109-113 Whitfield St, Fitzrovia, London W1T 4HJ	Residential	529294, 182057	4.5	37.07	37.07	Negligible
R8.1	109-113 Whitfield St, Fitzrovia, London W1T 4HJ	Residential	529294, 182057	7.5	37.07	37.07	Negligible
R8.2	109-113 Whitfield St, Fitzrovia, London W1T 4HJ	Residential	529294, 182057	10.5	37.07	37.07	Negligible
R8.3	109-113 Whitfield St, Fitzrovia, London W1T 4HJ	Residential	529294, 182057	13.5	37.07	37.07	Negligible
R9.0	86 Cleveland St, London W1T 6NQ	Residential	529085, 182013	4.5	37.07	37.07	Negligible

Recept or Number 32	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)	Impact descriptor
R9.1	86 Cleveland St, London W1T 6NQ	Residential	529085, 182013	7.5	37.07	37.07	Negligible
R9.2	86 Cleveland St, London W1T 6NQ	Residential	529085, 182013	10.5	37.07	37.07	Negligible
R9.3	86 Cleveland St, London W1T 6NQ	Residential	529085, 182013	13.5	37.07	37.07	Negligible
R10.0	Foley St, Fitzrovia, London W1W 7JJ	School	529243, 181765	1.5	40.80	40.80	Negligible
R10.1	Foley St, Fitzrovia, London W1W 7JJ	School	529243, 181765	4.5	40.80	40.80	Negligible
R10.2	Foley St, Fitzrovia, London W1W 7JJ	School	529243, 181765	7.5	40.80	40.80	Negligible
R11.0	25 Cleveland St, Fitzrovia, London W1T 4AJ	Hospital	529283, 181735	1.5	40.80	40.80	Negligible
R11.1	25 Cleveland St, Fitzrovia, London W1T 4AJ	Hospital	529283, 181735	4.5	40.80	40.80	Negligible
R11.2	25 Cleveland St, Fitzrovia, London W1T 4AJ	Hospital	529283, 181735	7.5	40.80	40.80	Negligible
R11.3	25 Cleveland St, Fitzrovia, London W1T 4AJ	Hospital	529283, 181735	10.5	40.80	40.80	Negligible
R11.4	25 Cleveland St, Fitzrovia, London W1T 4AJ	Hospital	529283, 181735	13.5	40.80	40.80	Negligible
R11.5	25 Cleveland St, Fitzrovia, London W1T 4AJ	Hospital	529283, 181735	16.5	40.80	40.80	Negligible
R11.6	25 Cleveland St, Fitzrovia, London W1T 4AJ	Hospital	529283, 181735	19.5	40.80	40.80	Negligible
R11.7	25 Cleveland St, Fitzrovia, London W1T 4AJ	Hospital	529283, 181735	22.5	40.80	40.80	Negligible
R11.8	25 Cleveland St, Fitzrovia, London W1T 4AJ	Hospital	529283, 181735	25.5	40.80	40.80	Negligible
R12.0	43-45 Charlotte St, Fitzrovia, London W1T 1RS	Residential	529449, 181678	4.5	40.80	40.80	Negligible
R12.1	43-45 Charlotte St, Fitzrovia, London W1T 1RS	Residential	529449, 181678	7.5	40.80	40.80	Negligible

Recept or Number 32	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)	Impact descriptor
R12.2	43-45 Charlotte St, Fitzrovia, London W1T 1RS	Residential	529449, 181678	10.5	40.80	40.80	Negligible
R12.3	43-45 Charlotte St, Fitzrovia, London W1T 1RS	Residential	529449, 181678	13.5	40.80	40.80	Negligible
R13.0	11 Mortimer St, Fitzrovia, London W1T 3JA	Residential	529327, 181609	4.5	40.80	40.80	Negligible
R13.1	11 Mortimer St, Fitzrovia, London W1T 3JA	Residential	529327, 181609	7.5	40.80	40.80	Negligible
R13.2	11 Mortimer St, Fitzrovia, London W1T 3JA	Residential	529327, 181609	10.5	40.80	40.80	Negligible
R13.3	11 Mortimer St, Fitzrovia, London W1T 3JA	Residential	529327, 181609	13.5	40.80	40.80	Negligible
R13.4	11 Mortimer St, Fitzrovia, London W1T 3JA	Residential	529327, 181609	16.5	40.80	40.80	Negligible
R14.0	21 Foley St, Fitzrovia, London W1W 6DR	Residential	529143, 181700	4.5	40.80	40.80	Negligible
R14.1	21 Foley St, Fitzrovia, London W1W 6DR	Residential	529143, 181700	7.5	40.80	40.80	Negligible
R14.2	21 Foley St, Fitzrovia, London W1W 6DR	Residential	529143, 181700	10.5	40.80	40.80	Negligible
R15.0	Clipstone Mews, Fitzrovia, London W1W 5DG	Residential	529084, 181905	1.5	40.80	40.80	Negligible
R15.1	Clipstone Mews, Fitzrovia, London W1W 5DG	Residential	529084, 181905	4.5	40.80	40.80	Negligible
R15.2	Clipstone Mews, Fitzrovia, London W1W 5DG	Residential	529084, 181905	7.5	40.80	40.80	Negligible
R15.3	Clipstone Mews, Fitzrovia, London W1W 5DG	Residential	529084, 181905	10.5	40.80	40.80	Negligible
R15.4	Clipstone Mews, Fitzrovia, London W1W 5DG	Residential	529084, 181905	13.5	40.80	40.80	Negligible
R15.5	Clipstone Mews, Fitzrovia, London W1W 5DG	Residential	529084, 181905	16.5	40.80	40.80	Negligible
R16.0	136-138 New Cavendish St, Fitzrovia, London W1W 6YD	Residential	529108, 181806	4.5	40.80	40.80	Negligible

Recept or Number 32	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)	Impact descriptor
R16.1	136-138 New Cavendish St, Fitzrovia, London W1W 6YD	Residential	529108, 181806	7.5	40.80	40.80	Negligible
R16.2	136-138 New Cavendish St, Fitzrovia, London W1W 6YD	Residential	529108, 181806	10.5	40.80	40.80	Negligible
R16.3	136-138 New Cavendish St, Fitzrovia, London W1W 6YD	Residential	529108, 181806	13.5	40.80	40.80	Negligible
R17.0	Romney Mansions, 52 Langham St, Fitzrovia, London W1W 7BA	Residential	529080, 181652	1.5	40.80	40.80	Negligible
R17.1	Romney Mansions, 52 Langham St, Fitzrovia, London W1W 7BA	Residential	529080, 181652	4.5	40.80	40.80	Negligible
R17.2	Romney Mansions, 52 Langham St, Fitzrovia, London W1W 7BA	Residential	529080, 181652	7.5	40.80	40.80	Negligible
R17.3	Romney Mansions, 52 Langham St, Fitzrovia, London W1W 7BA	Residential	529080, 181652	10.5	40.80	40.80	Negligible
R17.4	Romney Mansions, 52 Langham St, Fitzrovia, London W1W 7BA	Residential	529080, 181652	13.5	40.80	40.80	Negligible
R18.0	88 Whitfield St, Fitzrovia, London W1T 4EZ	Residential	529336, 182026	4.5	37.07	37.07	Negligible
R18.1	88 Whitfield St, Fitzrovia, London W1T 4EZ	Residential	529336, 182026	7.5	37.07	37.07	Negligible
R18.2	88 Whitfield St, Fitzrovia, London W1T 4EZ	Residential	529336, 182026	10.5	37.07	37.07	Negligible
R18.3	88 Whitfield St, Fitzrovia, London W1T 4EZ	Residential	529336, 182026	13.5	37.07	37.07	Negligible
R18.4	88 Whitfield St, Fitzrovia, London W1T 4EZ	Residential	529336, 182026	16.5	37.07	37.07	Negligible
R18.5	88 Whitfield St, Fitzrovia, London W1T 4EZ	Residential	529336, 182026	19.5	37.07	37.07	Negligible
R18.6	88 Whitfield St, Fitzrovia, London W1T 4EZ	Residential	529336, 182026	22.5	37.07	37.07	Negligible

Recept or Number 32	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)	Impact descriptor
R19.0	39 Tottenham St, Fitzrovia, London W1T 4RX	Residential	529356, 181744	4.5	40.80	40.80	Negligible
R19.1	39 Tottenham St, Fitzrovia, London W1T 4RX	Residential	529356, 181744	7.5	40.80	40.80	Negligible
R19.2	39 Tottenham St, Fitzrovia, London W1T 4RX	Residential	529356, 181744	10.5	40.80	40.80	Negligible
R20.0	1 Scala St, Fitzrovia, London W1T 2HL	Residential	529475, 181802	4.5	40.80	40.80	Negligible
R20.1	1 Scala St, Fitzrovia, London W1T 2HL	Residential	529475, 181802	7.5	40.80	40.80	Negligible
R20.2	1 Scala St, Fitzrovia, London W1T 2HL	Residential	529475, 181802	10.5	40.80	40.80	Negligible
R24.0	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529308, 181888	4.5	40.80	40.80	Negligible
R24.1	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529308, 181888	7.5	40.80	40.80	Negligible
R24.2	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529308, 181888	10.5	40.80	40.80	Negligible
R24.3	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529308, 181888	13.5	40.80	40.80	Negligible
R24.4	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529308, 181888	16.5	40.80	40.80	Negligible
R24.5	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529308, 181888	19.5	40.80	40.80	Negligible
R26.0	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529300, 181883	4.5	40.80	40.81	Negligible
R26.1	Astor College, 99 Charlotte St, Fitzrovia, London W1T	Student halls	529300, 181883	7.5	40.80	40.81	Negligible

Recept or Number 32	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)	Impact descriptor
	4QB						
R26.2	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529300, 181883	10.5	40.80	40.81	Negligible
R26.3	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529300, 181883	13.5	40.80	40.81	Negligible
R26.4	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529300, 181883	16.5	40.80	40.81	Negligible
R26.5	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529300, 181883	19.5	40.80	40.81	Negligible
R27.0	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529315, 181856	4.5	40.80	40.81	Negligible
R27.1	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529315, 181856	7.5	40.80	40.81	Negligible
R27.2	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529315, 181856	10.5	40.80	40.81	Negligible
R27.3	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529315, 181856	13.5	40.80	40.81	Negligible
R27.4	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529315, 181856	16.5	40.80	40.81	Negligible
R27.5	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529315, 181856	19.5	40.80	40.81	Negligible
R28.0	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529330, 181831	4.5	40.80	40.80	Negligible

Recept or Number ³²	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)	Impact descriptor
R28.1	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529330, 181831	7.5	40.80	40.80	Negligible
R28.2	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529330, 181831	10.5	40.80	40.80	Negligible
R28.3	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529330, 181831	13.5	40.80	40.80	Negligible
R28.4	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529330, 181831	16.5	40.80	40.80	Negligible
R28.5	Astor College, 99 Charlotte St, Fitzrovia, London W1T 4QB	Student halls	529330, 181831	19.5	40.80	40.80	Negligible

Table 5.7 Estimated annual mean NO₂ (µg/m³) at new receptors within the proposed development.

Receptor Number ³³	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)
R21.0	South House, Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529267, 181787	1.5	40.80	40.80

³³ Receptors have been named as "Rn.z", where n is the receptor number and z stands for different heights assessed at the same address location .

Receptor Number ³³	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)
R21.1	South House, Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529267, 181787	4.5	40.80	40.80
R21.2	South House, Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529267, 181787	7.5	40.80	40.80
R22.0	North House, Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529242, 181825	1.5	40.80	40.80
R22.1	North House, Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529242, 181825	4.5	40.80	40.80
R22.2	North House, Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529242, 181825	7.5	40.80	40.80
R23.0	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529256, 181818	1.5	40.80	40.81
R23.1	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529256, 181818	4.5	40.80	40.81
R23.2	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529256, 181818	7.5	40.80	40.81
R23.3	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529256, 181818	10.5	40.80	40.81
R25.0	Proposed residential block, Cleveland Street	Residential	529289, 181857	7.5	40.80	40.81
R25.1	Proposed residential block, Cleveland Street	Residential	529289, 181857	10.5	40.80	40.81
R25.2	Proposed residential block, Cleveland Street	Residential	529289, 181857	13.5	40.80	40.81
R25.3	Proposed residential block, Cleveland Street	Residential	529289, 181857	16.5	40.80	40.81
R25.4	Proposed residential block, Cleveland Street	Residential	529289,	19.5	40.80	40.81

Receptor Number ³³	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)
			181857			
R25.5	Proposed residential block, Cleveland Street	Residential	529289, 181857	22.5	40.80	40.81
R29.0	South House, Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529284, 181799	1.5	40.80	40.80
R29.1	South House, Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529284, 181799	4.5	40.80	40.80
R29.2	South House, Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529284, 181799	7.5	40.80	40.80
R30.0	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529266, 181825	1.5	40.80	40.81
R30.1	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529266, 181825	4.5	40.80	40.81
R30.2	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529266, 181825	7.5	40.80	40.81
R30.3	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529266, 181825	10.5	40.80	40.81
R31.0	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529281, 181804	1.5	40.80	40.80
R31.1	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529281, 181804	4.5	40.80	40.80
R31.2	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529281, 181804	7.5	40.80	40.80
R31.3	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529281, 181804	10.5	40.80	40.80
R32.0	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529273, 181816	1.5	40.80	40.80

Receptor Number ³³	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)
R32.1	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529273, 181816	4.5	40.80	40.80
R32.2	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529273, 181816	7.5	40.80	40.80
R32.3	Cleveland Street, Fitzrovia, London W1T 4LB	Residential	529273, 181816	10.5	40.80	40.80
R33.0	Proposed residential block, Cleveland Street	Residential	529260, 181837	7.5	40.80	40.81
R33.1	Proposed residential block, Cleveland Street	Residential	529260, 181837	10.5	40.80	40.81
R33.2	Proposed residential block, Cleveland Street	Residential	529260, 181837	13.5	40.80	40.81
R33.3	Proposed residential block, Cleveland Street	Residential	529260, 181837	16.5	40.80	40.81
R33.4	Proposed residential block, Cleveland Street	Residential	529260, 181837	19.5	40.80	40.81
R33.5	Proposed residential block, Cleveland Street	Residential	529260, 181837	22.5	40.80	40.81
R34.0	Proposed residential block, Cleveland Street	Residential	529274, 181847	7.5	40.80	40.81
R34.1	Proposed residential block, Cleveland Street	Residential	529274, 181847	10.5	40.80	40.81
R34.2	Proposed residential block, Cleveland Street	Residential	529274, 181847	13.5	40.80	40.81
R34.3	Proposed residential block, Cleveland Street	Residential	529274, 181847	16.5	40.80	40.81
R34.4	Proposed residential block, Cleveland Street	Residential	529274, 181847	19.5	40.80	40.81

Receptor Number ³³	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)
			181847			
R34.5	Proposed residential block, Cleveland Street	Residential	529274, 181847	22.5	40.80	40.81
R35.0	Proposed residential block, Cleveland Street	Residential	529300, 181843	7.5	40.80	40.81
R35.1	Proposed residential block, Cleveland Street	Residential	529300, 181843	10.5	40.80	40.81
R35.2	Proposed residential block, Cleveland Street	Residential	529300, 181843	13.5	40.80	40.81
R35.3	Proposed residential block, Cleveland Street	Residential	529300, 181843	16.5	40.80	40.81
R35.4	Proposed residential block, Cleveland Street	Residential	529300, 181843	19.5	40.80	40.81
R35.5	Proposed residential block, Cleveland Street	Residential	529300, 181843	22.5	40.80	40.81
R36.0	Proposed residential block, Cleveland Street	Residential	529270, 181822	7.5	40.80	40.81
R36.1	Proposed residential block, Cleveland Street	Residential	529270, 181822	10.5	40.80	40.81
R36.2	Proposed residential block, Cleveland Street	Residential	529270, 181822	13.5	40.80	40.81
R36.3	Proposed residential block, Cleveland Street	Residential	529270, 181822	16.5	40.80	40.81
R36.4	Proposed residential block, Cleveland Street	Residential	529270, 181822	19.5	40.80	40.81
R36.5	Proposed residential block, Cleveland Street	Residential	529270, 181822	22.5	40.80	40.81

Receptor Number ³³	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)
R37.0	Proposed residential block, Cleveland Street	Residential	529280, 181829	7.5	40.80	40.81
R37.1	Proposed residential block, Cleveland Street	Residential	529280, 181829	10.5	40.80	40.81
R37.2	Proposed residential block, Cleveland Street	Residential	529280, 181829	13.5	40.80	40.81
R38.0	Proposed residential block, Cleveland Street	Residential	529292, 181837	7.5	40.80	40.81
R38.1	Proposed residential block, Cleveland Street	Residential	529292, 181837	10.5	40.80	40.81
R38.2	Proposed residential block, Cleveland Street	Residential	529292, 181837	13.5	40.80	40.81
R39.0	Proposed residential block, Cleveland Street	Residential	529301, 181824	7.5	40.80	40.81
R39.1	Proposed residential block, Cleveland Street	Residential	529301, 181824	10.5	40.80	40.81
R39.2	Proposed residential block, Cleveland Street	Residential	529301, 181824	13.5	40.80	40.81
R40.0	Proposed residential block, Cleveland Street	Residential	529290, 181816	7.5	40.80	40.81
R40.1	Proposed residential block, Cleveland Street	Residential	529290, 181816	10.5	40.80	40.81
R40.2	Proposed residential block, Cleveland Street	Residential	529290, 181816	13.5	40.80	40.81
R41.0	Proposed residential block, Cleveland Street	Residential	529287, 181804	7.5	40.80	40.80
R41.1	Proposed residential block, Cleveland Street	Residential	529287,	10.5	40.80	40.80

Receptor Number ³³	Receptor address	Type of receptor	Coordinates	Height (m)	2020 background NO ₂ without proposed development (µg/m ³)	2020 total NO ₂ with proposed development (µg/m ³)
			181804			
R41.2	Proposed residential block, Cleveland Street	Residential	529287, 181804	13.5	40.80	40.80
R42.0	Proposed residential block, Cleveland Street	Residential	529313, 181822	7.5	40.80	40.80
R42.1	Proposed residential block, Cleveland Street	Residential	529313, 181822	10.5	40.80	40.80
R42.2	Proposed residential block, Cleveland Street	Residential	529313, 181822	13.5	40.80	40.80

Air quality effects at new and existing locations

Annual mean NO₂ concentrations are predicted to be close to or exceed the objective at existing receptors near to the proposed development. At all of the receptors modelled (Table 5.6), the change in NO₂ concentration resulting from the operation of boilers is less than one per cent and the EPUK guidance¹⁸ classifies this air quality impact as negligible, see Table 3.1. The effect of operation will therefore be not significant at receptors near to the proposed development.

There are currently locations on-site that are relevant for assessment of annual mean NO₂. Although their locations do not correspond exactly with relevant exposure locations for the proposed development, on-site receptor locations have been assessed with and without the proposed boilers in place. The change in NO₂ concentrations resulting from the operation of the boilers is less than one per cent for these receptors. The EPUK guidance classifies these impacts as negligible and the effect of the operation will not be significant at on-site receptor locations.

Using Defra background maps within the model, annual mean NO₂ concentrations are predicted to exceed the air quality objectives at all modelled new receptors within the proposed development once it is fully operational in 2020. This is shown in Table 5.7.

Contour plot of predicted concentrations

A contour plot displaying predicted pollutant contributions from the boiler emissions is displayed in **Appendix D**.

5.2.3 Air-quality-neutral assessment

In accordance with the Air Quality Neutral Planning Support guidance¹³ published in support of the GLA SPG¹² in 2014, an air quality neutral assessment of the building and transport emissions has been undertaken.

Building Emissions Benchmarks (BEBs)

Boilers will be installed within the proposed development, supplying the residential units. The final units to be installed are to be confirmed. As stated in Section 5.2.2 above, the energy consultant has advised that two Hoval UltraGas 575 boilers are likely. These have been assumed for this assessment.

BEBs were calculated based on the gross floor area of the proposed development. The air quality neutral guidance gives emission benchmarks for specific land-use classes. The total building emissions benchmarks are shown in Table 5.8 below:

Table 5.8 Building Emissions Benchmark for the proposed development

Description	Land Use	Gross floor area (m ²)	BEB (gNO _x /m ² /annum)	Benchmarked emissions (kgNO _x /annum)
Commercial	D1	4,129	30.8	127.2
Residential	C3	6,221	26.2	163.0
Total gross floor area		10,350	Total benchmarked building emissions	290.2

Calculated emissions from the proposed development are shown in Table 5.9, based on emission rates for the two boilers and an assumption of a power output of 980 kW for each boiler. As shown in Table 5.5, the boilers are expected to be run at an equivalent of 1.4 per cent of full load over the year.

Table 5.9 Calculated building emissions for the proposed development

Plant	NO _x (g/s)	Percentage load	Building emissions NO _x (kg/annum)
Boiler x 2	0.02047	1.4	9.0
Total calculated building emissions			9.0

The calculated building emissions for the proposed development are well within the BEB. The building emissions fully meet air quality neutral requirements for building emissions.

Transport Emissions Benchmark (TEBs)

TEBs have been derived for residential and commercial land uses in the London Central Activity Zone and are shown in Table 5.10 and Table 5.11. These values were used to calculate the transport emissions benchmark.

Table 5.10 Commercial Transport Emissions Benchmark for the proposed development

Description	Land Use	Gross floor area (m ²)	NO _x TEB (g NO _x /m ² /annum)	PM ₁₀ TEB (g PM ₁₀ / m ² /annum)	Benchmarked NO _x TEB for the proposed development (g NO _x / annum)	PM ₁₀ TEB for the proposed development (g PM ₁₀ / annum)
Commercial	D1	4,129	1.27	0.22	5,244	908

Table 5.11 Residential Transport Emissions Benchmark for the proposed development

Description	Land Use	Total residential properties	TEB (g NO _x /dwelling/annum)	TEB (g PM ₁₀ /dwelling/annum)	Benchmarked NO _x TEB for the proposed development (g NO _x / annum)	PM ₁₀ TEB for the proposed development (g PM ₁₀ / annum)
Residential	C3	40	234	40.7	9,360	1,628

Table 5.12 Transport Emissions Benchmark for the proposed development.

Land Use	Total Benchmarked Transport Emissions	
	NO _x emissions (g/annum)	PM ₁₀ emissions (g/annum)
Commercial	5,244	908
Residential	9,360	1,628
Total emissions	14,604	2,535

These benchmarks are included for information only, since no direct vehicle trips, and hence no vehicle emissions, are anticipated from the proposed development during operation, since it will be car-free. The proposed development will fully meet the air quality neutral requirements for transport emissions.

Emissions standards for boilers and CHP plant

The GLA SPG¹² states that individual or communal boilers installed in commercial or domestic buildings should achieve a NO_x rating of less than 40 mg NO_x/kWh. The communal boilers (Hoval UltraGas 575) assumed in this assessment have an emission rating of 36 mg NO_x/kWh, which meets this ultra-low-NO_x emission rating. Boilers chosen for the proposed development will need to meet this rating.

6.0 Evaluation of assessment results

6.1 Developmental constraints

This section considers air quality impacts in the vicinity of the proposed development in order to examine the suitability of the site for the intended use.

The air quality conditions in the vicinity of the site have been assessed in the baseline assessment in Section 4.0. PM₁₀ concentrations and one-hour NO₂ levels are likely to meet the national air quality objectives currently and in future years. Annual mean NO₂ levels are likely to exceed the national air quality objective at present, based on monitoring, LAEI modelling and Defra background maps.

Annual mean NO₂ levels may also exceed the objective in 2020, the year of operation, although the evidence is inconclusive regarding the likelihood or otherwise of exceedance. There are currently receptors relevant to annual mean NO₂ exposure on site, although there will be additional receptors with the proposed development in place.

6.2 Construction impacts

The potential for construction and demolition activities to create pollution is dependent on a range of factors that are often specific to each site. Due to the variable nature of construction techniques and activities, it is difficult accurately to assess potential impacts, especially if they have not been identified.

As indicated in the method, a qualitative assessment has been conducted in identifying areas of potential risk and mitigation measures appropriate to the scale and type of construction, as per the IAQM guidance. Mitigation measures will help to negate some of the potentially negative air quality impacts resulting from the proposed development and will avoid significant dust effects.

As outlined in Section 5.1.1, it is anticipated that the impact of construction vehicles will be negligible.

6.3 Operational impacts

As outlined in Section 5.2 an assessment of the operational impacts has been conducted and the impacts from the boilers found to be negligible and not significant. However, new receptors will be introduced in an area that may exceed the annual mean NO₂ objective in 2020.

7.0 Mitigation

7.1 Mitigation of construction dust

Under best practice guidance, the proposed development will constitute a medium risk for construction dust and there is the potential for occasional and minor impacts on nearby receptors.

The impacts associated with this development are likely to be in the form of dust generated during demolition, earthworks, construction and track-out. The use of appropriate mitigation measures throughout the construction period will ensure that impacts to sensitive receptors are minimised or removed. The following best practice mitigation measures should be included in the construction method statement:

- Stakeholder engagement should be implemented through a stakeholder communication plan.
- The contact details for the individuals accountable for air quality and dust issues should be displayed at the site boundary.
- Complaints regarding air quality should be logged, and the log made available to the local authority on request.
- The site should be at least visually monitored for dust on a daily basis, with the frequency of monitoring increased during dry and windy conditions.
- The site should be organised so that:
 - physical barriers or screens are installed around the site to limit the dispersal of dust emissions; and
 - loose materials are covered as soon as possible.
- Haul routes should be kept free from dust as far as possible, and swept regularly (water assisted). No dry sweeping of large areas will be carried out.
- Un-surfaced haul routes and working areas will be regularly damped down in dry conditions;
- All vehicles carrying loose or potentially dusty material to or from the working areas will be fully sheeted.
- Materials will not be burnt on site.
- Minimum drop heights will be used from conveyors, loading shovels and loading equipment.
- Provision of adequate water will be supplied to the working areas.
- Suitable dust suppression techniques such as water sprays or local extraction will be used when cutting, grinding or sawing materials onsite.
- Dust soiling checks at sensitive receptors and automatic monitoring of PM₁₀ at the site boundary should be undertaken to ensure that the mitigation measures are being effective.

- PM₁₀ concentration thresholds should be implemented at these locations, with exceedance alerts being sent to the individual responsible for air quality on the site. Where the site threshold is being significantly exceeded, work should cease on site until the source of the dust emissions is identified and negated.

These mitigation measures are intended to be a summary of the key controls specific to this site in order to minimise potential emissions. These measures are not intended to be a comprehensive list of all best practice guidance; for more complete mitigation measures and control the IAQM guidance¹⁹ should be consulted.

Provided these measures are put in place, emissions from the site during construction will not be significant.

7.2 Cumulative effects from construction

There are a number of schemes in the vicinity of the proposed development that have gained approval (see Planning Statement). There is the potential for cumulative air quality effects from construction. However, provided that the measures in Section 7.1 are put in place and adequate controls are in place at other sites, cumulative effects are not expected to be any greater than for individual sites.

7.3 Mitigation of exposure to NO₂

There are currently relevant exposure locations at the application site.

The annual concentration of NO₂ is predicted to exceed the AQS objective at relevant on-site receptors when the proposed development is operational. This exposure could potentially be mitigated having non-opening windows installed and mechanical ventilation with air inlets away from streets. However, given that the application site is away from busy roads, this would be of limited benefit.

The LAEI modelled NO₂ concentration maps (Table 4.4) predict exposure concentrations to be within the AQS objective at relevant on site receptors in 2020. It is considered that LAEI modelled NO₂ is likely to provide a more realistic concentration than Defra background maps, which provide an average annual mean concentration over a 1 km² area.

In addition, NO₂ concentrations are continuing to fall. With national and Londonwide policies in place to reduce NO₂ levels, including the advent of the London Ultra Low Emission Zone³⁴, NO₂ concentrations are likely to meet the annual mean objective soon after 2020.

Given the above, mitigation of exposure to NO₂ is not considered necessary.

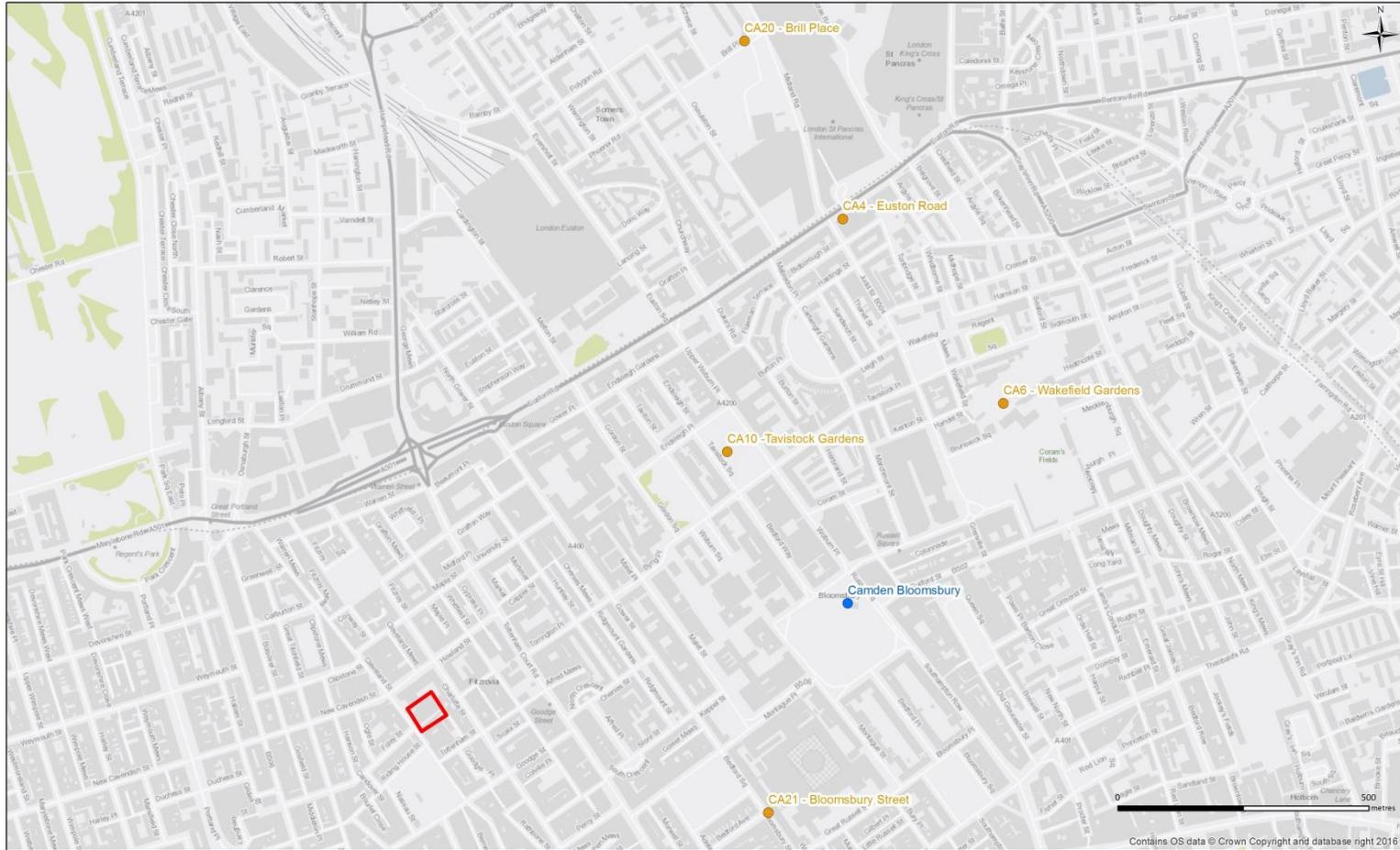
³⁴ <https://tfl.gov.uk/modes/driving/ultra-low-emission-zone>

8.0 Conclusions

The air quality assessment has determined the following:

- Baseline air quality conditions indicate that annual mean NO₂ levels currently exceed the national objective level in the vicinity of the proposed development, and that NO₂ one-hour, PM₁₀ annual and PM₁₀ 24-hour objectives are being met.
- Annual mean concentrations are likely to meet the air quality objectives for NO₂ one-hour, PM₁₀ annual and PM₁₀ 24-hour in the construction years.
- Air quality impacts from construction traffic are predicted to be negligible.
- The dust risk assessment has identified that construction activities may have occasional and minor dust soiling and health impacts on local receptors, but these can be minimised or removed with appropriate mitigation measures.
- Air quality impacts from operational traffic will be negligible, since the proposed development will be car-free.
- The air-quality-neutral assessment has identified that:
 - the proposed development meets the Building Emissions Benchmark, therefore the emissions from buildings fully meet the Mayor of London’s requirements for air quality neutrality;
 - the proposed development meets the Transport Emissions Benchmark, therefore the emissions from traffic associated with the proposed development fully meet the Mayor of London’s requirements for air quality neutrality;
 - the assessed boilers meet the standards required by the GLA SPG for air quality neutrality. The final boilers chosen for the development will need to meet these standards.
- The assessment of air quality in relation to the boilers has determined that there will be a negligible impact at nearby existing sensitive receptors and therefore its effect will not be significant.
- The assessment in relation to the boilers has determined that future receptors within the development may be exposed to concentrations in excess of the annual mean objective for NO₂. However, given that there is currently relevant exposure onsite, the local pollutant concentrations predicted by the LAEI indicate that there is a limited potential benefit in providing mechanical ventilation. Annual NO₂ concentrations at the development site are likely to meet the objective soon after 2020, therefore mitigation of exposure is not considered necessary.

Appendix A – Site map and baseline monitoring locations



Project: **T3452 - Middlesex Annex**
 Client: **UCLH Charity**
Air Quality Monitoring Locations

- Legend**
- Site boundary
 - Automatic
 - Diffusion tube



Appendix B – Receptor locations (boiler assessment)



Map Reference: T3452-0002 / User Name: Joseph.Alexis / Date: 14/12/2016

Project: **T3452 - Middlesex Annex**
 Client: **UCLH Charity**
Air Quality Receptors

Legend
 Site boundary
 Receptors



Appendix C – Results of the boiler modelling for different meteorological years (2011-2015)

Receptor Number	Boiler NO ₂ contribution (µg/m ³) (2011)	Boiler NO ₂ contribution (µg/m ³) (2012)	Boiler NO ₂ contribution (µg/m ³) (2013)	Boiler NO ₂ contribution (µg/m ³) (2014)	Boiler NO ₂ contribution (µg/m ³) (2015)
R1.0	0.001	0.001	0.001	0.001	0.001
R1.1	0.001	0.001	0.001	0.001	0.001
R1.2	0.001	0.001	0.001	0.001	0.001
R1.3	0.001	0.001	0.001	0.001	0.001
R2.0	0.001	0.001	0.001	0.001	0.001
R2.1	0.001	0.001	0.001	0.001	0.001
R2.2	0.001	0.001	0.001	0.001	0.001
R3.0	0.000	0.000	0.000	0.001	0.000
R3.1	0.000	0.000	0.000	0.001	0.000
R3.2	0.000	0.000	0.000	0.001	0.000
R4.0	0.001	0.001	0.001	0.001	0.001
R4.1	0.001	0.001	0.001	0.001	0.001
R4.2	0.001	0.001	0.001	0.001	0.001
R4.3	0.001	0.001	0.001	0.001	0.001
R4.4	0.001	0.001	0.001	0.001	0.001
R5.0	0.001	0.002	0.001	0.001	0.001
R6.0	0.001	0.001	0.001	0.001	0.001
R6.1	0.001	0.001	0.001	0.001	0.001
R6.2	0.001	0.002	0.001	0.001	0.001
R7.0	0.001	0.001	0.000	0.001	0.001
R7.1	0.001	0.001	0.000	0.001	0.001
R7.2	0.001	0.001	0.000	0.001	0.001

Receptor Number	Boiler NO ₂ contribution (µg/m ³) (2011)	Boiler NO ₂ contribution (µg/m ³) (2012)	Boiler NO ₂ contribution (µg/m ³) (2013)	Boiler NO ₂ contribution (µg/m ³) (2014)	Boiler NO ₂ contribution (µg/m ³) (2015)
R7.3	0.001	0.001	0.000	0.001	0.001
R7.4	0.001	0.001	0.000	0.001	0.001
R8.0	0.001	0.001	0.001	0.001	0.001
R8.1	0.001	0.001	0.001	0.001	0.001
R8.2	0.001	0.001	0.001	0.001	0.001
R8.3	0.001	0.001	0.001	0.001	0.001
R9.0	0.000	0.000	0.000	0.000	0.000
R9.1	0.000	0.000	0.000	0.000	0.000
R9.2	0.000	0.000	0.000	0.000	0.000
R9.3	0.000	0.000	0.000	0.000	0.000
R10.0	0.002	0.001	0.002	0.001	0.001
R10.1	0.002	0.001	0.002	0.001	0.001
R10.2	0.002	0.001	0.002	0.001	0.001
R11.0	0.001	0.001	0.001	0.001	0.001
R11.1	0.001	0.001	0.001	0.001	0.001
R11.2	0.001	0.001	0.001	0.001	0.001
R11.3	0.001	0.001	0.001	0.001	0.001
R11.4	0.001	0.001	0.001	0.001	0.001
R11.5	0.001	0.001	0.001	0.001	0.001
R11.6	0.001	0.001	0.001	0.001	0.001
R11.7	0.001	0.001	0.002	0.001	0.001
R11.8	0.001	0.002	0.002	0.001	0.001

Receptor Number	Boiler NO ₂ contribution (µg/m ³) (2011)	Boiler NO ₂ contribution (µg/m ³) (2012)	Boiler NO ₂ contribution (µg/m ³) (2013)	Boiler NO ₂ contribution (µg/m ³) (2014)	Boiler NO ₂ contribution (µg/m ³) (2015)
R12.0	0.000	0.001	0.000	0.000	0.000
R12.1	0.000	0.001	0.000	0.000	0.000
R12.2	0.000	0.001	0.000	0.000	0.000
R12.3	0.000	0.001	0.000	0.000	0.000
R13.0	0.000	0.000	0.000	0.000	0.000
R13.1	0.000	0.000	0.000	0.000	0.000
R13.2	0.000	0.000	0.000	0.000	0.000
R13.3	0.000	0.000	0.000	0.000	0.000
R13.4	0.000	0.000	0.000	0.000	0.000
R14.0	0.001	0.001	0.001	0.001	0.001
R14.1	0.001	0.001	0.001	0.001	0.001
R14.2	0.001	0.001	0.001	0.001	0.001
R15.0	0.000	0.000	0.000	0.000	0.000
R15.1	0.000	0.000	0.000	0.000	0.000
R15.2	0.000	0.000	0.000	0.000	0.000
R15.3	0.000	0.000	0.000	0.000	0.000
R15.4	0.000	0.000	0.000	0.000	0.000
R15.5	0.000	0.000	0.000	0.000	0.000
R16.0	0.001	0.001	0.001	0.000	0.000
R16.1	0.001	0.001	0.001	0.000	0.000
R16.2	0.001	0.001	0.001	0.000	0.000
R16.3	0.001	0.001	0.001	0.000	0.000

Receptor Number	Boiler NO ₂ contribution (µg/m ³) (2011)	Boiler NO ₂ contribution (µg/m ³) (2012)	Boiler NO ₂ contribution (µg/m ³) (2013)	Boiler NO ₂ contribution (µg/m ³) (2014)	Boiler NO ₂ contribution (µg/m ³) (2015)
R17.0	0.000	0.000	0.001	0.000	0.000
R17.1	0.000	0.000	0.001	0.000	0.000
R17.2	0.000	0.000	0.001	0.000	0.000
R17.3	0.000	0.000	0.001	0.000	0.000
R17.4	0.000	0.000	0.001	0.000	0.000
R18.0	0.001	0.001	0.001	0.001	0.001
R18.1	0.001	0.001	0.001	0.001	0.001
R18.2	0.001	0.001	0.001	0.001	0.001
R18.3	0.001	0.001	0.001	0.001	0.001
R18.4	0.001	0.001	0.001	0.001	0.001
R18.5	0.001	0.001	0.001	0.001	0.001
R18.6	0.001	0.001	0.001	0.001	0.001
R19.0	0.001	0.001	0.001	0.001	0.001
R19.1	0.001	0.001	0.001	0.001	0.001
R19.2	0.001	0.001	0.001	0.001	0.001
R20.0	0.001	0.001	0.001	0.001	0.001
R20.1	0.001	0.001	0.001	0.001	0.001
R20.2	0.001	0.001	0.001	0.001	0.001
R21.0	0.003	0.003	0.004	0.003	0.003
R21.1	0.003	0.003	0.004	0.003	0.003
R21.2	0.003	0.003	0.004	0.003	0.003
R22.0	0.005	0.004	0.005	0.004	0.004

Receptor Number	Boiler NO ₂ contribution (µg/m ³) (2011)	Boiler NO ₂ contribution (µg/m ³) (2012)	Boiler NO ₂ contribution (µg/m ³) (2013)	Boiler NO ₂ contribution (µg/m ³) (2014)	Boiler NO ₂ contribution (µg/m ³) (2015)
R22.1	0.005	0.004	0.005	0.004	0.004
R22.2	0.005	0.004	0.005	0.004	0.004
R23.0	0.009	0.009	0.009	0.009	0.008
R23.1	0.009	0.009	0.009	0.009	0.008
R23.2	0.009	0.009	0.009	0.009	0.008
R23.3	0.009	0.009	0.009	0.009	0.008
R24.0	0.003	0.003	0.003	0.003	0.003
R24.1	0.003	0.003	0.003	0.003	0.003
R24.2	0.003	0.003	0.003	0.003	0.003
R24.3	0.004	0.003	0.003	0.003	0.003
R24.4	0.004	0.003	0.003	0.004	0.004
R24.5	0.004	0.004	0.003	0.004	0.004
R25.0	0.010	0.010	0.010	0.010	0.009
R25.1	0.010	0.010	0.010	0.010	0.009
R25.2	0.010	0.010	0.010	0.010	0.009
R25.3	0.010	0.010	0.010	0.010	0.009
R25.4	0.010	0.010	0.010	0.010	0.009
R25.5	0.010	0.010	0.010	0.010	0.010
R26.0	0.009	0.009	0.009	0.009	0.008
R26.1	0.009	0.009	0.009	0.009	0.008
R26.2	0.009	0.009	0.009	0.009	0.008
R26.3	0.009	0.009	0.009	0.009	0.009

Receptor Number	Boiler NO ₂ contribution (µg/m ³) (2011)	Boiler NO ₂ contribution (µg/m ³) (2012)	Boiler NO ₂ contribution (µg/m ³) (2013)	Boiler NO ₂ contribution (µg/m ³) (2014)	Boiler NO ₂ contribution (µg/m ³) (2015)
R26.4	0.009	0.009	0.009	0.009	0.009
R26.5	0.009	0.009	0.009	0.009	0.009
R27.0	0.008	0.009	0.008	0.008	0.008
R27.1	0.008	0.009	0.008	0.008	0.008
R27.2	0.008	0.009	0.008	0.008	0.008
R27.3	0.008	0.009	0.008	0.008	0.008
R27.4	0.008	0.009	0.008	0.008	0.008
R27.5	0.009	0.010	0.009	0.009	0.009
R28.0	0.004	0.005	0.005	0.004	0.004
R28.1	0.004	0.005	0.005	0.004	0.004
R28.2	0.005	0.005	0.005	0.004	0.004
R28.3	0.005	0.005	0.005	0.004	0.004
R28.4	0.005	0.005	0.005	0.004	0.004
R28.5	0.005	0.005	0.005	0.004	0.004
R29.0	0.005	0.005	0.005	0.005	0.005
R29.1	0.005	0.005	0.005	0.005	0.005
R29.2	0.005	0.005	0.005	0.005	0.005
R30.0	0.011	0.011	0.011	0.011	0.010
R30.1	0.011	0.011	0.011	0.011	0.010
R30.2	0.011	0.011	0.011	0.011	0.010
R30.3	0.011	0.011	0.011	0.011	0.010
R31.0	0.005	0.005	0.006	0.006	0.005

Receptor Number	Boiler NO ₂ contribution (µg/m ³) (2011)	Boiler NO ₂ contribution (µg/m ³) (2012)	Boiler NO ₂ contribution (µg/m ³) (2013)	Boiler NO ₂ contribution (µg/m ³) (2014)	Boiler NO ₂ contribution (µg/m ³) (2015)
R31.1	0.005	0.005	0.006	0.006	0.005
R31.2	0.005	0.005	0.006	0.006	0.005
R31.3	0.005	0.005	0.006	0.006	0.005
R32.0	0.000	0.000	0.000	0.000	0.000
R32.1	0.000	0.000	0.000	0.000	0.000
R32.2	0.000	0.000	0.000	0.000	0.000
R32.3	0.000	0.000	0.000	0.000	0.000
R33.0	0.010	0.010	0.010	0.010	0.009
R33.1	0.010	0.010	0.010	0.010	0.009
R33.2	0.010	0.010	0.010	0.010	0.009
R33.3	0.010	0.010	0.010	0.010	0.009
R33.4	0.010	0.010	0.010	0.010	0.009
R33.5	0.010	0.010	0.010	0.010	0.009
R34.0	0.011	0.012	0.011	0.011	0.011
R34.1	0.011	0.012	0.011	0.011	0.011
R34.2	0.011	0.012	0.011	0.011	0.011
R34.3	0.011	0.012	0.011	0.011	0.011
R34.4	0.011	0.012	0.011	0.011	0.011
R34.5	0.011	0.012	0.011	0.011	0.011
R35.0	0.011	0.011	0.011	0.011	0.010
R35.1	0.011	0.011	0.011	0.011	0.010
R35.2	0.011	0.011	0.011	0.011	0.010

Receptor Number	Boiler NO ₂ contribution (µg/m ³) (2011)	Boiler NO ₂ contribution (µg/m ³) (2012)	Boiler NO ₂ contribution (µg/m ³) (2013)	Boiler NO ₂ contribution (µg/m ³) (2014)	Boiler NO ₂ contribution (µg/m ³) (2015)
R35.3	0.011	0.011	0.011	0.011	0.010
R35.4	0.011	0.011	0.011	0.011	0.010
R35.5	0.011	0.011	0.011	0.011	0.010
R36.0	0.010	0.010	0.010	0.010	0.010
R36.1	0.010	0.010	0.010	0.010	0.010
R36.2	0.010	0.010	0.010	0.010	0.010
R36.3	0.010	0.010	0.010	0.010	0.010
R36.4	0.010	0.010	0.010	0.010	0.010
R36.5	0.010	0.010	0.010	0.010	0.010
R37.0	0.011	0.012	0.011	0.011	0.011
R37.1	0.011	0.012	0.011	0.011	0.011
R37.2	0.011	0.012	0.011	0.011	0.011
R38.0	0.011	0.012	0.011	0.011	0.011
R38.1	0.011	0.012	0.011	0.011	0.011
R38.2	0.011	0.012	0.011	0.011	0.011
R39.0	0.009	0.009	0.009	0.009	0.008
R39.1	0.009	0.009	0.009	0.009	0.008
R39.2	0.009	0.009	0.009	0.009	0.008
R40.0	0.009	0.008	0.009	0.009	0.008
R40.1	0.009	0.008	0.009	0.009	0.008
R40.2	0.009	0.008	0.009	0.009	0.008
R41.0	0.005	0.005	0.005	0.005	0.005

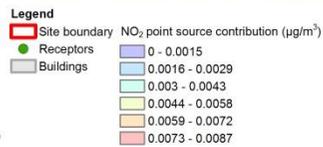
Receptor Number	Boiler NO₂ contribution (µg/m³) (2011)	Boiler NO₂ contribution (µg/m³) (2012)	Boiler NO₂ contribution (µg/m³) (2013)	Boiler NO₂ contribution (µg/m³) (2014)	Boiler NO₂ contribution (µg/m³) (2015)
R41.1	0.005	0.005	0.005	0.005	0.005
R41.2	0.005	0.005	0.005	0.005	0.005
R42.0	0.000	0.000	0.000	0.000	0.000
R42.1	0.000	0.000	0.000	0.000	0.000
R42.2	0.000	0.000	0.000	0.000	0.000

Appendix D – Contour plot of 2012 meteorological year scenario (boilers assessment)



Project: T3452 - Middlesex Annex
 Client: UCLH Charity

**Point Source Emissions Isoleth of
 Predicted NO₂ Concentrations**





Map Reference: EN62-2004 / User Name: jroth@temple / Date: 14/02/2016

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Project: **T3452 - Middlesex Annex**
 Client: **UCLH Charity**
**Point Source Emissions Isopleth of
 Predicted NO₂ Concentrations**

Legend	NO₂ point source contribution (µg/m³)
Site boundary	0 - 0.0015
Receptors	0.0016 - 0.0029
Buildings	0.003 - 0.0043
	0.0044 - 0.0058
	0.0059 - 0.0072
	0.0073 - 0.0087

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