150 HOLBORN AIR QUALITY ASSESSMENT

DAH REAL ESTATES SARL

APRIL 2016

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TEMPLE

LEADERS IN ENVIRONMENT, PLANNING & SUSTAINABILITY.

Document Version Control

Version	Date	Author	Reviewed by	Reviewed and Approved by
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Final	07/03/2016	N/A	Gillian Cotter	Alaric Lester

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1.0 Introduction

This air quality statement has been prepared by Temple Group in support of a planning application for the redevelopment of 150 Holborn; which is bounded by Holborn to the south, Gray's Inn Road to the west and Brooke Street to the east. The redevelopment will provide a mix of office accommodation (Class B1), retail floor space (Class A1-A3), residential units (Class C3) and public realm improvements. The description of development is:

"*Demolition of existing building and redevelopment for a mixed use development up to 9 storeys in height comprising 14,604 sqm GEA office floorspace (Use Class B1), 1,450 sqm GEA retail floorspace (Use Class A1-A3), 13 residential units (Use Class C3), improvements to the public realm and all other necessary enabling works."*

This statement details the likely receptors and potential effects of the proposed scheme in regard to air quality. The air quality assessment considers the potential effects that the proposed scheme could have on local air quality conditions. A baseline assessment of local air quality has also been undertaken to establish existing and historic air quality conditions at the development site and in the local area. The assessment considers the air quality effects of the proposed scheme 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 Ireland[1] (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 2000[2], as amended[3].

Although achievement of air quality objectives is not a statutory requirement, they reflect statutory limits outlined in The Air Quality Standards Regulations 2010[4], 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	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

[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 May 2005 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.

2.1.2 The Environment Act 1995

The Environment Act 1995[7], 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 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 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published on the 27th March 2012. It replaced existing national planning policies relevant to air quality such as Planning Policy Statement PPS1: Delivering Sustainable Development and PPS23: Planning and Pollution Control.

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."

2.2 Regional and Local Policy

2.2.1 The London Plan

The London Plan[8] 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 polices. Regarding planning decisions, Policy 7.14 (B) states:

"Development proposals should:

"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

[7] Environment Act 1995, Part IV Air Quality

[8] Greater London Authority, 2011, The London Plan: Spatial Development Strategy for Greater London, Greater London Authority, London.

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)[9] 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 document[10], produced by Air Quality Consultants and Environ, further defines these emission benchmarks.

2.2.2 Camden Local Development Framework

Camden's Local Development Framework was adopted in November 2010[11]. It replaces the Camden Unitary Development Plan (UDP). Policies included in the plan relating to air quality include Policy DP32, which 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".

Camden Council's Amenity SPD[12] sets out when an air quality assessment is required and the elements required to be set out within an air quality assessment.

[9] Greater London Authority, 2014, Sustainable Design and Construction, The London Plan Supplementary Planning Guidance, Greater London Authority, London.

[10] Air Quality Consultants, Environ. 2013. Air Quality Neutral Planning Support: GLA 80371

[11] Camden Council. 2010. Camden Development Policies (adoption version). Camden Local Development Framework

[12] Camden Council (2010). Camden Planning Guidance: CPG6 Amenity. http://www.camden.gov.uk/ccm/content/environment/planning-and-built-environment/two/planning-policy/supplementary-planning-documents/camden-planning-guidance.en

2.2.3 London Borough of Camden Air Quality Action Plan

Following the designation of the whole of Camden as an air quality management area (AQMA), the Council published an air quality action plan (AQAP)[13] in 2002 to promote better air quality conditions within the Borough. The current AQAP was published in 2013. 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 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 exposure to air pollution.*
- *"Improve the health and well-being of the local population.*
- *"Work in partnership with national and regional bodies, and with local public and private organisations, to foster improvements in air quality.*
- *"Lead by example and reduce NO_2 and PM_{10} emissions associated with the Council's own buildings and transport services.*
- *"Ensure actions which serve to reduce NO_2 and PM_{10} emissions complement actions to mitigate CO_2 emissions, and vice-versa."*

[13] Camden Council (2013), Camden's Clean Air Action Plan 2013-2015,

3.0 Methodology

3.1 Air quality assessment methodology for roads and CHP /boilers

Road traffic can be considered a primary source of emissions to air. Stationary sources can also be important. 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 (NO_2) and particulates (PM_{10}).

Environmental Protection UK (EPUK) and the IAQM have developed a procedure for assessing the significance of traffic changes on local air quality in their guidance document, '*Land-Use Planning & Development Control: Planning for Air Quality'* (EPUK).[14] 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 following methodology.

The EPUK/ IAQM methodology adopts several assessment levels, each requiring a more detailed and in depth approach. If an emission source or the potential change in traffic volumes is deemed insignificant at any level, no further assessment is required. The initial scoping stage includes a mixture of qualitative and quantitative techniques to gather data and evaluate potential emissions and impacts on local air quality.

The preliminary scoping stage involves the identification of impacts of the local area on 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 air quality management areas (AQMAs), heavily-trafficked roads and any other sources of odour or dust are used as indicators of exceedences.

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 include:

A) If any of the following apply:

- 10 or more residential units or a site area of more than 0.5ha;
- more than 1,000 m^2 of floor space for all other uses or a site area greater than 1ha;

B) coupled with any of the following:

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

[14] Moorcroft and Barrowcliffe. et al. (2015) Land-use Planning & Development Control: Planning for Air Quality. Institute of Air Quality Management, London

Criteria under both A) and B) must be met in order for the assessment to proceed to the second stage. If the criteria 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) daily traffic flows changing by 100 AADT or more, within or adjacent to an AQMA, or 500 AADT or more elsewhere;
- heavy-goods-vehicle (HGV) 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.

If none of criteria in the second stage are met 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.

In the case of this air quality assessment, for the development at 150 Holborn, there will be no significant traffic generation associated with the development. Worst-case traffic generation has been determined to be well below the EPUK criteria for assessment outlined above.

The air quality impacts of future combustion processes are assessed in this report.

Model Selection

The EPUK screening assessment and the ADMS-Roads detailed dispersion model were used to assess direct effects from the boilers on local air quality when the proposed scheme will be complete and operational. The operational scenario was modelled using three years' meteorological data (2012, 2013 and 2014) and the worst-case scenario year reported. Background pollution concentrations were taken from the Defra UK Air Quality Archive for 2018, the year of operation.

The ADMS-Roads model considers the key variables that influence pollutant emission and dispersion (meteorology, surface roughness, diurnal traffic flows, predicted future traffic mixes and predicted future engine emission standard mixes). Concentrations of NO_2 were predicted at a number of locations in the vicinity of the proposed scheme. The receptors chosen include those that are representative of worst-case exposure locations around the modelled project area.

Assessment Scenarios

Predictions of NO_2 have been made for 2018, as this is the likely year that the development will become operational.

3.2 Significance Criteria

The potential effects of the proposed scheme 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 EPUK[14] 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.

Impact Magnitude

The EPUK[14] 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 significance descriptors that take account of the percentage change in concentration relative to the air quality objective and the mean concentration at the receptor during the assessment year.

Table 3.1: Description of Air Quality Impact

Air quality impact descriptors for changes to annual mean nitrogen dioxide concentrations at a receptor				
Long term mean 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 any changes in local air quality that are predicted, based on 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.

3.3 Construction Dust Assessment Methodology

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 quality 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*'[15] and the Greater London Authority (GLA) Supplementary Planning Guidance (SPG) document[16] '*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

Comparison with the standards in the Sustainable Design and Construction SPG[9] 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. The building emission benchmarks and transport emission benchmarks for the appropriate land-use classes were applied.

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 would meet the NO_X emission standard of <40mg NO_X/kWh.

[15] IAQM, 2014, Guidance on the assessment of dust from demolition and construction. Institute of Air Quality Management.

[16] Mayor of London. 2014. The control of dust and emissions from construction and demolition. Supplementary Planning Guidance. GLA

4.0 Baseline conditions

4.1 London Borough of Camden Review and Assessment Process

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 NO_2 and annual and 24-hour mean PM_{10} would not be met within Camden by the relevant deadlines.[17]

In 2000, the Council designated the whole of the London Borough of Camden an air quality management area (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 PM_{10}, but continued to exceed the annual mean objective for NO_2. 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.[18]

4.2 Local monitoring

Camden Council undertakes monitoring at a number of locations within the borough using continuous automatic monitors. The nearest continuous monitoring locations to the site are described below, including relevant sites located in the City of London:

- Holborn (Camden), approximately 600m west of the site. This monitors NO_2, and is a kerbside site. This site was opened in February 2014.
- Beech Street (City of London), approximately 970m east of the site. This monitors NO_2 and $PM_{2.5}$ and is a kerbside site;
- London Bloomsbury (Camden), approximately 1.1km northeast of the site. This monitors NO_2 and PM_{10} $PM_{2.5}$ and O_3 and is an urban background site.

Camden Council also monitors NO_2 concentrations using diffusion tubes. The diffusion tubes are located across the borough at roadside and background monitoring locations.

Table 4.1 to **Table 4.3** present recent NO_2 and PM_{10} data for the nearest continuous monitoring sites. The locations of the nearest air quality monitoring sites are shown in **Appendix 1**.

Table 4.1 shows monitoring results from the Holborn kerbside automatic monitoring site. The annual mean and the 1-hour NO_2 mean objective have been exceeded at this monitoring location in 2014.

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

[18] Lyle P (2014), 2014 Air Quality Progress Report for London Borough of Camden, Camden Council, available from

Table 4.1 - Annual mean concentrations at Holborn monitoring location (µg/m^3)

Year	Concentration NO_2	Number of 1-hour exceedences
2014	94.0	202
Objective	**40**	**18**

Table 4.2 shows monitoring results from the Beech Street roadside automatic monitoring site. The NO_2 annual mean and 1-hour objectives were exceeded in all monitoring years, and the PM_{10} 24-hour mean objective exceeded in 2011 and 2012. The PM_{10} annual mean was met in all recent monitoring years.

Table 4.2- Annual mean concentrations at the Beech Street monitoring location (µg/m^3)

Year	Concentration PM_{10}	No of 24-hour exceedences PM_{10}	Concentration NO_2	No of 1-hour exceedences NO_2
2009	28	23	90	189
2010	30	26	81	134
2011	29	35	67	42
2012	28	42	79	176
2013	30	29	85	221
2014	25	19	80	175
Objective	**40**	**35**	**40**	**18**

Table 4.3 shows monitoring results from the London Bloomsbury urban background automatic monitoring site. The annual NO_2 objective has been exceeded in all recent years. The 1-hour NO_2, and annual and 24-hour PM_{10} mean objectives have been met at this monitoring location in recent years.

Table 4.3- Annual mean concentrations at the London Bloomsbury monitoring location (µg/m^3)

Year	Concentration PM_{10}	No of 24-hour exceedences PM_{10}	Concentration NO_2	No of 1-hour exceedences NO_2
2009	23	15	54	2
2010	18	2	55	1
2011	22	17	50	0
2012	19	10	55	1
2013	18	4	44	0
2014	20	10	51	0
Objective	**40**	**35**	**40**	**18**

The results of background NO_2 diffusion tube monitoring at locations in the vicinity of the site are shown in **Table 4.4.** The results indicate that NO_2 concentrations have exceeded the annual mean objective (40µg/m^3) in all years at Tavistock Gardens, and in 2011 and 2013 at Wakefield Garden.

Table 4.4 – Annual mean NO_2 concentrations at background diffusion tube sites (µg/m^3)

Location	Distance from site	2009	2010	2011	2012	2013	NO_2 Objective
Wakefield Garden	1.1km	39.4	34.0	45.6	39.3	40.3	40
Tavistock Gardens	1.5km	50.1	52.0	47.6	40.1	49.4	40

The results of roadside NO_2 diffusion tube monitoring at locations in the vicinity of the site are shown in **Table 4.5**. The results indicate that the annual mean objective (40µg/m^3) was exceeded at all sites in recent years.

Table 4.5 – Annual mean NO_2 concentrations at roadside diffusion tube sites (µg/m^3)

Location	Distance from site	2009	2010	2011	2012	2013	NO_2 Objective
Bloomsbury Street	1.2km	81.3	41.0	76.7	71.7	76.1	40
Euston Road	1.6km	87.1	82.0	93.1	82.1	107.8	40

4.3 London Atmospheric Emissions Inventory

The London Atmospheric Emissions Inventory (LAEI)[19] and associated pollution maps, produced by the GLA, provide detailed estimates of pollution levels Londonwide. The July 2013 update indicates modelled pollutant concentrations in the vicinity of the development shown below in **Table 4.6.**

Table 4.6 - Modelled pollution levels in the vicinity of the development, taken from London Atmospheric Emissions Inventory pollution maps (µg/m^3)

Pollutant	2015	2020	NO_2 / PM_{10} Objective
NO_2	62	55	40
PM_{10}	36	30	40

4.4 Pollutant background concentrations

Background concentrations of NO_X, NO_2 and PM_{10} were obtained from the UK Air Quality Archive (AQA)[20] for the 1km x 1km grid square for the development, which is located within the grid square 531500, 181500. These background maps are available for each year up to 2030. Background NO_X, NO_2 and PM_{10} concentrations for 2016 (first year of construction) and 2018 (operational year) are shown in **Table 4.7**.

[19] GLA (2013), London Atmospheric Emissions Inventory 2010,

[20] Defra (2014), Emissions Factor Toolkit, http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

Table 4.7 - Background pollutant concentrations at 150 Holborn from the UK Air Quality Archive

Pollutant	2016 (µg/m^3)	2018 (µg/m^3)
NO_2	46.2	42.7
NO_x	82.0	74.5
PM_{10}	24.4	23.9

5.0 Assessment of Effects

5.1 Construction Phase

5.1.1 Construction Dust

Specific management controls will be required to reduce the potential for dust impacts on the adjacent residential and commercial units on 150 Holborn.

Plant operating on the proposed development and construction vehicles entering and leaving the development could have the potential to contribute to local air pollution, particularly in respect of NO_2 and PM_{10}.

The mean traffic generation over the construction period is anticipated to be fewer than 25 heavy duty vehicles during the day. The impact of this traffic would be small in comparison to the existing road traffic movements on the main roads adjacent to the proposed development. Consequently, it is anticipated that the impact of construction vehicles entering and leaving the site will be negligible during the construction phase.

Screening

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

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

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

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

The volume of the building to be demolished has been estimated to be less than 50,000m^3; this, combined with the potentially dusty nature of the material comprising the structure to be demolished, indicates that the dust emissions class is likely to be medium.

Earthworks

The total site area of the proposed development is less than 2,500m^2, and the total earthworks material to be moved on site has been estimated to be less than 20,000m^3; this, combined with the potentially dusty nature of the material moved, indicates that the dust emissions class is likely to be medium.

Construction

The total building volume to be constructed has been calculated to be less than 25,000m^3. Materials with a high potential for dust release, such as concrete and brickwork, will be used on site; and piling operations will also occur. Based on this the emissions category for this activity is likely to be medium.

Track-out

Site access will be to the west of the site, with site traffic coming from the north along Gray's Inn Road, and site egress to the south along Brooke Street and east along Holborn. There will be fewer than 25 vehicle movements from the site per day, putting the likely emission magnitude as medium.

Significance of Effects

The surrounding area has a moderate density of residential properties, which have a high sensitivity to dust soiling and health effects. Between 10 and 100 residential properties are located within 20m of the 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 and health effects has been found to be high due to the close proximity of residential properties to the site, combined with the predicted 2016 PM_{10} concentration of between 24 and 28 µg/m^3.

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

In order to determine the dust soiling and health effects from track-out, 500m of the length of the predicted site exit route along the public highway has been assessed. The number of high-sensitivity receptors within 20m of the route is between 10 and 100; therefore the dust soiling and health effects are likely to be high. The sensitivity of the area to dust soiling and health effects from the on-site activities is shown in **Table 5.2.**

Table 5.2 - Summary – Dust risk from site activities

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

The overall dust risk from the site is predicted to be medium due to the low number of HGV movements and the medium density of sensitive receptors in the surrounding area combined with the ambient concentration of PM_{10}.

All activities have an equal amount of risk, with the potential to give rise to nuisance dust effects and health impacts. Common nuisance 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.

5.2 Operational Phase

The development at 150 Holborn will be 'car-free' and accommodate only two disabled parking bays, one with an electric charging point. It is therefore anticipated there will be a negligible air quality impact from local traffic movements as a result of the proposed development.

The EPUK methodology[14] states that when a development is anticipated to generate a change in daily traffic flows of greater than 100 AADT (LDV) or 25 AADT (HGV), an assessment is required. As no additional traffic is anticipated, air quality effects from road traffic as a result of the development will not be significant.

The energy requirements of 150 Holborn will be met with a combination of photovoltaic cells and boilers installed as part of the development. Under the EPUK screening guidance, the air quality effects of any combustion process must be assessed, and guidance provided by Camden Council instructs that detailed assessments should include air dispersion modelling. The results of the modelling are included in this report.

5.2.1 Air Quality Neutral Assessment

In accordance with the Air Quality Neutral Planning Support guidance[21] published in support of the GLA SPG[9] in 2014, an air quality neutral assessment of the building emissions and boilers has been undertaken.

It is proposed that three boilers will be installed within the development, supplying the 13 residential units, one commercial unit, and retail space.

Building Emissions Benchmarks (BEBs) were calculated based on the gross floor area of different components of the proposed scheme. The emission benchmarks, including total building emissions benchmarks, are shown in **Table 5.3** below. The air quality neutral guidance gives emission benchmarks for specific land-use classes.

Calculated emissions from the proposed scheme are shown in **Table 5.4**, based on emission rates for the boilers, an assumption of a power output of 600kW with an expected loading of 45 per cent (10 hours per day).

[21] Air Quality Consultants and Environ. 2014. Air Quality Neutral Planning Support Update: GLA 80371

Table 5.3– Building Emissions Benchmark for Proposed Scheme

Description	Land use	Gross Floor Area (m^2)	BEB (g NO_x/m^2/ annum)	Benchmarked emissions (kg NO_x/ annum)
Retail	A1/ A3	1,388	22.6	31.4
Commercial	B1	12,960	30.8	399.2
Residential	C3	1,225	26.2	32.1
Total[22]		15,573	**Total benchmarked building emissions**	462.6

Table 5.4 – Calculated Building Emissions for Proposed Scheme

Plant	NO_x (g/s)	Load	NO_x (kg/annum)
Boilers (3 units)	0.02	45%	284.4

The calculated emissions for the proposed scheme are shown below the emission benchmarks; the building emissions are fully compliant with a requirement for air quality neutrality.

Transport Emissions Benchmarks (TEBs) have not been calculated for the development, as it is 'car-free' and no resulting change in traffic flows are predicted. Users of the development will not use off-site parking as the area surrounding the site has controlled parking zones (CPZ). Cycling provision of 210 bays has been integrated into the building design.

Emissions standards for boilers

The GLA SPG[9] states that individual or communal boilers installed in commercial or domestic buildings should achieve a NO_X rating of <40mgNO_X/kWh. The boilers installed in the development will meet this ultra-low-NO_X emission rating.

[22] This figure excludes 1,866m^2 of plant / service floor space. This has been excluded as this does not fall into the benchmarked land use classes; excluding this figure ensures that the assessment is conservative.

6.0 Evaluation of Assessment Results

6.1 Developmental Constraints

This section considers air quality at the proposed development site in order to examine the suitability of the site for the intended use. The concentrations of air pollutants, particularly NO_2 and PM_{10}, may constrain the proposed development if they are sufficiently high or may require mitigation measures to be considered in the design of the development. Therefore it is important to determine what the pollutant levels will be when the development is completed and occupied; completion of the development is anticipated in 2018.

The air quality conditions in the vicinity of the site have been assessed in the baseline assessment in **Section 4.0**. Air quality review and assessments carried out by Camden Council, and the LAEI and Defra map predictions indicate that pollutant concentrations at the proposed development are likely to exceed the national air quality objective for NO_2 in 2016 and are likely to continue to do so in 2018, although PM_{10} concentrations are likely to be within objective levels.

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 methodology, 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.

6.3 Operational Impacts

6.3.1 Traffic emissions

As outlined in **Section 5.2**, an assessment of the operational impacts has not been conducted as the proposed development will not impact local traffic flows. The impacts from the development itself can be considered neutral, thus requiring no further assessment.

6.3.2 Boiler emissions

The dispersion of emissions from the boiler stacks located at the proposed development have been modelled with ADMS-Roads Extra in order to determine the impact of this 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 have been integrated into the model. Due to the development having uneven roof heights and the ADMS software being unable to model irregular building shapes, the building has been split into 10 separate rectangular buildings for the purpose of modelling; these are included in **Table 6.1**.

Table 6.1– Building dimension inputs

Building number	Coordinates	Height (m)	Length / Diameter (m)	Width (m)	Angle (*)
Building 1	531176, 181660	30	16.3	5.8	91
Building 2	531176, 181639	33.7	35.6	17.9	1
Building 3	531150, 181646	33.7	60.1	13.9	158
Building 4	531165, 181640	33.7	10.9	5.6	1
Building 5	531160, 181662	28.2	15	10.2	90
Building 6	531162, 181651	28.2	10.6	10.5	90
Building 7	531156, 181654	28.2	4.8	2.4	1
Building 8	531152, 181664	28.2	4.8	2.2	1
Building 9	531166, 181632	33.7	6.5	3	1
Building 10	531161, 181643	33.7	5.4	2.3	1

6.3.3 Boiler Specifications

The boiler stacks are located on the roof of the seventh floor, and have been assumed to have a height of one metre from the roof and an emission release of 50 per cent NO_2. The emission release was chosen as appropriate with reference to the EPUK CHP guidance[23], which states that that the percentage of NO_2 at the point of emission from a combustion process is less than 10 per cent, as the remaining emissions are typically made up of oxides of nitrogen (NO). Between the point of emission and receptor locations, further atmospheric reactions may result in the creation of NO_2 from NO. Emissions of 50 per cent NO_2 has been chosen as a conservative estimate.

The details of the boilers modelled in this assessment are shown in **Table 6.2**, based on likely specifications provided by Elementa Consulting.

[23] Dearnley, E. 2012. Combined Heat and Power: Air Quality Guidance for Local Authorities. EPUK (Environmental Protection UK).

Table 6.2 – Boiler Emissions

Specifications	Boiler
Exhaust mass flow rate	857 kg/hr
Exhaust volume flow rate	0.1875 m^3/s
Exhaust stack diameter	200 mm
Exhaust temperature	60˚C
NOx emission rate	0.0067 g/s
Operating hours	10

6.3.4 Receptors

Sensitive receptors have been selected where the public is regularly present and likely to be exposed to air pollutants, such as residential properties and schools. 21 residential properties and St Alban's Primary School have been selected in the vicinity of the development. Results are presented in **Table 6.3**

In addition, the six floors over which the nine proposed dwellings in the development are to be built have been assessed for their suitability as residential properties when the development is complete and operational. The ground floor level to sixth floor level facades of the north-eastern end of the development have been assessed. Predicted annual mean pollutant concentrations at these modelled locations are presented in **Table 6.4.** The year with the highest NO_2 contributions and impacts (2014) has been reported as the worst-case scenario.

Table 6.3- Estimated Annual Mean NO_2 ($\mu g/m^3$) at Existing Receptors near to the Proposed Development

Receptor Number	Receptor address	Coordinates	Height (m)	2018 Background NO_2 ($\mu g/m^3$)	Contribution from point sources - NO_2 ($\mu g/m^3$)	Impact descriptor
1.1	1st floor, 7 High Holborn (south facade)	531125, 181625	3.5	42.7	0.10	Negligible
1.2	2nd floor, 7 High Holborn (south facade)	531125, 181625	7.0	42.7	0.10	Negligible
1.3	3rd floor, 7 High Holborn (south facade)	531125, 181625	10.5	42.7	0.10	Negligible
1.4	4th floor, 7 High Holborn (south facade)	531125, 181625	14.0	42.7	0.10	Negligible
1.5	5th floor, 7 High Holborn (south facade)	531125, 181625	17.5	42.7	0.10	Negligible
1.6	6th floor, 7 High Holborn (south facade)	531125, 181625	21.0	42.7	0.10	Negligible
1.7	7th floor, 7 High Holborn (south facade)	531125, 181625	24.5	42.7	0.10	Negligible
2.1	1st floor, 7 High Holborn (north facade)	531108, 181670	3.5	42.7	0.04	Negligible
2.2	2nd floor, 7 High Holborn (north facade)	531108, 181670	7.0	42.7	0.04	Negligible
2.3	3rd floor, 7 High Holborn (north facade)	531108, 181670	10.5	42.7	0.04	Negligible
2.4	4th floor, 7 High Holborn (north facade)	531108, 181670	14.0	42.7	0.04	Negligible

2.5	5th floor, 7 High Holborn (north facade)	531108, 181670	17.5	42.7	0.04	Negligible
2.6	6th floor, 7 High Holborn (north facade)	531108, 181670	21.0	42.7	0.05	Negligible
2.7	7th floor, 7 High Holborn (north facade)	531108, 181670	24.5	42.7	0.05	Negligible
3.1	Ground floor, Brooke Court (north-east facade)	531181, 181739	1.5	42.7	0.03	Negligible
3.2	1st floor, Brooke Court (north-east facade)	531181, 181739	3.5	42.7	0.03	Negligible
3.3	2nd floor, Brooke Court (north-east facade)	531181, 181739	7.0	42.7	0.04	Negligible
3.4	3rd floor, Brooke Court (north-east facade)	531181, 181739	10.5	42.7	0.05	Negligible
4	St Albans Primary School	531151, 181808	1.5	42.7	0.03	Negligible
5.1	Ground floor, 3 Gray's Inn Square	531104, 181683	2.0	42.7	0.02	Negligible
5.2	1st floor, 3 Gray's Inn Square	531104, 181683	5.5	42.7	0.03	Negligible
5.3	2nd floor, 3 Gray's Inn Square	531104, 181683	9.0	42.7	0.03	Negligible
5.4	3rd floor, 3 Gray's Inn Square	531104, 181683	12.5	42.7	0.03	Negligible
6.1	Ground floor, 13 Gray's Inn Square	531077, 181749	1.5	42.7	0.02	Negligible
6.2	1st floor, 13 Gray's Inn Square	531077, 181749	3.5	42.7	0.02	Negligible

6.3	2nd floor, 13 Gray's Inn Square	531077, 181749	7.0	42.7	0.02	Negligible
6.4	3rd floor, 13 Gray's Inn Square	531077, 181749	10.5	42.7	0.02	Negligible
7.1	1st floor, 28 Gray's Inn Road	531117, 181703	3.5	42.7	0.02	Negligible
7.2	2nd floor, 28 Gray's Inn Road	531117, 181703	7.0	42.7	0.03	Negligible
7.3	3rd floor, 28 Gray's Inn Road	531117, 181703	10.5	42.7	0.03	Negligible
7.4	4th floor, 28 Gray's Inn Road	531117, 181703	14.0	42.7	0.04	Negligible
7.5	5th floor, 28 Gray's Inn Road	531117, 181703	17.5	42.7	0.06	Negligible
8.1	Ground floor, Brook Court	531146, 181733	1.5	42.7	0.04	Negligible
8.2	1st floor, Brook Court	531146, 181733	3.5	42.7	0.04	Negligible
8.3	2nd floor, Brook Court	531146, 181733	7.0	42.7	0.05	Negligible
9.1	1st floor, Heron House, 322 High Holborn	531035, 181597	3.5	42.7	0.03	Negligible
9.2	2nd floor, Heron House, 322 High Holborn	531035, 181597	7.0	42.7	0.03	Negligible
9.3	3rd floor, Heron House, 322 High Holborn	531035, 181597	10.5	42.7	0.03	Negligible
9.4	4th floor, Heron House, 322 High Holborn	531035, 181597	14.0	42.7	0.03	Negligible

9.5	5th floor, Heron House, 322 High Holborn	531035, 181597	17.5	42.7	0.03	Negligible
9.6	6th floor, Heron House, 322 High Holborn	531035, 181597	21.0	42.7	0.02	Negligible
9.7	7th floor, Heron House, 322 High Holborn	531035, 181597	24.5	42.7	0.02	Negligible
9.8	8th floor, Heron House, 322 High Holborn	531035, 181597	28.0	42.7	0.02	Negligible
16.1	1st floor, Aston House (36-37 Furnival Street)	531206, 181526	3.5	42.7	0.02	Negligible
16.2	2nd floor, Aston House (36-37 Furnival Street)	531206, 181526	7.0	42.7	0.02	Negligible
16.3	3rd floor, Aston House (36-37 Furnival Street)	531206, 181526	10.5	42.7	0.02	Negligible
16.4	4th floor, Aston House (36-37 Furnival Street)	531206, 181526	14.0	42.7	0.02	Negligible
17.1	1st floor, 1-3 Printers Inn Court	531186, 181429	3.5	42.7	0.01	Negligible
17.2	2nd floor, 1-3 Printers Inn Court	531186, 181429	7.0	42.7	0.01	Negligible
17.3	3rd floor, 1-3 Printers Inn Court	531186, 181429	10.5	42.7	0.01	Negligible
17.4	4th floor, 1-3 Printers Inn Court	531186, 181429	14.0	42.7	0.01	Negligible
18.1	1st floor, The Castle Public House (26 Furnival St)	531206, 181450	3.5	42.7	0.01	Negligible
18.2	2nd floor, The Castle Public House (26 Furnival St)	531206, 181450	7.0	42.7	0.01	Negligible

18.3	3rd floor, The Castle Public House (26 Furnival St)	531206, 181450	10.5	42.7	0.01	Negligible
18.4	4th floor, The Castle Public House (26 Furnival St)	531206, 181450	14.0	42.7	0.01	Negligible
19.1	3rd floor, Vesage Court, Leather Lane	531302, 181645	10.5	42.7	0.04	Negligible
19.2	4th floor, Vesage Court, Leather Lane	531302, 181645	14.0	42.7	0.04	Negligible
19.3	5th floor, Vesage Court, Leather Lane	531302, 181645	17.5	42.7	0.04	Negligible
19.4	6th floor, Vesage Court, Leather Lane	531302, 181645	21.0	42.7	0.04	Negligible
19.5	7th floor, Vesage Court, Leather Lane	531302, 181645	24.5	42.7	0.04	Negligible
19.6	8th floor, Vesage Court, Leather Lane	531302, 181645	28.0	42.7	0.04	Negligible
19.7	9th floor, Vesage Court, Leather Lane	531302, 181645	31.5	42.7	0.04	Negligible
19.8	10th floor, Vesage Court, Leather Lane	531302, 181645	35.0	42.7	0.04	Negligible
19.9	11th floor, Vesage Court, Leather Lane	531302, 181645	38.5	42.7	0.03	Negligible
19.10	12th floor, Vesage Court, Leather Lane	531302, 181645	10.5	42.7	0.04	Negligible
19.11	13th floor, Vesage Court, Leather Lane	531302, 181645	45.5	42.7	0.03	Negligible
20.1	1st floor, 2 Greville Street	531298, 181721	3.5	42.7	0.04	Negligible

20.2	2nd floor, 2 Greville Street	531298, 181721	7.0	42.7	0.04	Negligible
20.3	3rd floor, 2 Greville Street	531298, 181721	10.5	42.7	0.04	Negligible
21.1	Ground floor, Cranley Building, Brooke's Market	531232, 181753	1.5	42.7	0.05	Negligible
21.2	1st floor, Cranley Building, Brooke's Market	531232, 181753	3.5	42.7	0.05	Negligible
21.3	2nd floor, Cranley Building, Brooke's Market	531232, 181753	7.0	42.7	0.05	Negligible
22.1	1st floor, The Beauchamp Building, Brooke's Market	531255, 181757	3.5	42.7	0.04	Negligible
22.2	2nd floor, The Beauchamp Building, Brooke's Market	531255, 181757	7.0	42.7	0.04	Negligible
22.3	3rd floor, The Beauchamp Building, Brooke's Market	531255, 181757	10.5	42.7	0.04	Negligible
23.1	1st floor, 32 Leather Lane	531282, 181783	3.5	42.7	0.03	Negligible
23.2	2nd floor, 32 Leather Lane	531282, 181783	7.0	42.7	0.03	Negligible
23.3	3rd floor, 32 Leather Lane	531282, 181783	10.5	42.7	0.03	Negligible
23.4	4th floor, 32 Leather Lane	531282, 181783	14.0	42.7	0.03	Negligible
23.5	5th floor, 32 Leather Lane	531282, 181783	17.5	42.7	0.03	Negligible
24.1	Ground floor, Sweeps Building, 34 Leather Lane	531274, 181814	1.5	42.7	0.03	Negligible

24.2	1st floor, Sweeps Building, 34 Leather Lane	531274, 181814	3.5	42.7	0.03	Negligible
24.3	2nd floor, Sweeps Building, 34 Leather Lane	531274, 181814	7.0	42.7	0.03	Negligible
25.1	Ground floor, Langdale House, 4-12 Dorrington Street	531214, 181774	1.5	42.7	0.04	Negligible
25.2	1st floor, Langdale House, 4-12 Dorrington Street	531214, 181774	3.5	42.7	0.04	Negligible
25.3	2nd floor, Langdale House, 4-12 Dorrington Street	531214, 181774	7.0	42.7	0.05	Negligible
25.4	3rd floor, Langdale House, 4-12 Dorrington Street	531214, 181774	10.5	42.7	0.05	Negligible
26.1	Ground floor, St Ursulas Hostel, Brooke St	531194, 181771	1.5	42.7	0.05	Negligible
26.2	1st floor, St Ursulas Hostel, Brooke St	531194, 181771	3.5	42.7	0.05	Negligible
26.3	2nd floor, St Ursulas Hostel, Brooke St	531194, 181771	7.0	42.7	0.05	Negligible
26.4	3rd floor, St Ursulas Hostel, Brooke St	531194, 181771	10.5	42.7	0.05	Negligible
26.5	4th floor, St Ursulas Hostel, Brooke St	531194, 181771	14.0	42.7	0.05	Negligible
26.6	5th floor, St Ursulas Hostel, Brooke St	531194, 181771	17.5	42.7	0.05	Negligible
27.1	1st floor, 29 Leather Lane	531263, 181815	3.5	42.7	0.03	Negligible
27.2	2nd floor, 29 Leather Lane	531263, 181815	7.0	42.7	0.03	Negligible

27.3	3rd floor, 29 Leather Lane	531263, 181815	10.5	42.7	0.03	Negligible
28.1	Ground floor, 39-41 Leather Lane	531243, 181841	1.5	42.7	0.03	Negligible
28.2	1st floor, 39-41 Leather Lane	531243, 181841	3.5	42.7	0.02	Negligible
28.3	2nd floor, 39-41 Leather Lane	531243, 181841	7.0	42.7	0.02	Negligible
28.4	3rd floor, 39-41 Leather Lane	531243, 181841	10.5	42.7	0.02	Negligible
29.1	1st floor, Laney Building, Bourne Estate (south facade)	531236, 181869	3.5	42.7	0.02	Negligible
29.2	2nd floor, Laney Building, Bourne Estate (south facade)	531236, 181869	7.0	42.7	0.02	Negligible
29.3	3rd floor, Laney Building, Bourne Estate (south facade)	531236, 181869	10.5	42.7	0.02	Negligible
30.1	1st floor, Laney Building, Bourne Estate (north facade)	531207, 181940	3.5	42.7	0.01	Negligible
30.2	2nd floor, Laney Building, Bourne Estate (north facade)	531207, 181940	7.0	42.7	0.01	Negligible
30.3	3rd floor, Laney Building, Bourne Estate (north facade)	531207, 181940	10.5	42.7	0.01	Negligible
30.4	4th floor, Laney Building, Bourne Estate (north facade)	531207, 181940	14.0	42.7	0.01	Negligible
30.5	5th floor, Laney Building, Bourne Estate (north facade)	531207, 181940	17.5	42.7	0.01	Negligible

Table 6.4- Estimated Annual Mean NO_2 ($\mu g/m^3$) at Future Receptors within the Proposed Development

Receptor Number	Receptor address	Coordinates	Height (m)	Background NO_2 ($\mu g/m^3$)	Total NO_2 ($\mu g/m^3$)
10.1	Ground floor, 150 Holborn (Op1)	531184, 181662	1.5	42.7	43.0
10.2	1st floor, 150 Holborn (Op1)	531184, 181662	3.8	42.7	43.0
10.3	2nd floor, 150 Holborn (Op1)	531184, 181662	7.5	42.7	43.0
10.4	3rd floor, 150 Holborn (Op1)	531184, 181662	11.2	42.7	43.0
10.5	4th floor, 150 Holborn (Op1)	531184, 181662	14.9	42.7	43.0
10.6	5th floor, 150 Holborn (Op1)	531184, 181662	18.6	42.7	43.0
10.7	6th floor, 150 Holborn (Op1)	531184, 181662	22.3	42.7	43.0
11.1	Ground floor, 150 Holborn (Op2)	531176, 181677	1.5	42.7	42.9
11.2	1st floor, 150 Holborn (Op2)	531176, 181677	3.8	42.7	42.9
11.3	2nd floor, 150 Holborn (Op2)	531176, 181677	7.5	42.7	42.9
11.4	3rd floor, 150 Holborn (Op2)	531176, 181677	11.2	42.7	42.9

11.5	4th floor, 150 Holborn (Op2)	531176, 181677	14.9	42.7	42.9
11.6	5th floor, 150 Holborn (Op2)	531176, 181677	18.6	42.7	42.9
11.7	6th floor, 150 Holborn (Op2)	531176, 181677	22.3	42.7	43.0
12.1	Ground floor, 150 Holborn (Op3)	531168, 181667	1.5	42.7	43.2
12.2	1st floor, 150 Holborn (Op3)	531168, 181667	3.8	42.7	43.2
12.3	2nd floor, 150 Holborn (Op3)	531168, 181667	7.5	42.7	43.2
12.4	3rd floor, 150 Holborn (Op3)	531168, 181667	11.2	42.7	43.2
12.5	4th floor, 150 Holborn (Op3)	531168, 181667	14.9	42.7	43.2
12.6	5th floor, 150 Holborn (Op3)	531168, 181667	18.6	42.7	43.2
12.7	6th floor, 150 Holborn (Op3)	531168, 181667	22.3	42.7	43.2
13.1	Ground floor, 150 Holborn (Op4)	531185, 181677	1.5	42.7	42.9
13.2	1st floor, 150 Holborn (Op4)	531185, 181677	3.8	42.7	42.9
13.3	2nd floor, 150 Holborn (Op4)	531185, 181677	7.5	42.7	42.9
13.4	3rd floor, 150 Holborn (Op4)	531185, 181677	11.2	42.7	42.9

13.5	4th floor, 150 Holborn (Op4)	531185, 181677	14.9	42.7	42.9
13.6	5th floor, 150 Holborn (Op4)	531185, 181677	18.6	42.7	42.9
13.7	6th floor, 150 Holborn (Op4)	531185, 181677	22.3	42.7	42.9
14.1	Ground floor, 150 Holborn (Op5)	531168, 181674	1.5	42.7	43.0
14.2	1st floor, 150 Holborn (Op5)	531168, 181674	3.8	42.7	43.0
14.3	2nd floor, 150 Holborn (Op5)	531168, 181674	7.5	42.7	43.0
14.4	3rd floor, 150 Holborn (Op5)	531168, 181674	11.2	42.7	43.0
14.5	4th floor, 150 Holborn (Op5)	531168, 181674	14.9	42.7	43.0
14.6	5th floor, 150 Holborn (Op5)	531168, 181674	18.6	42.7	43.0
14.7	6th floor, 150 Holborn (Op5)	531168, 181674	22.3	42.7	43.0
15.1	Ground floor, 150 Holborn (Op6)	531186, 181656	1.5	42.7	43.1
15.2	1st floor, 150 Holborn (Op6)	531186, 181656	3.8	42.7	43.1
15.3	2nd floor, 150 Holborn (Op6)	531186, 181656	7.5	42.7	43.1
15.4	3rd floor, 150 Holborn (Op6)	531186, 181656	11.2	42.7	43.1

15.5	4th floor, 150 Holborn (Op6)	531186, 181656	14.9	42.7	43.1
15.6	5th floor, 150 Holborn (Op6)	531186, 181656	18.6	42.7	43.1
15.7	6th floor, 150 Holborn (Op6)	531186, 181656	22.3	42.7	43.1

6.3.5 Air Quality Effects from Changes in Boiler Plant Emissions

The modelled results in **Table 6.3** show the effect of the emissions from the boilers. At all of the receptors modelled, the change in NO_2 resulting from the operation of the proposed development is less than one per cent and the IAQM classifies this air quality impact as negligible, see **Table 3.1**. The impact of the operation of the boilers will therefore not be significant.

6.3.6 Air Quality Effects for New Locations

The total NO_2 concentrations are predicted to exceed the air quality objectives (**Table 2.1**) at all modelled future receptors at 150 Holborn. This is shown in **Table 6.4** to be largely due to the high ambient background concentrations of NO_2 in the vicinity of the development, likely to be a result of the main road (Holborn) adjacent to the site.

This has been mitigated to some degree by the positioning of the future residential properties, as they are furthest away from the main road. It must also been taken into account that these receptors will be replacing existing receptors on site.

7.0 Mitigation

7.1 Mitigation of Construction Dust

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

The primary impacts associated with this development are likely to be in the form of dust generated during demolition, earthworks, construction and track out activities. 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.
- All mobile vehicles associated with the demolition or construction should comply with the standards of the London Low Emission Zone. This also applies to Non-Road Mobile Machinery (NRMM) such as generators, construction machinery and mobile cranes.
- 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.
- Visual dust soiling checks on and around the site should be undertaken to ensure that the mitigation measures are being effective.

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 GLA Supplementary Planning Guidance for construction and demolition sites[16] should be consulted. Provided these measures are used it is expected that emissions from the site during construction will not present a significant problem to local receptors.

7.2 Mitigation of Exposure to NO_2

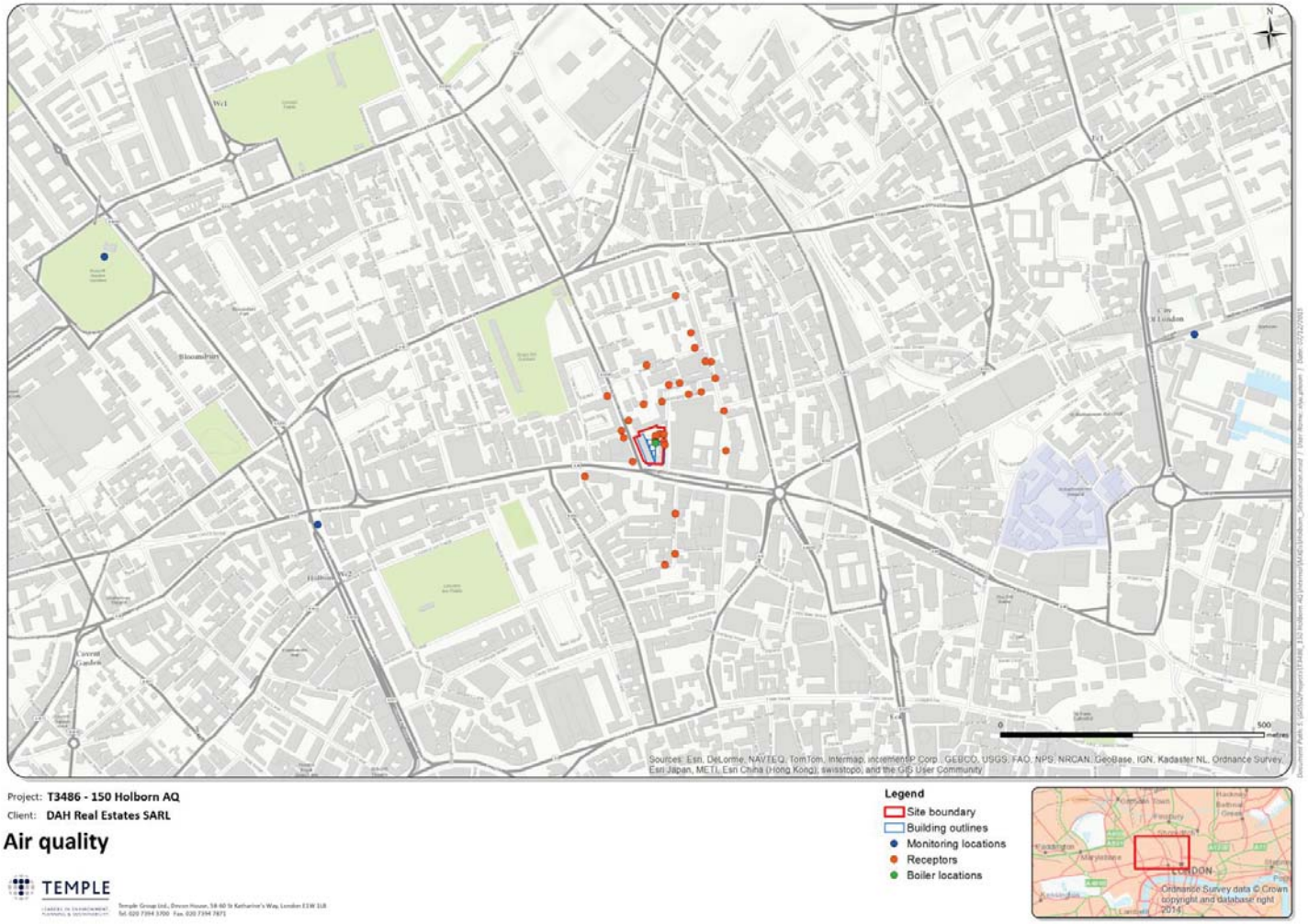
The annual concentration of NO_2 is predicted to exceed the AQS objective at relevant on-site receptors when the development is operational. This has already been mitigated by positioning the residential properties away from the main road.

8.0 Conclusions

The air quality assessment has determined the following:

- Baseline air quality conditions in the vicinity of the development are likely to meet the air quality objectives for NO_2 1-hour, PM_{10} annual and 24-hour mean in both the construction and operational years. Annual mean NO_2 is likely to be exceeded in both the construction and operational years.
- The assessment of air quality in relation to roads has determined that there will be a negligible impact on local traffic and therefore air quality as a result of construction and operational traffic.
- The assessment of air quality in relation to the boilers within the development has determined that there will be a negligible impact on nearby sensitive receptors.
- The assessment in relation to the boilers has determined that future receptors within the development will be exposed to concentrations in excess of the annual mean objective for NO_2. However, it should be noted that these receptors are replacing current receptors on site.
- 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.
- The air-quality-neutral assessment has identified that the proposed development meets the Mayor of London's requirements for air quality neutrality.

Appendix I – Site map


N
0
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metres
Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community
Project: T3486 - 150 Holborn AQ
Client: DAH Real Estates SARL
Air quality
TEMPLE
Legend
Site boundary
Building outlines
Monitoring locations
Receptors
Boiler locations
LONDON
Ordnance Survey data © Crown copyright and database right 2014

Appendix II – Modelled scenarios - boilers

Table 8.1- Estimated Annual Mean NO_2 ($\mu g/m^3$) at Existing Receptors near to the Proposed Development (All modelled years)

Receptor Number	Receptor address	Coordinates	Height (m)	2012 Contribution from point sources - NO_2 ($\mu g/m^3$)	2013 Contribution from point sources - NO_2 ($\mu g/m^3$)	2014 Contribution from point sources - NO_2 ($\mu g/m^3$)
1.1	1st floor, 7 High Holborn (south facade)	531125, 181625	3.5	0.09	0.13	0.10
1.2	2nd floor, 7 High Holborn (south facade)	531125, 181625	7.0	0.09	0.13	0.10
1.3	3rd floor, 7 High Holborn (south facade)	531125, 181625	10.5	0.09	0.13	0.10
1.4	4th floor, 7 High Holborn (south facade)	531125, 181625	14.0	0.09	0.13	0.10
1.5	5th floor, 7 High Holborn (south facade)	531125, 181625	17.5	0.09	0.13	0.10
1.6	6th floor, 7 High Holborn (south facade)	531125, 181625	21.0	0.09	0.13	0.10
1.7	7th floor, 7 High Holborn (south facade)	531125, 181625	24.5	0.09	0.13	0.10
2.1	1st floor, 7 High Holborn (north facade)	531108, 181670	3.5	0.03	0.04	0.04
2.2	2nd floor, 7 High Holborn (north facade)	531108, 181670	7.0	0.03	0.04	0.04
2.3	3rd floor, 7 High Holborn (north facade)	531108, 181670	10.5	0.03	0.04	0.04
2.4	4th floor, 7 High Holborn (north facade)	531108, 181670	14.0	0.03	0.04	0.04

2.5	5th floor, 7 High Holborn (north facade)	531108, 181670	17.5	0.04	0.04	0.04
2.6	6th floor, 7 High Holborn (north facade)	531108, 181670	21.0	0.04	0.04	0.05
2.7	7th floor, 7 High Holborn (north facade)	531108, 181670	24.5	0.04	0.05	0.05
3.1	Ground floor, Brooke Court (north-east facade)	531181, 181739	1.5	0.03	0.03	0.03
3.2	1st floor, Brooke Court (north-east facade)	531181, 181739	3.5	0.03	0.03	0.03
3.3	2nd floor, Brooke Court (north-east facade)	531181, 181739	7.0	0.04	0.03	0.04
3.4	3rd floor, Brooke Court (north-east facade)	531181, 181739	10.5	0.05	0.04	0.05
4	St Albans Primary School	531151, 181808	1.5	0.02	0.02	0.03
5.1	Ground floor, 3 Gray's Inn Square	531104, 181683	2.0	0.02	0.02	0.02
5.2	1st floor, 3 Gray's Inn Square	531104, 181683	5.5	0.02	0.02	0.03
5.3	2nd floor, 3 Gray's Inn Square	531104, 181683	9.0	0.02	0.02	0.03
5.4	3rd floor, 3 Gray's Inn Square	531104, 181683	12.5	0.02	0.03	0.03

6.1	Ground floor, 13 Gray's Inn Square	531077, 181749	1.5	0.02	0.02	0.02
6.2	1st floor, 13 Gray's Inn Square	531077, 181749	3.5	0.02	0.02	0.02
6.3	2nd floor, 13 Gray's Inn Square	531077, 181749	7.0	0.02	0.02	0.02
6.4	3rd floor, 13 Gray's Inn Square	531077, 181749	10.5	0.02	0.02	0.02
7.1	1st floor, 28 Gray's Inn Road	531117, 181703	3.5	0.02	0.02	0.02
7.2	2nd floor, 28 Gray's Inn Road	531117, 181703	7.0	0.02	0.02	0.03
7.3	3rd floor, 28 Gray's Inn Road	531117, 181703	10.5	0.02	0.03	0.03
7.4	4th floor, 28 Gray's Inn Road	531117, 181703	14.0	0.03	0.03	0.04
7.5	5th floor, 28 Gray's Inn Road	531117, 181703	17.5	0.04	0.04	0.06
8.1	Ground floor, Brook Court	531146, 181733	1.5	0.03	0.03	0.04
8.2	1st floor, Brook Court	531146, 181733	3.5	0.03	0.03	0.04
8.3	2nd floor, Brook Court	531146, 181733	7.0	0.03	0.03	0.05
9.1	1st floor, Heron House, 322 High Holborn	531035, 181597	3.5	0.02	0.03	0.03

9.2	2nd floor, Heron House, 322 High Holborn	531035, 181597	7.0	0.02	0.03	0.03
9.3	3rd floor, Heron House, 322 High Holborn	531035, 181597	10.5	0.02	0.03	0.03
9.4	4th floor, Heron House, 322 High Holborn	531035, 181597	14.0	0.02	0.03	0.03
9.5	5th floor, Heron House, 322 High Holborn	531035, 181597	17.5	0.02	0.03	0.03
9.6	6th floor, Heron House, 322 High Holborn	531035, 181597	21.0	0.02	0.03	0.02
9.7	7th floor, Heron House, 322 High Holborn	531035, 181597	24.5	0.02	0.03	0.02
9.8	8th floor, Heron House, 322 High Holborn	531035, 181597	28.0	0.02	0.03	0.02
16.1	1st floor, Aston House (36-37 Furnival Street)	531206, 181526	3.5	0.02	0.03	0.02
16.2	2nd floor, Aston House (36-37 Furnival Street)	531206, 181526	7.0	0.02	0.03	0.02
16.3	3rd floor, Aston House (36-37 Furnival Street)	531206, 181526	10.5	0.02	0.03	0.02

16.4	4th floor, Aston House (36-37 Furnival Street)	531206, 181526	14.0	0.02	0.03	0.02
17.1	1st floor, 1-3 Printers Inn Court	531186, 181429	3.5	0.01	0.01	0.01
17.2	2nd floor, 1-3 Printers Inn Court	531186, 181429	7.0	0.01	0.01	0.01
17.3	3rd floor, 1-3 Printers Inn Court	531186, 181429	10.5	0.01	0.01	0.01
17.4	4th floor, 1-3 Printers Inn Court	531186, 181429	14.0	0.01	0.01	0.01
18.1	1st floor, The Castle Public House (26 Furnival St)	531206, 181450	3.5	0.01	0.02	0.01
18.2	2nd floor, The Castle Public House (26 Furnival St)	531206, 181450	7.0	0.01	0.02	0.01
18.3	3rd floor, The Castle Public House (26 Furnival St)	531206, 181450	10.5	0.01	0.01	0.01
18.4	4th floor, The Castle Public House (26 Furnival St)	531206, 181450	14.0	0.01	0.01	0.01
19.1	3rd floor, Vesage Court, Leather Lane	531302, 181645	10.5	0.04	0.04	0.04
19.2	4th floor, Vesage Court, Leather Lane	531302, 181645	14.0	0.04	0.04	0.04
19.3	5th floor, Vesage Court, Leather Lane	531302, 181645	17.5	0.04	0.04	0.04

19.4	6th floor, Vesage Court, Leather Lane	531302, 181645	21.0	0.04	0.04	0.04
19.5	7th floor, Vesage Court, Leather Lane	531302, 181645	24.5	0.04	0.04	0.04
19.6	8th floor, Vesage Court, Leather Lane	531302, 181645	28.0	0.04	0.04	0.04
19.7	9th floor, Vesage Court, Leather Lane	531302, 181645	31.5	0.04	0.04	0.04
19.8	10th floor, Vesage Court, Leather Lane	531302, 181645	35.0	0.04	0.03	0.04
19.9	11th floor, Vesage Court, Leather Lane	531302, 181645	38.5	0.04	0.03	0.03
19.10	12th floor, Vesage Court, Leather Lane	531302, 181645	10.5	0.04	0.04	0.04
19.11	13th floor, Vesage Court, Leather Lane	531302, 181645	45.5	0.03	0.03	0.03
20.1	1st floor, 2 Greville Street	531298, 181721	3.5	0.05	0.03	0.04
20.2	2nd floor, 2 Greville Street	531298, 181721	7.0	0.05	0.03	0.04
20.3	3rd floor, 2 Greville Street	531298, 181721	10.5	0.05	0.03	0.04
21.1	Ground floor, Cranley Building, Brooke's Market	531232, 181753	1.5	0.05	0.04	0.05
21.2	1st floor, Cranley Building, Brooke's Market	531232, 181753	3.5	0.05	0.04	0.05

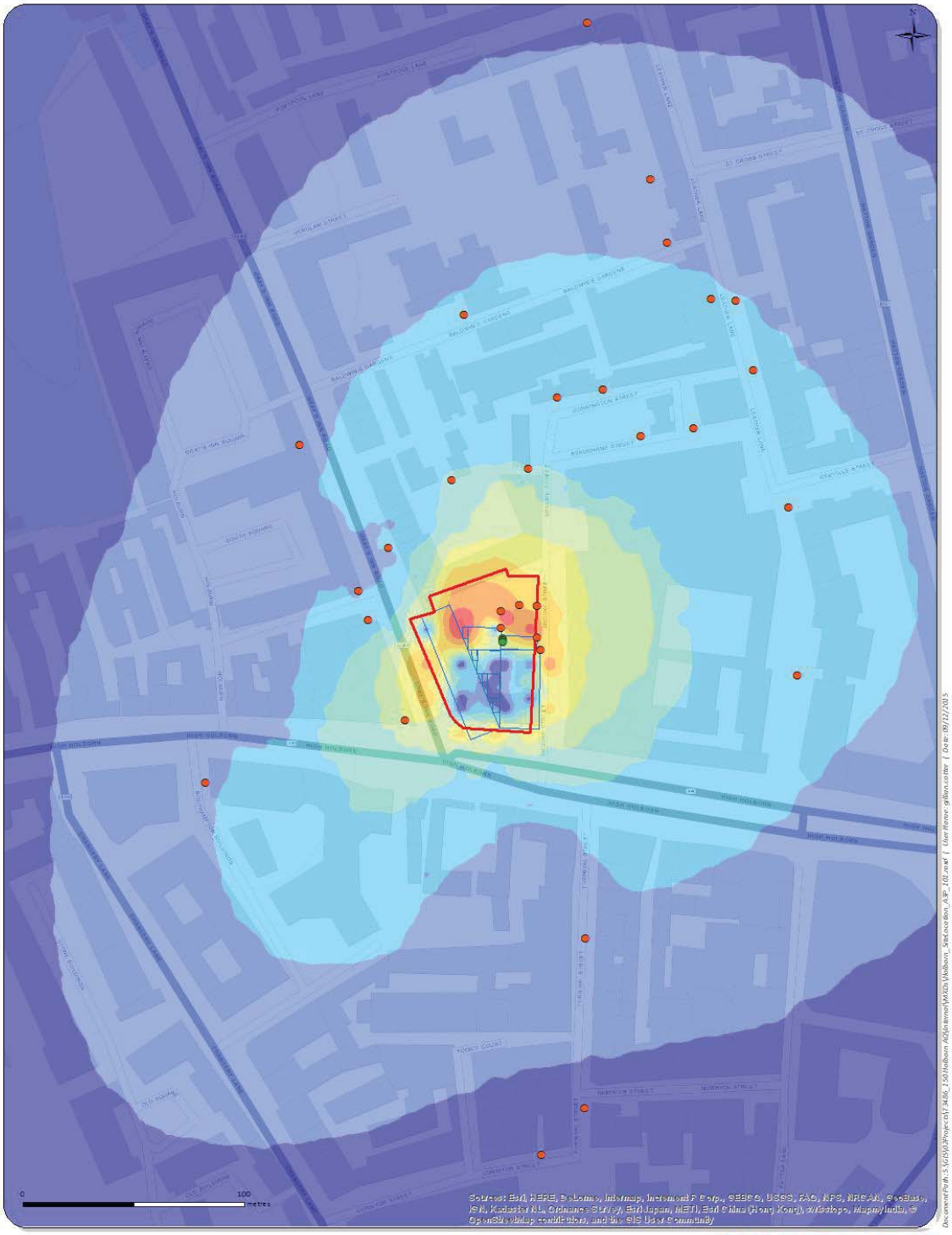
21.3	2nd floor, Cranley Building, Brooke's Market	531232, 181753	7.0	0.05	0.04	0.05
22.1	1st floor, The Beauchamp Building, Brooke's Market	531255, 181757	3.5	0.05	0.04	0.04
22.2	2nd floor, The Beauchamp Building, Brooke's Market	531255, 181757	7.0	0.05	0.04	0.04
22.3	3rd floor, The Beauchamp Building, Brooke's Market	531255, 181757	10.5	0.05	0.04	0.04
23.1	1st floor, 32 Leather Lane	531282, 181783	3.5	0.04	0.03	0.03
23.2	2nd floor, 32 Leather Lane	531282, 181783	7.0	0.04	0.03	0.03
23.3	3rd floor, 32 Leather Lane	531282, 181783	10.5	0.03	0.03	0.03
23.4	4th floor, 32 Leather Lane	531282, 181783	14.0	0.03	0.03	0.03
23.5	5th floor, 32 Leather Lane	531282, 181783	17.5	0.03	0.03	0.03
24.1	Ground floor, Sweeps Building, 34 Leather Lane	531274, 181814	1.5	0.03	0.02	0.03
24.2	1st floor, Sweeps Building, 34 Leather Lane	531274, 181814	3.5	0.03	0.02	0.03

24.3	2nd floor, Sweeps Building, 34 Leather Lane	531274, 181814	7.0	0.03	0.02	0.03
25.1	Ground floor, Langdale House, 4-12 Dorrington Street	531214, 181774	1.5	0.04	0.04	0.04
25.2	1st floor, Langdale House, 4-12 Dorrington Street	531214, 181774	3.5	0.04	0.04	0.04
25.3	2nd floor, Langdale House, 4-12 Dorrington Street	531214, 181774	7.0	0.04	0.04	0.05
25.4	3rd floor, Langdale House, 4-12 Dorrington Street	531214, 181774	10.5	0.04	0.04	0.05
26.1	Ground floor, St Ursulas Hostel, Brooke St	531194, 181771	1.5	0.04	0.04	0.05
26.2	1st floor, St Ursulas Hostel, Brooke St	531194, 181771	3.5	0.04	0.04	0.05
26.3	2nd floor, St Ursulas Hostel, Brooke St	531194, 181771	7.0	0.04	0.04	0.05
26.4	3rd floor, St Ursulas Hostel, Brooke St	531194, 181771	10.5	0.04	0.04	0.05
26.5	4th floor, St Ursulas Hostel, Brooke St	531194, 181771	14.0	0.05	0.04	0.05
26.6	5th floor, St Ursulas Hostel, Brooke St	531194, 181771	17.5	0.05	0.04	0.05
27.1	1st floor, 29 Leather Lane	531263, 181815	3.5	0.03	0.03	0.03

27.2	2nd floor, 29 Leather Lane	531263, 181815	7.0	0.03	0.03	0.03
27.3	3rd floor, 29 Leather Lane	531263, 181815	10.5	0.03	0.02	0.03
28.1	Ground floor, 39-41 Leather Lane	531243, 181841	1.5	0.02	0.02	0.03
28.2	1st floor, 39-41 Leather Lane	531243, 181841	3.5	0.02	0.02	0.02
28.3	2nd floor, 39-41 Leather Lane	531243, 181841	7.0	0.02	0.02	0.02
28.4	3rd floor, 39-41 Leather Lane	531243, 181841	10.5	0.02	0.02	0.02
29.1	1st floor, Laney Building, Bourne Estate (south facade)	531236, 181869	3.5	0.02	0.02	0.02
29.2	2nd floor, Laney Building, Bourne Estate (south facade)	531236, 181869	7.0	0.02	0.02	0.02
29.3	3rd floor, Laney Building, Bourne Estate (south facade)	531236, 181869	10.5	0.02	0.02	0.02
30.1	1st floor, Laney Building, Bourne Estate (north facade)	531207, 181940	3.5	0.01	0.01	0.01
30.2	2nd floor, Laney Building, Bourne Estate (north facade)	531207, 181940	7.0	0.01	0.01	0.01
30.3	3rd floor, Laney Building, Bourne Estate (north facade)	531207, 181940	10.5	0.01	0.01	0.01

30.4	4th floor, Laney Building, Bourne Estate (north facade)	531207, 181940	14.0	0.01	0.01	0.01
30.5	5th floor, Laney Building, Bourne Estate (north facade)	531207, 181940	17.5	0.01	0.01	0.01

Appendix III – Contour plot of worst-case scenario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100
metres
Project: T3486 - 150 Holborn AQ
Client: DAH Real Estates SARL
Air quality
Legend
Site boundary
Building outlines
Receptors
Boiler locations
2018 NOx concentrations
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0.0274 - 0.0543
0.0544 - 0.1015
0.1016 - 0.1657
0.1658 - 0.2467
0.2468 - 0.3479
0.3480 - 0.4728
0.4729 - 0.6416
0.6417 - 0.861
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