Air Quality Assessment Report
Space House

DATE OF ISSUE: **20 MAY 2019**

ISSUE: **00**

HM REFERENCE: **25738-RP-SU-001**

PROJECT:

SPACE HOUSE
1 KEMBLE STREET
LONDON
WC2B 4AN

CLIENT:

SLQR TRUSTEE NO1 LIMITED &
SLQR TRUSTEE NO2 LIMITED
AS CO TRUSTEES FOR SLQR UNIT
TRUST NO3

PROJECT NAME:	**SPACE HOUSE**
REPORT NAME:	**Air Quality Assessment Report** **Space House**
ISSUE STATUS:	**FINAL**
HM REFERENCE:	**25738-RP-SU-001**
DATE OF ISSUE:	**20 MAY 2019**
ISSUE:	**00**
AUTHOR:	**TOM READE**
CHECKER:	**TOM HALL**
APPROVER:	**CHRIS BIRCH**

HM OFFICE: **SHACKLETON HOUSE**
HAYS GALLERIA
4 BATTLEBRIDGE LANE
LONDON
SE1 2HP

T: +44 (0)20 7940 8888
HILSONMORAN.COM
INFO@HILSONMORAN.COM

DOCUMENT HISTORY:

ISSUE	DATE	DETAILS
00	20/5/2019	FINAL FOR PLANNING

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Executive Summary

Hilson Moran has been commissioned by Gardiner and Theobald LLP, on behalf of SLQR Trustee No1 Limited & SLQR Trustee No2 Limited as Co Trustees for SLQR Unit Trust No3, to undertake an air quality assessment to consider the potential air quality impacts arising from the proposed redevelopment of Civil Aviation Authority (CAA) House, 1 Kemble Street, London.

This report presents the findings of the assessment, which addresses the potential air quality impacts during both the construction and operational stages of the Proposed Development. The assessment has been undertaken in line with the relevant policy and guidance, and where necessary outlines the required mitigation measures to minimise impacts.

A qualitative assessment of construction phase impacts has been carried out. There is a low to negligible risk of impacts during the construction phase and, through good site practice and the implementation of suitable mitigation measures, the residual effect of the construction phase on air quality is not significant.

A quantitative assessment of operational phase impacts has been carried out by modelling the emissions from the proposed gas-fired boilers using the ADMS 5.2 dispersion model. A detailed road traffic assessment has, however, not been carried out as the vehicle trip generation from the Proposed Development does not breach the criteria in air quality planning guidance for sites within an AQMA.

In summary, the results indicate the impact of the Proposed Development is classified as negligible with the exception of existing receptor E1 (London School of Economics), which is classified as moderate adverse. However, the annual mean objective is not generally applicable at existing commercial uses and, therefore, mitigation is not recommended.

There are no predicted exceedances of the hourly mean NO_2 air quality standard objective and the greatest short-term process contribution from the proposed gas-fired boilers is less than 20µg/m^3, therefore mitigation is not required.

With respect to particulates, annual mean PM_{10} and $PM_{2.5}$ concentrations within the boundary of the Application Site are estimated to be below the relevant annual mean AQS objectives, therefore mitigation is not recommended.

The overall residual effect for the operational phase is not significant.

It is worth noting that with the introduction of the Real Driving Emissions (RDE) testing and the emergence of cleaner vehicle technologies (in particular EURO 6 (VI) a, b, c and d fleet categories – which indicate lower emissions than the previous EURO 5 (V), and the uptake of electric/hybrid vehicles) that deliver improvements in vehicle emissions, in particular NOx, ambient pollutant concentrations have the potential to be lower in the future.

The Proposed Development was found to be compliant in relation to Building and Transport Emissions and is therefore air quality neutral. No mitigation or additional off-setting is required.

Overall, with the recommended mitigation measure in place (construction phase only), the proposals would be compliant with legislation and policy.

1. Introduction

Hilson Moran has been commissioned by Gardiner and Theobald LLP, on behalf of SLQR Trustee No1 Limited & SLQR Trustee No2 Limited as Co Trustees for SLQR Unit Trust No3, to undertake an air quality assessment to consider the potential air quality impacts arising from the proposed redevelopment of Civil Aviation Authority (CAA) House, 1 Kemble Street, London, hereafter referred to as the 'Proposed Development' or 'Application Site'.

1.1. Proposed Development

The Application Site lies within the London Borough of Camden (LBC) but to south of Kemble Street is the City of Westminster, as illustrated in **Figure 1**. The Application Site is currently home to the Civil Aviation Authority (CAA).

The planning application for the Proposed Development seeks the following:

"Removal of existing roof plant equipment at 1 Kemble Street and erection of a single storey facsimile floor plus one setback floor; removal of roof plant from 43-59 Kingsway and erection of a single storey set-back extension; enclosure of the southern external stair at ground floor level on Kingsway with slimline glazing replacement windows and new glazing at ground floor level across the site; enclosing the redundant petrol filling station area with slimline glazing; façade cleaning; new landscaping and public realm works and internal alterations to both buildings in connection with their refurbishment and change of use from Class B1 offices to Class A1/A3 and flexible Class B1/B1 and events space (sui generis) at part ground and basement levels."

1.2. Potential Impacts

This report presents the findings of the air quality assessment for both the operational and construction phase. During the construction phase, activities on the Application Site could give rise to dust, which, if transported beyond the site boundary, could have an adverse effect on local air quality. During the operational phase, emissions arising from vehicles and any onsite combustion plant (such as gas-fired boilers) have the potential to affect local pollution levels, both within and surrounding the Application Site. For both phases the impacts are identified and the mitigation measures that should be implemented to minimise these impacts are described.

The air quality assessment considers the potential impact on future users of the Proposed Development as the site is located within an existing Air Quality Management Area (AQMA). Furthermore, an Air Quality Neutral Assessment (AQNA) has been undertaken in accordance with the Mayor of London's Supplementary Planning Guidance.

A glossary of terms is provided in **Appendix A**.

2. Legislation, Policy and Guidance

2.1. Legislation

A summary of the relevant air quality legislation is provided below.

2.1.1. Air Quality Strategy for England, Scotland, Wales and Northern Ireland

The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland[1], most recently updated in July 2007. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that the European Union and International agreements are met in the UK.

The AQS covers the following air pollutants: ammonia (NH_3), benzene (C_6H_6), 1,3 butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), oxides of nitrogen (NO_X) (including nitrogen dioxide NO_2), particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), ozone (O_3), and polycyclic aromatic hydrocarbons (PAHs).

The AQS sets standards and objectives for the listed pollutants for the protection of human health, vegetation and ecosystems. The standards are based on recommendations by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO) based on current understanding and scientific knowledge about the effects of air pollution on health and the environment. The air quality objectives are policy based targets set by the UK Government that are often expressed as maximum concentrations not to be exceeded either without exception or with a limited number of exceedances within a specified timescale.

For the pollutants considered in this assessment, there are both a long-term (*e.g*. annual mean) and short-term standards (*e.g*. one hour mean). In the case of NO_2, the short term standard is for a 1-hour averaging period (no more than 18 exceedances of 200µg/m^3 per year), whereas for PM_{10} it is a 24-hour averaging period (no more than 35 exceedances of 50µg/m^3 per year). The variation in time periods reflects the varying impacts on health of differing exposures to pollutants.

2.1.2. Air Quality Standards Regulations

The air quality objectives in the AQS are statutory in England with the Air Quality (England) Regulations 2000[2] and the Air Quality (England) (Amendment) Regulations 2002[3] for the purpose of Local Air Quality Management (LAQM).

The regulations require likely exceedances of the AQS objectives to be assessed in relation to:

> *"…the quality of air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present…"*

The Air Quality Standards (Amendment) Regulations 2016[4] transpose the European Union Ambient Air Quality Directive (2008/50/EC) into law in England. This Directive sets legally binding limit values for concentrations in outdoor air of major air pollutants that impact public health such as NO_2, PM_{10} and $PM_{2.5}$. The limit values for NO_2 and PM_{10} are the same concentration levels as the relevant AQS objectives and the limit value for $PM_{2.5}$ is a concentration of 25µg/m^3. The relevant air quality objectives are presented in Table 2.1.

Table 2.1 Air Quality Objectives for Relevant Pollutants

Pollutant	Concentration	Measured as
NO_2	200µg/m^3	1-hour mean, not to be exceeded more than 18 times a year (99.79%ile)
	40µg/m^3	Annual mean
PM_{10}	50µg/m^3	24-hour mean, not to be exceeded more than 35 times a year (90.41%ile)
	40µg/m^3	Annual mean
$PM_{2.5}$	25µg/m^3	Annual mean, 0% margin of tolerance from 1st January 2015 and reducing to 20µg/m^3 by January 2020

2.1.3. Environment Act 1995

Part IV of the Environment Act 1995[5] requires local authorities to periodically review and assess the quality of air within their administrative area. The reviews have to consider both the air quality at the time of review and likely future air quality during the 'relevant period' and whether any air quality objectives prescribed in regulations are being achieved or are likely to be achieved in the future. Where the objectives are not likely to be achieved, an authority is required to designate an AQMA. For each designated AQMA the local authority is required to produce an Air Quality Action Plan (AQAP) that works to ensure compliance with the objectives by implementing a number of air quality improvement measures.

2.1.4. Environmental Protection Act 1990

Section 79 of the Environmental Protection Act 1990 (as amended)[6] makes provision for the identification and control of statutory nuisances. The Act identifies statutory nuisance, in relation to air quality, as:

- *"Any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance"; and*
- *"Any accumulation or deposit which is prejudicial to health or a nuisance".*

As a result, the level at which a nuisance occurs is highly variable and dependent on perception, with effects influenced by existing conditions and the degree of change that has occurred.

Where a statutory nuisance has been demonstrated the local authority must serve an abatement notice, non-compliance with which would constitute a legal offence. The abatement notice may prevent or restrict occurrence or re-occurrence of the nuisance or the local authority may, itself, undertake action to abate the nuisance and recover any associated expenses.

2.2. Planning Policy

A summary of the national, regional and local planning policy relevant to air quality and the Development is detailed below.

2.2.1. National Planning Policy

2.2.1.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF)[7] sets out policies, which will apply to the preparation of local plans, and to development management decisions. This framework sets out the Government's economic, environmental and social planning policies for England. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.

The NPPF sets out the Government's planning policies on the conservation and enhancement of the natural environment, with the following paragraphs relating to air quality:

- Paragraph 8c, which states "*to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy*";
- Paragraph 54, which states "*Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition*";
- Paragraph 103, which states "*the planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making*";
- Paragraph 170e, which states *"preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans"*;
- Paragraph 181, which states "*Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan*";
- Paragraph 183, which states *"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning*

issues should not be revisited through the permitting regimes operated by pollution control authorities"; and,

- Paragraph 205c, which states "*ensure that any unavoidable noise, dust and particle emissions and any blasting vibrations are controlled, mitigated or removed at source, and establish appropriate noise limits for extraction in proximity to noise sensitive properties*".

2.2.2. Regional Planning Policy

2.2.2.1. Clearing the Air: The Mayor's Air Quality Strategy 2010

The Mayor's Air Quality Strategy[8] is focused on delivering improvements to London's air quality and identifies road traffic as the largest contributor to air pollution. The strategy sets out a framework for improving air quality and details a number of measures to reduce emissions in London, these include:

- Development of electric vehicle infrastructure;
- Congestion charging and the London Low Emission Zone (LEZ);
- Smarter travel initiatives to encourage a shift to greener modes of transport;
- Funding and supporting car clubs (especially hybrid and electric cars);
- Maintaining roads in good repair to reduce the contribution of particulate matter from road surface wear;
- Smoothing traffic;
- Bus emissions programme, so that older buses have been fitted with particulate traps and diesel-electric hybrid buses are introduced as quickly as possible; and
- Publication and implementation of the London Best Practice Guidance for controlling dust and emissions from construction.

Regarding new developments, the Strategy plans to make use of the existing planning system to ensure that any new development does not have a negative impact on air quality in London by stating '*new developments in London shall as a minimum be 'air quality neutral' through the adoption of best practice in the management and mitigation of emissions*'. It also aims to implement the Construction Best Practice Guidance on all construction sites across London.

2.2.2.2. The London Plan: Spatial Development Strategy for Greater London 2016

Planning policy in respect of development planning and air quality management is also presented in the London Plan[9]. Policy 7.14 on improving air quality states that development proposals should:

- Minimise exposure to existing poor air quality, make provision for addressing air quality problems and where development is likely to be used by large numbers of people particularly vulnerable to poor air quality, set up design solutions, buffer zones and travel plans for promoting a greater use of sustainable transport modes;
- Promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance;
- Be at minimum 'air quality neutral' and not lead to further deterioration of existing poor air quality;
- Ensure that where provision needs to be made to reduce emissions from a development, this is generally made on-site; and

- Where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations.

2.2.2.3. The Draft London Plan: Spatial Development Strategy for Greater London 2018

Planning policy in respect of development planning and air quality management is also presented in the draft London Plan[10], which is being taken by the Mayor of London as adopted policy. Policy SI1 on improving air quality states:

- *Development proposals should not:*
  - *i. Lead to further deterioration of existing poor air quality;*
  - *ii. Create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits;*
  - *iii. Reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality;*
  - *iv. Create unacceptable risk of high levels of exposure to poor air quality.*
- *Development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality. Particular care should be taken with developments that are in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people.*
- *The development of large-scale redevelopment areas, such as Opportunity Areas and those subject to an Environmental Impact Assessment should propose methods of achieving an Air Quality Positive approach through the new development. All other developments should be at least Air Quality Neutral.*
- *Development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance.*
- *Air Quality Assessments (AQAs) should be submitted with all major developments, unless they can demonstrate that transport and building emissions will be less than the previous or existing use.*
- *Development proposals should ensure that where emissions need to be reduced, this is done on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated.*

2.2.3. Local Planning Policy

2.2.3.1. London Borough of Camden Local Plan

The Camden Local Plan[11] sets out the Council's planning policies and replaces the Core Strategy and Development Policies planning documents (adopted in 2010). It ensures that Camden continues to have robust, effective and up to-date planning policies that respond to changing circumstances and the borough's unique characteristics and contribute to delivering the Camden Plan and other local priorities. The Local Plan will cover the period from 2016-2031.

The policies of interest within the local plan include: Policy CC4 – Air Quality, which states:

"The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough.

The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of the development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan.

Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution. Where the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact.

Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan".

In addition to Policy CC4, this Plan also actively supports the improvement of air quality in Camden by:

- Requiring all new development in the borough to be 'car-free' (see Policy T2 Parking and car-free development);
- Maintaining and increasing green infrastructure (see Policy A2 Open space);
- Reducing emissions associated with new development (see Policy CC1 Climate change mitigation); and,
- Supporting and encouraging sensitive energy efficiency improvements to existing buildings (see Policy CC1 Climate change mitigation).

2.2.3.2. Camden's Draft Clean Air Action Plan

The Camden Draft Clean Air Action Plan[12] has been produced as part of the borough's duty to London Local Air Quality Management. It outlines the action they will take to improve air quality in Camden between 2019 and 2022. The Clean Air Action Plan (CAAP) is split across seven themes:

- Building Emissions;
- Construction Emissions;
- Transport Emissions;
- Communities and Schools;
- Delivery, Servicing and Freight;
- Public Health and Awareness; and,
- Lobbying.

The CAAP has been developed in recognition of the role local authorities have under the Environment Act to meet the air quality obligations. Camden's role in this includes:

- Working to reduce emissions from their own estate and operations;
- Helping residents and visitors to reduce emissions and exposure;
- Using planning policy and regulation to reduce air pollution;
- Implementing innovative projects across the borough to improve air quality;

- Using their influence to lobby for increased financial and regulatory support for the mitigation of air pollution;
- Maintaining a monitoring network and ensuring the data is freely accessible; and,
- Raising awareness on how to reduce emissions and exposure.

The CAAP is support by a number of other plans and strategies (including Camden 2025, Our Camden Plan, Green Action for Change 2010 – 2020, Camden's Parking and Enforcement Plan, Camden's Transport Strategy 2019 – 2022 and the Joint Strategic Needs Assessment) with the overarching aim if improving air quality in the borough of Camden.

2.2.4. Guidance

A summary of the publications referred to in undertaking the air quality assessment is provided below.

2.2.4.1. London Local Air Quality Management Technical Guidance

The Mayor of London has published guidance for use by the London boroughs in their review and assessment work[13]. The guidance is referred to as LLAQM.TG(16) and has been appropriately used within this assessment.

2.2.4.2. Local Air Quality Management Review and Assessment Technical Guidance

The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities. This technical guidance, identified as LAQM.TG(16)[14], is for use by local authorities for their review and assessment work and has been applied where appropriate to this assessment.

2.2.4.3. Land-Use Planning and Development Control: Planning for Air Quality

Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have published guidance[15] which offers advice as to when and air quality assessment may or may not be required. The guidance document details what should be included within an assessment, how to determine the significance of air quality impacts and the likely mitigation measures required to minimise the impacts.

2.2.4.4. Guidance on the Assessment of Dust from Demolition and Construction

This document[16], published by the IAQM, provides guidance on how to assess the impact of construction activities on air quality associated with new developments. The methodology prescribed within the document allows the impacts to be categorised based on risk (with particular reference to dust and PM_{10} on sensitive human and ecological receptors) and, where applicable, identify mitigation measures associated to the risk classification determined.

2.2.4.5. National Planning Practice Guidance

The National Planning Practice Guidance[17] outlines how the planning process can address potential air quality impacts associated with new development. It provides guidance on the level of detail required, how impacts can be mitigated and also provides information on how local authorities may take air quality as a specific consideration in a planning decision.

2.2.4.6. London Councils Guidance for Air Quality Assessments

The London Councils have published guidance[18] for undertaking air quality assessments in the London Boroughs, the majority of which have declared AQMA's. The guidance sets out suggested

methodologies for undertaking air quality assessments and sets out criteria for determining the impacts of a new development on air quality.

2.2.4.7. Mayor of London's Supplementary Planning Guidance for the Control of Dust and Emissions during Construction and Demolition

The Supplementary Planning Guidance (SPG)[19] builds on the London Councils guidance to establish best practice when mitigating impacts on air quality during construction and demolition. The SPG, offers further detail and seeks to address emissions from Non-Road Mobile Machinery (NRMM) through the use of a Low Emission Zone, which was introduced in 2015.

The SPG provides a methodology for assessment the impacts on air quality of the construction and activities following the same procedure set out in the IAQM guidance. It identifies the potential impacts and risks to sensitive receptors and details the relevant control measures required to mitigate any adverse impacts.

2.2.4.8. Greater London Authority: Sustainable Design and Construction Supplementary Planning Guidance

Section 4.3 of this SPG[20] provides guidance on when an air quality assessment is required, looks at how transport measures can minimise emissions to air and sets out emissions standards/limits for combustion plant.

The SPG also contains guidance on assessing the air quality neutrality of a new development. Emission benchmarks for transport and buildings for NO_X and PM_{10} are detailed in the SPG.

Developments that do not exceed the calculated emission benchmarks are considered 'air quality neutral', however when the emission benchmarks are exceeded the development is not 'air quality neutral'. Where a development exceeds the benchmarks, additional mitigation or off-setting is required. This can be achieved by providing appropriate abatement including: green planting, upgrade or additional abatement to on-site combustion plant, retro-fitting of abatement technology for vehicles or flues, exposure reduction. Such measures can be achieved by condition or S106 contribution. The SPG states that air quality monitoring is not an eligible method for off-setting air quality impacts as this does not contribute to actual air quality improvements.

2.2.4.9. Camden planning Guidance – Amenity

The Camden Amenity Planning Guidance[21] was adopted in September 2011, but subsequently updated in March 2018. The planning guidance outlines what the Council requires in relation to air quality for a planning application, what an air quality assessment should cover, and what measures can be implemented to minimise pollutant and protect public exposure. This guidance has been used to inform this assessment where appropriate.

2.2.4.10. Air Quality Neutral Planning Support Guidance

The Air Quality Neutral Planning Support Guidance[22] provides a methodology for assessing the air quality neutrality of Proposed Developments in London.

3. Methodology

3.1. Scope of the Assessment

The scope of the assessment has been determined in the following way:

- Consultation with the Environmental Health Officer (EHO) at LBC to agree the scope of the assessment and the methodology to be applied;
- Review of the LBC's latest review and assessment reports[23] and the air quality data for the area surrounding the Application Site, including the LBC, Defra[24], the London Air Quality Network (LAQN)[25] and the London Atmospheric Emissions Inventory (LAEI)[26];
- Desk study to confirm the locations of nearby existing receptors that may be sensitive to changes in local air quality, and a review of the masterplan for the Development to establish the location of new sensitive receptors;
- Review of the traffic data, provided by Canapero Associates; and,
- Review of the technical specifications for the proposed onsite gas-fired boilers, provided by Long and Partners.

The scope of the assessment includes consideration of the potential impacts on local air quality resulting from:

- Dust and particulate matter generated by on-site activities during the construction phase;
- Increases in pollutant concentrations as a result of exhaust emissions arising from construction traffic and plant;
- Increases in pollutant concentrations as a result of exhaust emissions arising from traffic generated by the Proposed Development once operational; and,
- Increases in pollutant concentrations as a result of emissions generated by the proposed onsite gas-fired boilers once the Proposed Development is operational.

3.2. Construction Phase

Assessment of the risk of impact associated with the generation of dust during the construction phase of the Proposed Development and determination of subsequent mitigation measures necessary has been undertaken following IAQM guidelines.

The assessment is based on a series of steps: screening the requirement for a detailed assessment, classification of the likely magnitude of dust emissions; characterisation of the area of influence and establishment of its sensitivity to dust; and establishment of the overall risk of impact. The risk of impact from dust emissions from the Proposed Development considers effects on human health, nuisance as a result of dust soiling and ecological receptors from four main activities: demolition; earthworks; construction; and trackout. The potential for dust emissions from each activity should be considered, unless any of them are not relevant to the Proposed Development.

The guidelines identify appropriate screening criteria for the identification of potential receptors, based on a conservative approach and in consideration of the exponential decline in both airborne concentrations and the rate of deposition with distance. A detailed assessment of the impact of dust from construction sites will be required where:

- A 'human receptor' is located within 350m of the boundary of the site or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance;

- An 'ecological receptor' is located within 50m of the boundary of the site or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance.

The magnitude of dust emissions for each activity is classified as small, medium or large depending upon the scale of the works proposed, materials involved and level of activity required. The IAQM guidelines provide examples of how the magnitude of emission can be defined, which are identified in Table 3.1. The Proposed Development is unlikely to satisfy all criteria within the examples, therefore professional judgement and site specific information are used to identify appropriate emission magnitude.

Table 3.1 Dust Emission Magnitude *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Activity	Small	Medium	Large
Demolition	• Total building volume <20,000m^3 • Construction material with low potential for dust release (*e.g.* metal cladding or timber) • Demolition activities <10m above ground level • Demolition during wetter months	• Total building volume 20,000 - 50,000m^3 • Potentially dusty construction material • Demolition activities 10-20m above ground level	• Total building volume >50,000m^3 • Potentially dusty construction material (*e.g.* concrete) • On-site crushing and screening • Demolition activities >20m above ground
Earthworks	• Total site area <2,500m^2 • Soil type with large grain size (*e.g.* sand) • <5 heavy earth moving vehicles active at any one time • Formation of bunds <4m in height • Total material moved <20,000 tonnes • Earthworks during wetter months	• Total site area 2,500 - 10,000m^2 • Moderately dusty soil type (*e.g.* silt) • 5 - 10 heavy earth moving vehicles active at any one time • Formation of bunds 4 - 8m in height • Total material moved 20,000 - 100,00 tonnes	• Total site area >10,000 m^2 • Potentially dusty soil type (*e.g.* clay) • >10 heavy earth moving vehicles active at any one time • Formation of bunds >8m in height • Total material moved >100,000 tonnes
Construction	• Total building volume <25,000 m^3 • Construction material with low potential for dust (*e.g.* metal cladding or timber).	• Total building volume 25,000 - 100,000 m^3 • Potentially dusty construction material (*e.g.* concrete) • On-site concrete batching	• Total building volume >100,000 m^3 • On-site concrete batching, sandblasting
Trackout	• <10 HDV (>3.5t) outward movements* in any one day# • Surface material with low potential for dust release • Unpaved road length <50m	• 10 - 50 HDV (>3.5t) outward movements* in any one day# • Moderately dusty surface material (*e.g.* high clay content) • Unpaved road length 50 - 100m	• >50 HDV (>3.5t) outward movements* in any one day# • Potentially dusty surface material (*e.g.* high clay content) • Unpaved road length >100 m
* A vehicle movement is a one way journey, i.e. from A to B, and excludes the return journey. # HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average.			

Consideration is given to the likely sensitivity of the area to the impacts of dust, establishing a sensitivity of low, medium or high for dust soiling, human health and ecological receptors. The sensitivity of the area considers a number of factors, including the specific sensitivities of receptors in the area, the proximity and number of those receptors, local baseline conditions such as background concentrations and site specific factors.

The first step in identifying the sensitivity of the area is to establish the sensitivity of the receptor, based on the presence or level of activity associated with the area influenced by the Proposed Development. Professional judgement and site specific information are used to assign an appropriate level of receptor sensitivity using the principles outlined in Table 3.2. Following this, the sensitivity of the area can be established from Tables 3.3 to 3.5 based on the sensitivity of the receptor, number of receptors (in the case of human health and dust soiling) and the distance from source.

Table 3.2 Receptor Sensitivity Definitions *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Activity	Small	Medium	Large
Dust Soiling	• Enjoyment of amenity would not reasonably be expected; • There is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; • Transient exposure, where people or property is only expected to be present for limited periods of time as part of the normal pattern of use; • Indicative examples include playing fields, farmland, footpaths, short-term car parks and roads.	• Users would expect to enjoy a reasonable level of amenity, but not reasonably at same level as in their home; • The appearance, aesthetics or value of property could be diminished by soiling; • Indicative examples include parks and places of work.	• Users can reasonably expect enjoyment of a high level of amenity; • The appearance, aesthetics or value of property would be diminished by soiling, and continuous or regularly extended periods of presence expected during normal pattern of land use; • Indicative examples include dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms.
Human Health	• Locations where human exposure is transient; • Indicative examples include public footpaths, playing fields, parks and shopping streets.	• Locations where the people exposed are workers#, and exposure is over a time period relevant to the air quality objective for PM_{10}*; • Indicative examples include office and shop workers, but not those occupationally exposed to dust.	• Locations where members of the public are exposed over a period of time relevant to the air quality objective for PM_{10}*; • Indicative examples include residential properties, hospitals, schools and residential care homes.
Ecological	• Locations with a local designations where the features may be affected by dust deposition, *e.g*. Local Nature Reserve.	• Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; • Locations with a national designation where the features may be affected by dust deposition, *e.g.* Site of Special Scientific Interest.	• Locations with an international or national designation and the designated features may be affected by dust soiling, *e.g*. Special Area of Conservation with acid heathland; • Location where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain.

Activity	Small	Medium	Large
* In the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day, following Defra Guidance.			
# Workers are considered to be less sensitive than the general public as a whole because those most sensitive to the effects of air pollution, such as young children, are not normally workers.			

Table 3.3 ***Sensitivity of the Area to Dust Soiling Effects on People and Property*** *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Receptor Sensitivity	Number of Receptors	Distance from Source			
		<20m	*<50m*	*<100m*	*<350m*
High	>100	High	High	Medium	Low
	10 – 100	High	Medium	Low	Low
	1 – 10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 3.4 ***Sensitivity of the Area to Human Health Impacts*** *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Receptor Sensitivity	Annual Mean PM_{10} Concentration ($\mu g/m^3$)	Number of Receptors	Distance from Source				
			<20m	*<50m*	*<100m*	*<200m*	*<350m*
High	>32	>100	High	High	High	Medium	Low
		10 – 100	High	High	Medium	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	28 - 32	>100	High	High	Medium	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	24 - 28	>100	High	Medium	Low	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10 – 100	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
Medium	>32	>10	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} Concentration ($\mu g/m^3$)	Number of Receptors	Distance from Source				
			<20m	*<50m*	*<100m*	*<200m*	*<350m*
	28 - 32	>10	Medium	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
	24 - 28	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
	<24	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 3.5 ***Sensitivity of the Area to Ecological Impacts*** *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Receptor Sensitivity	Distance from Source	
	<20m	*<50m*
High	High	Medium
Medium	Medium	Low
Low	Low	Low

3.2.1. Establishing Significance

The risk of dust related impacts from the Proposed Development is established from the sensitivity of the area and the likely dust emission magnitude. The risk should be established, on the worst-case area sensitivity and in the absence of mitigation, for each of the construction related activities (demolition, earthworks, construction and trackout) following the matrix in Table 3.6.

The IAQM guidelines identify a range of mitigation measures intended to reduce the emission and effects of dust from construction sites, and identify their likely applicability to a development based on the level of impact risk attributed. Consideration is given to these in the development of mitigation measures, with the significance of the residual effect based on professional judgement.

Table 3.6 ***Risk of Dust Impacts from Each Activity*** *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Sensitivity of Area	Activity	Dust Emission Magnitude		
		Large	*Medium*	*Small*
High	Demolition	High Risk	Medium Risk	Medium Risk
	Earthworks	High Risk	Medium Risk	Low Risk
	Construction	High Risk	Medium Risk	Low Risk
	Trackout	High Risk	Medium Risk	Low Risk
Medium	Demolition	High Risk	Medium Risk	Low Risk
	Earthworks	Medium Risk	Medium Risk	Low Risk
	Construction	Medium Risk	Medium Risk	Low Risk
	Trackout	Medium Risk	Low Risk	Negligible
Low	Demolition	Medium Risk	Low Risk	Negligible
	Earthworks	Low Risk	Low Risk	Negligible
	Construction	Low Risk	Low Risk	Negligible
	Trackout	Low Risk	Low Risk	Negligible

3.3. Operational Phase

3.3.1. Road Traffic Emissions

The trip generation for the Application Site is presented in Table 3.7.

Table 3.7 ***Trip Generation of Application Site (AADT)***

Scenario	Total Vehicles (AADT)		
	LDV	HDV	Total
Existing	99	99	198
Proposed	115	114	229
Net Change	16	15	30

Following consultation with the Transport Consultant (Caneparo Associates) it has been confirmed that the trip generation (AADT) of the Proposed Development does not breach the criteria detailed in Table 6.2 of the EPUK & IAQM air quality planning guidance for sites located within an AQMA (>100 AADT for Light Duty Vehicles (LDVs) and >25 AADT for Heavy Duty Vehciles (HDVs)). On this basis, a detailed road traffic assessment has been scoped out.

3.3.2. Energy Centre Emissions

The impact of the proposed on-site energy centre has been assessed using ADMS 5.2. The ADMS model uses meteorological data including wind speed and direction to determine the how pollution is transported and diluted with distance from the source. For this assessment meteorological data from London City Airport for 2013 has been utilised as this is considered

representative of the Application Site and aligns with the LAEI base model. Table 3.8 summarise the energy centre modelling inputs.

Table 3.8 ADMS 5.2 Modelling Parameters

Parameter	Each Boiler
Unit Number	3
Stack Height (m)	60.657 (1m above roof level)
Stack Diameter (m)	0.4 (individual)
Flue Gas Release Temperature (°C)	71
Efflux Velocity (m/s)	7.78
NO_X Emission Rate (g/s)	0.0343
NO_x Emissions (mg/kWh)	38
NO_X Emissions (mg/Nm^3)	44.2
Operating Schedule	12 hours per day

Local topography and the existing built environment can affect the dispersion characteristics of a plume, *i.e*. existing buildings can cause the plume to come to the ground much closer to the stack than would be normally expected. The dispersion model contains algorithms which attempt to account for such impacts.

A description of the modelled buildings can be found in **Appendix B** and is shown in **Figure 2**.

The annual mean NO_X concentrations and the hourly mean concentrations (99.79th percentile) associated with the energy centre have been predicted. The predicted NO_X contributions were then converted to NO_2 assuming 70% for long-term emissions and 35% for short-term emissions, in accordance with Environment Agency guidance[27].

For the assessment, two scenarios have been considered:

- 2022 – LAEI Baseline Data (2020); and,
- 2022 – LAEI Baseline Data (2020) + Energy Centre Process Contributions.

3.3.3. Sensitivity Test

A sensitivity test has been undertaken considering the following scenarios:

- 2022 – LAEI Baseline Data (2013); and,
- 2022 – LAEI Baseline Data (2013) + Energy Centre Process Contributions.

This approach assumes there is no improvement in baseline concentrations between the current and future baseline years, whereby the 2013 LAEI mapped data has been used, as opposed to 2020.

3.3.4. Selection of Background Concentrations

Baseline concentrations from NO_2, PM_{10} and $PM_{2.5}$ have been obtained from the Greater London Authority (GLA) LAEI models for 2013 and 2020 (to indicate baseline concentrations in the opening year of 2022). The LAEI baseline datasets incorporate all known pollution sources and have been validated against the LAQN. The 2020 LAEI baseline data set is based up on GLA emission forecasts.

To obtain total pollutant concentrations the Process Contributions (PCs) as a result of onsite energy centre have been added to the 2020 baseline concentrations taken from the LAEI and the 2013 LAEI baseline concentrations for the sensitivity test.

This approach is considered reasonable, as the LAEI models have been validated and represent the GLA's position for baseline projections of pollutants concentrations.

3.3.5. Significant Energy Centre Contributions

The Environment Agency's Air Emissions risk assessment guidance sets the following criteria whereby PCs can screened out as being insignificant:

- The long term PC is <1% of the long term environmental standard (for NO_2 <0.4µg/m^3);
- The short term PC is <10% of the short term environmental standard (for NO_2 <20µg/m^3).

Where the PC exceed either of the above criteria the impact is potentially significant, and it is necessary to compare the Predicted Environmental Concentration (PEC) against the relevant AQS objective, by combining the PC with appropriate baseline.

3.3.6. Impacts of the Emissions from the Proposed Energy Centre

The total NO_2 concentrations (*i.e.* PEC) at each receptor were calculated as follows:

- Long term: PEC = PC + Baseline Concentration
- Short term: $PEC_{short\ term}$ = PC_{short} term + (2 x $Baseline_{long\ term}$).

To compare the emissions generated from the Proposed Development with the relevant AQS, objectives for the PCs have to be combined relevant LAEI baseline concentrations.

To determine compliance with the 1-hour mean objective for NO_2, detailed modelling has been undertaken and the results are presented in Section 5.2.

Total annual mean concentrations for PM_{10} and $PM_{2.5}$ are calculated by adding the modelled output with the LAEI baseline concentrations. The total pollutant concentrations are then compared with annual mean objectives of 40µg/m^3 and 25µg/m^3, respectively.

The short term AQS objective for PM_{10} is 50µg/m^3, where no more than 35 exceedances are allowed per year. Guidance from Defra provides the following equation that relates the long term AQS objective to the short term AQS objective:

No. 24-hour mean exceedances = -18.5 + 0.00145 x annual mean3 + (206/annual mean).

This approach has been adopted for 24-hour mean PM_{10} for this assessment.

3.3.7. Significance Criteria

The EPUK and IAQM provide guidance for establishing the significance of air quality impacts arising as a result of the Proposed Development. The magnitude of impact on individual receptors is dependent upon the long-term average pollutant concentrations at the receptor in the assessment year and the percentage change relative to the Air Quality Assessment Level (AQAL), as identified in Table 3.9.

Table 3.9 Impact Descriptors

Long-term Average Concentration at Receptor in Assessment Year	Percentage Change in Concentration to 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

*Where the % change is <0.5% the change is described as 'Negligible' regardless of concentration.

The guidelines do not, however, provide a set method for establishing the significance of impact. Whilst the establishment of the impact magnitude on individual receptors can be identified as negligible, slight, moderate or substantial, the significance of the overall effect is dependent on a number of factors. Therefore, professional judgement will be applied to determine the likely significance of effects, with the following factors considered:

- The existing and future air quality in the absence of the development, notably whether the Air Quality Objectives are likely to be met or the scale of exceedances in the long-term and short-term concentrations;
- The extent of current and future population exposure to the impacts, notably the number of properties and/or people present and the scale of impact (*e.g.* whether the majority of the local population is subject to substantial or slight magnitude impacts);
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts, such as establishing a worst-case scenario for sensitive receptors.

In addition, the London Council's guidance for air quality assessments[28] provides a flow chart for assessing the significance of air quality impacts. These are illustrated in Table 3.10.

Table 3.10 London Councils Flow Chart Method for Assessing the Significance of Air Quality Impacts

Effect of Development	Outcome
Will development interfere with or prevent implementation of measures in the AQAP?	Air Quality is an overriding consideration.
Is development likely to cause a worsening of air quality or introduce new exposure into the Air Quality Management Area (AQMA)?	Air Quality of a highly significant consideration.
Would the development contribute to air quality exceedances or lead to the designation of a new AQMA?	Air Quality is a highly significant consideration.
Is the development likely to increase emissions of or increase/introduce new exposure to PM_{10}?	Air Quality is a significant consideration.

The London Councils guidance for air quality assessments has published the Air Pollution Exposure Criteria (APEC) specifically for new exposure to determine the significance of new exposure to poor air quality and level of mitigation required. The APEC criteria are identified in Table 3.11.

Table 3.11 London Councils Significance Criteria

APEC Level	Applicable Range Annual Average NO_2	Applicable Range PM_{10}	Recommendation
A	>5% below national objective	Annual Mean: >5% below national objective 24-hour Mean: >1 day less than the national objective	No air quality grounds for refusal, however mitigation of any emissions should be considered.
B	Between 5% below or above national objective	Annual Mean: Between 5% below or above national objective. 24-hour Mean: Between 1 day above or below the national objective.	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered – *e.g.* maximise distance from pollution source, proven ventilation systems, parking considerations, winter gardens, internal layout considered and internal pollutant emissions minimised.
C	>5% above national objective	Annual Mean: > 5% above national objective 24-hour Mean: >1 day more than the national objective	Refusal on air quality grounds should be anticipated unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures.

3.4. Air Quality Neutral Assessment

In line with the Sustainable Design and Construction SPG (2014), an Air Quality Neutral Assessment (AQNA) is required for all new developments. The AQNA compares NO_x and PM_{10} emission for buildings and transport against calculated benchmarks. NO_x and PM_{10} emission for buildings and transport have been calculated based on the information in Table 3.12.

Table 3.12 Input Parameters for AQNA

Parameter	Value Used
Gross Internal Area (m^2)	A1/A3 – 1,234, B1 (incl. Sui Generis) – 33,074 (excludes UKPN space).
Energy Centre Total NO_x Emissions (kg/year)	4.45
Annual Development Generated Vehicle Trips	B1 (incl. Sui Generis) – 51,425, A1 – 1,460, A3 – 10,220

The NO_x and PM_{10} emissions calculated using the information in Table 3.12 are compared to the benchmarks provided in Table 3.13. Should a benchmark be exceeded (*i.e.* is in deficit), mitigation will be required either locally or by off-setting emissions elsewhere.

Table 3.13 Emissions Benchmarks for AQNA

Land Use Class	Benchmark Category	NO_x Benchmark	PM_{10} Benchmark
A1/A3	Buildings	27.9	1.6
	Transport	270.2	48.5
B1	Buildings	1018.7	58.5
	Transport	377	67.8

3.5. Selection of Sensitive Receptors

Defra provides guidance on locations where the air quality objectives should apply and Table 3.14 and professional judgement have been used to select receptors where likely significant exposure to pollutant concentrations may occur.

Table 3.14 Examples of where the Air Quality Objectives may or may not apply

Averaging Period	Objectives Should Apply	Objectives Should Generally Not Apply
Annual mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, care homes etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other locations where public exposure is expected to be short term.
24-hour mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other locations where public exposure is expected to be short term.

Averaging Period	Objectives Should Apply	Objectives Should Generally Not Apply
1-hour mean	All locations where the annual mean and 24 -hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-minute mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

As the proposals are for the refurbishment and a roof top extension of a commercial office space, a number of the air quality objectives do not generally apply to this land use class (see Table 3.14). Therefore, a grid and a number of existing receptors have been modelled across the local area (see **Figure 3** and **Appendix C**).

3.6. Limitations & Assumptions

Professional judgement has been used in the completion of the construction phase dust assessment for the Proposed Development.

It is assumed that the traffic data provided by Canapero Associates is accurate and robust to justify scoping out a detailed assessment of road traffic emissions.

The ADMS 5.2 dispersion model has been used in this assessment to assess the impact of the proposed onsite gas-fired boilers. The dispersion model relies on input data, such as predicted emissions data, *etc*., which may have uncertainties associated with them. The model itself simplifies complex environments and does not always accurately reflect local micro-climatic conditions which may ultimately affect the predicted pollutant concentrations.

A sensitivity assessment has been undertaken whereby for the future scenario concentrations have utilised opening year baseline concentrations from 2013, in accordance with the LAEI datasets.

4. Baseline Conditions

4.1. Local Air Quality Information

Between 1998 and 2000, the LBC undertook its first round of review and assessment for air quality. Following this review, it was concluded that a borough wide AQMA warranted designation due to exceedances of the AQS objectives for annual mean of NO_2 and PM_{10} concentrations and 24 hour PM_{10} concentrations, predominantly brought about by road transport emissions. The Proposed Development lies within the existing AQMA (see **Figure 4**) and in close proximity to an Air Quality Focus Area (AQFA). Since then, exceedances of the objective for annual mean concentrations of NO_2 have persisted in many locations (most pronounced at roadside).

4.1.1. Local Authority Monitoring Data

LBC operates four continuous monitoring stations and undertakes passive diffusion tube monitoring at 14 locations. The relevant monitoring locations are presented in **Figure 5**.

Nitrogen Dioxide

Table 4.1 and Table 4.2 presents the annual mean NO_2 concentrations and the number of exceedances of the 1-hour NO_2 objective, respectively for the most representative continuous monitors.

The annual mean NO_2 objective has been exceeded at all monitoring locations between 2011 and 2017.

As can be seen from Table 4.2, the monitoring data has been compliant with the 1-hour mean NO_2 objective between in all years monitored at London Bloomsbury and Shaftesbury Avenue. Swiss Cottage and Euston Road indicate exceedance of the 1-hour mean objective in all years between 2011 and 2017, with the exception of Swiss Cottage in 2015 and 2017.

Table 4.1 Continuous Monitoring – Annual Mean NO_2

Site ID	X, Y	Type	Annual Mean (µg/m³)						
			2011	2012	2013	2014	2015	2016	2017
London Bloomsbury	530123, 182014	UB	**50**	**55**	**44**	**45**	**48**	**42**	**38**
Swiss Cottage	526629, 184391	K	**71**	**70**	**63**	**66**	**61**	**66**	**53**
Euston Road	529878, 182648	R	**122**	**106**	**106**	**98**	**90**	**88**	**83**
Shaftesbury Avenue	530060, 181290	R	**76**	**71**	**74**	**59**	**-**	-	**-**

Bold indicates an exceedance of the annual mean objective.

Data capture was greater than 90% at all monitoring locations in 2017.

Notes: UB = Urban Background, K = Kerbside, R = Roadside

Table 4.2 Continuous Monitoring – 1-Hour Mean NO_2

Site ID	X, Y	Type	Number of Exceedances of 1-Hour Mean NO_2 Objective Threshold of 200µg/m³ (<18 per/yr)						
			2011	2012	2013	2014	2015	2016	2017
London Bloomsbury	530123, 182014	UB	0	1	0	0	0	0	0
Swiss Cottage	526629, 184391	K	**77**	**43**	**42**	14	11	**37**	1
Euston Road	529878, 182648	R	**726**	**294**	**404**	**221**	**54**	**39**	**25**
Shaftesbury Avenue	530060, 181290	R	15	12	10	2	-	-	-

Bold indicates an exceedance of the annual mean objective.

Data capture was greater than 90% at all monitoring locations in 2017.

Notes: UB = Urban Background, K = Kerbside, R = Roadside

Table 4.3 presents a summary of the diffusion tube monitoring collected by LBC between 2011 and 2017.

All monitoring locations, with the exception of CA6 Wakefield Gardens (2012, 2014, 2015 and 2016), CA7 Frognal Way (2011-2017) and CA10 Tavistock Garden (2016) exceeded the annual mean NO_2 objective between 2011 and 2017. However, it should be noted that these locations all represent urban background sites with all roadside sites exceeding the annual mean NO_2 objective throughout.

Table 4.3 Diffusion Tube Monitoring – Annual Mean NO_2

Site ID	X, Y	Type	Annual Mean (µg/m³)						
			2011	2012	2013	2014	2015	2016	2017
CA4 -Euston Road	530110, 182795	R	**93.1**	**82.1**	**107.8**	**89.7**	**86.8**	**82.7**	**92.5**
CA6 -Wakefield Gardens	530430, 182430	UB	**45.6**	39.3	**40.3**	36.4	35.8	31.3	-
CA7 - Frognal Way	526213, 185519	UB	31.5	28.9	32.0	28.6	27.8	27.9	32.3
CA10 - Tavistock Garden	529880, 182334	UB	**47.6**	**40.1**	**49.4**	**46.5**	**44.6**	39.7	-
CA11 - Tottenham Court Road	529568, 181728	K	**91.7**	**83.3**	**88.1**	**86.8**	**85.6**	**83.6**	-
CA15 - Swiss Cottage	526633, 184392	K	**73.2**	**72.7**	**83.1**	**74.3**	**69.3**	**73.9**	-
CA16 - Kentish Town Road	529013, 185102	R	**57.2**	**59.0**	**65.3**	**57.8**	**63.6**	**58.7**	**74.9**
CA17 -47 Fitzjohn's Road	526547, 185125	R	**58.4**	**61.2**	**65.2**	**60.3**	**55.8**	**56.4**	-

Site ID	X, Y	Type	Annual Mean (µg/m^3)						
			2011	2012	2013	2014	2015	2016	2017
CA20 - Brill Place	529914, 183147	R	**50.8**	**50.0**	**49.4**	**52.3**	**48.9**	**47.5**	**57.3**
CA21 - Bloomsbury Street	529962, 181620	R	**76.7**	**71.7**	**76.1**	**80.8**	**71.4**	**72.2**	**80.7**
CA23 - Camden Road	529173, 184129	R	**72.2**	**67.4**	**77.9**	**72.2**	**63.3**	**61.7**	**75.4**
CA24 - Chetwynd Road	528722, 185950	R	**44.1**	**43.7**	**47.8**	**44.8**	**46.5**	**42.0**	**55.0**
CA25 -Emmanuel Primary	525325, 185255	R	**41.5**	**45.9**	**57.9**	**48.4**	**47.7**	**52.2**	**55.2**
WITT -Wittanhurst Lane	528213, 187203	R	-	-	**53.1**	**48.3**	**45.0**	**43.1**	**48.9**

Bold indicates an exceedance of the annual mean objective.

Data capture was less than 75% at all monitoring locations in 2017, therefore caution should be taken when using this data.

Notes: UB = Urban Background, K = Kerbside, R = Roadside

Particulate Matter

Table 4.4 and Table 4.5 presents the annual mean PM_{10} concentrations and the number of exceedances of the 24-hour PM_{10} objective, respectively for the most representative continuous monitors.

Annual mean PM_{10} concentrations (Table 4.4) at all monitoring locations have been well below the air quality objective since 2011

As can be seen from Table 4.5, the measured data indicates compliance with the short term air quality objective for PM_{10}.

Table 4.4 Continuous Monitoring – Annual Mean PM_{10}

Site ID	X, Y	Type	Annual Mean (µg/m^3)						
			2011	2012	2013	2014	2015	2016	2017
London Bloomsbury	530123, 182014	UB	22	19	18	20	22	20	19
Swiss Cottage	526629, 184391	K	27	23	21	22	20	21	20
Euston Road	529878, 182648	R	-	-	-	29	18	24	20
Shaftesbury Avenue	530060, 181290	R	32	29	29	25	22	18	-

Bold indicates an exceedance of the annual mean objective.

Data capture was greater than 90% at all monitoring locations in 2017.

Notes: UB = Urban Background, K = Kerbside, R = Roadside

Table 4.5 Continuous Monitoring – 24-Hour Mean PM_{10}

Site ID	X, Y	Type	Number of Exceedances of 24-Hour Mean PM10 Objective Threshold of 50µg/m3 (<35 per/yr)						
			2011	2012	2013	2014	2015	2016	2017
London Bloomsbury	530123, 182014	UB	17	10	4	11	6	9	6
Swiss Cottage	526629, 184391	K	31	21	8	12	8	7	8
Euston Road	529878, 182648	R	-	-	-	5	5	10	3
Shaftesbury Avenue	530060, 181290	R	27	18	17	16	4	-	-
Bold indicates an exceedance of the annual mean objective. Data capture was greater than 90% at all monitoring locations in 2017. Notes: UB = Urban Background, K = Kerbside, R = Roadside									

Table 4.6 presents the annual mean $PM_{2.5}$ concentrations for the Piccadilly continuous monitor.

Annual mean $PM_{2.5}$ concentrations (Table 4.6) at all monitoring locations have been well below the air quality objective since 2011.

Table 4.6 Continuous Monitoring – Annual Mean $PM_{2.5}$

Site ID	X, Y	Type	Annual Mean (µg/m^3)						
			2011	2012	2013	2014	2015	2016	2017
London Bloomsbury	530123, 182014	UB	-	-	-	-	11	12	13
Swiss Cottage	526629, 184391	K	-	-	-	-	12	15	16
Euston Road	529878, 182648	R	-	-	-	-	17	17	14
Bold indicates an exceedance of the annual mean objective. Data capture was greater than 90% at all monitoring locations in 2017. Notes: UB = Urban Background, K = Kerbside, R = Roadside									

4.1.2. London Atmospheric Emissions Inventory

The LAEI includes dispersion model results for the whole of London for 2013 and 2020 (updated in April 2017). Estimated ground level annual mean concentrations for NO_2, PM_{10} and $PM_{2.5}$ in the vicinity of the Application Site are presented in **Figures 6** to **11**.

Figure 6 presents the 2013 LAEI baseline concentrations for annual mean NO_2 in the vicinity of the Application Site. This indicates elevated ground level concentrations in excess of 50µg/m^3 along the A4200 Kingsway, which is located to the east of the Application Site. Within the Application Site boundary, baseline annual mean NO_2 concentrations are generally above 40µg/m^3 and, therefore, there is potential that future users of the Proposed Development will be exposed to annual mean NO_2 concentrations that exceed the annual mean AQS objective.

To determine compliance with the 1-hour mean objective for NO_2 the approach detailed in Defra's LAQM.TG(16) guidance has been followed. It suggests that where annual mean NO_2 concentrations do not exceed 60µg/m^3 then it is likely that exceedances of the 1-hour mean concentrations do not occur. The 2013 LAEI baseline data indicates that within the Application Site boundary annual mean NO_2 concentrations are below 60µg/m^3, therefore it is unlikely that the 1-hour mean AQS objective at the Proposed Development would be exceeded.

Figure 7 presents the 2013 LAEI baseline concentrations for annual mean PM_{10} in the vicinity of the Application Site. This indicates ground level concentrations are around 40µg/m^3 along The A4200 Kingsway, which is located to the east of the Application Site. Within the Application Site boundary estimated annual mean PM_{10} concentrations are generally below 35µg/m^3. It is therefore unlikely that future users of the Proposed Development would be exposed to annual mean PM_{10} concentrations that exceed the annual mean AQS objective.

Figure 8 presents the 2013 LAEI baseline concentrations for annual mean $PM_{2.5}$ in the vicinity of the Application Site. This indicates ground level concentrations less than 22µg/m^3 along the A4200 Kingsway, which is located to the east of the Application Site. Within the Application Site boundary estimated annual mean $PM_{2.5}$ concentrations are generally below 19µg/m^3. It is therefore unlikely that future users of the Proposed Development would be exposed to annual mean $PM_{2.5}$ concentrations that exceed the annual mean AQS objective.

Based up on GLA forecasts on expected emission reductions **Figures 9, 10** and **11** (taken from the 2020 LAEI mapped data) estimated ground level annual mean concentrations for NO_2, PM_{10} and $PM_{2.5}$ in 2020 are predicted to be lower than those presented in **Figures 6, 7**, and **8** for 2013. With the introduction of the Real Driving Emissions (RDE) testing and the likely improvement in cleaner vehicle technologies (in particular EURO 6 (VI) a, b, c and d fleet categories – which are substantially cleaner than the previous EURO 5 (V), and the uptake of electric/hybrid vehicles) delivering improvements in vehicle emissions, in particular NO_x, then ambient pollutant concentrations could potentially be lower in 2020 than is currently predicted by the 2013 LAEI baseline. Although, it is important to note that such improvements would depend upon traffic growth, congestion and the implementation of government/ local authority air quality initiatives and policy.

5. Effects Appraisal and Site Suitability

5.1. Construction

5.1.1. Assessment of Potential Dust Emission Magnitude

The likely magnitude of dust emissions from the Proposed Development for the four main activities has been assessed, as identified in Table 5.1.

Table 5.1 Predicted Magnitude of Dust Emissions from Proposed Development

Activity	Magnitude	Justification
Demolition	Small	The existing building is to be retained, with the majority of works to be undertaken restricted to internal refurbishment. However, some of the existing façade will be removed, but retained for re-use. There is likely to be some small scale demolition relating to existing concrete slabs. This work will be limited and is expected to be well below 20,000m^3, as per the IAQM thresholds.
Earthworks	Small	The total site area is approximately 3,000m^2, which is categorised as medium in accordance with the IAQM guidance document. However, given the proposals are predominantly for the refurbishment of the existing building, the earthwork activities are likely to be minimal and limited to the area surrounding the existing building footprint. It is expected that there would be less than 5 heavy earth moving vehicles operational at any one time, and the volume of material generated would be less than 20,000 tonnes. On this basis the magnitude of impact associated with the earthworks have been categorised as small.
Construction	Small	The Proposed Development comprises the internal refurbishment of the existing buildings, and rooftop extension. It is estimated that the total proposed building volume will be less than 25,000m^3. It is anticipated that the building will be constructed using steel, therefore the potential for dust generation is low.
Trackout	Small	Based up on the proposals, it is reasonable to assume that construction trips would be low. It has been estimated that the number of HGV movements in a typical day would be less than 10.

5.1.2. Sensitivity of the Area

A wind rose for London City Airport for 2013, provided in **Appendix D**, indicates that the prevailing wind direction is predominantly from the south, south west. Therefore, existing receptors that are located to the north and north east are most likely to fall within the area of influence from dust emissions generated by the construction phase.

The majority of dust generated by the construction stage is likely to be deposited in close proximity to the source (within 350m) – **Figure 12** indicates the construction zone of influence., The majority of existing buildings surrounding the Application Site are of commercial (office) or retail/restaurants use (within 20m). There are no ecological receptors located within 50m of the

Application Site, or within 500m of the likely construction traffic route and therefore consideration of these receptors has been scoped out.

The 2020 LAEI baseline PM_{10} concentration for the Application Site 26.8µg/m^3, which is well below the annual mean air quality objective.

The sensitivity of the area to each of the previously identified impact types associated with the Proposed Development are identified in Table 5.2.

Table 5.2 Sensitivity of Receptors to Dust Emission Effects

Impact Type	Sensitivity of Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium	Medium
Human Health	Low	Low	Low	Low
Ecological	N/A	N/A	N/A	N/A

The sensitivity of the surrounding area for dust soiling is classified as medium, and for human health the sensitivity is classified as low.

5.1.3. Risk of Impact

To determine the risk of impacts prior to the implementation of mitigation the dust emission magnitude and the sensitivity of the area have been combined. Table 5.3 below summaries the potential risk of impacts during the construction phase.

Table 5.3 Risk of Dust Related Impacts from the Proposed Development

Impact Type	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Low Risk	Low Risk	Low Risk	Negligible
Human Health	Negligible	Negligible	Negligible	Negligible
Ecological	N/A	N/A	N/A	N/A

The risk of dust related impacts from the Proposed Development on existing receptors in the vicinity of the Application Site is Low Risk to Negligible without the implementation of mitigation. The risk of dust related impacts on human health during the construction phase is Negligible.

5.1.4. Construction Road Traffic & Non-Road Mobile Machinery (NRMM)

The greatest impact on air quality due to construction traffic and NRMM is likely to be along roads in the vicinity of the Application Site. It is likely that construction traffic will enter the Application Site via the Kemble Street or Keeley Street from the A4200 Kingsway. It is likely that the volume of construction traffic will be low compared to the existing traffic flows.

Based on the current local air quality in the area, the proximity of sensitive receptors to the roads likely to be used by construction vehicles and the likely number of construction vehicles (estimated to be less than 10 per day) the impacts are therefore considered to be negligible.

5.2. Operational Phase (2020 LAEI Baseline Concentrations)

Full results of the dispersion modelling are presented in **Appendix E** and a summary is provided below.

As the proposals are for the refurbishment and roof top extension of a commercial office space, a number of the air quality objectives do not generally apply to this land use class (see Table 3.14). Therefore, a grid and a number of existing receptors have been modelled across the local area and maximum process contributions presented to determine the significance.

5.2.1. Annual Mean NO_2 Concentrations

The objective for annual mean NO_2 concentrations is 40µg/m^3. With the Proposed Development operational the results indicate that all existing receptor locations are below the AQS objective in the opening year, with the exception of E1 and E2 where exceedance of 40µg/m^3 is predicted. The highest concentration predicted is 66.7µg/m^3 at existing receptor E2 (ground floor commercial receptor along the A4022 Kingsway). The greatest change as a result of the Proposed Development (process contribution (PC) from the gas-fired boilers) is 0.3µg/m^3 at existing receptor E1 (ground floor commercial receptor along the A4022 Kingsway) - the impact of the Proposed Development at existing receptor E1 is classified as moderate adverse, primarily due to the existing elevated baseline. The impact at all remaining existing receptors is classified as negligible.

The annual mean objective is not generally applicable at existing commercial uses (see Table 3.14). Therefore, although the impact at existing receptor E1 is classified as moderate adverse, installing mitigation to protect existing users from long term impacts is not required.

To consider the long-term impact of the proposed gas-fired boilers on NO_x emissions a grid has been modelled at ground level (1.5m) (see **Figure 13**). The gridded outputs indicate that the greatest long-term PC as a result of the proposed gas-fired boilers is 0.8µg/m^3, which is above the 1% long-term environmental standard of 0.4µg/m^3 which indicates that the impacts are potentially significant. However, the PCs above the 1% long-term environmental standard of 0.4µg/m^3 are generally within the Application Site boundary, or in the immediate vicinity. Given the nature of the Proposed Development (commercial), the long-term impacts are generally not applicable (see Table 3.14). Therefore, it is considered unlikely that the operation of the gas-fired boilers would be significant and mitigation is not required.

5.2.2. Hourly Mean NO_2 Concentrations

There are no predicted exceedances of the hourly mean NO_2 objective of 200µg/m^3, which is not to be exceeded more than 18 times a year (99.79th percentile). The highest predicted concentration is 133.8.µg/m^3 at existing receptor E2 (ground floor commercial receptor along the A4022 Kingsway). The greatest short-term PC as a result of the Proposed Development is 1.6µg/m^3 at existing receptor E1 (ground floor commercial receptor along the A4022 Kingsway), which is less than 20µg/m^3 (*i.e.* 10% of the short-term objective). Therefore, the short-term PCs of the proposed gas-fired boilers is not significant and mitigation is not required.

To consider the impact of the proposed gas-fired boilers on short-term NO_x emissions a grid has been modelled at ground level (1.5m) (see **Figure 14**). The gridded outputs indicate that the greatest short-term PC as a result of the Proposed Development is 2.2µg/m^3, which is less than 20µg/m^3 (*i.e.* 10 % of the short term objective). Therefore, the short-term PCs from the proposed gas-fired boilers are not significant and mitigation is not required.

5.2.3. Annual Mean PM_{10} Concentrations

The objective for annual mean PM_{10} concentrations is 40µg/m^3. The operation of the gas-fired boilers associated with the Proposed Development do not contribute to emissions of PM_{10}, therefore no PCs have been presented for existing receptors or for the gridded output. The operation of the Proposed Development is not predicted to cause a change in annual mean PM_{10} concentrations, therefore mitigation is not required.

Baseline annual mean PM_{10} concentrations within the boundary of the Application Site are estimated to be below 35µg/m^3 (see **Figure 10**). It is therefore unlikely that future users of the Proposed Development would be exposed to annual mean PM_{10} concentrations that exceed the annual mean AQS objective – mitigation is not required.

5.2.4. Annual Mean $PM_{2.5}$ Concentrations

The objective for annual mean $PM_{2.5}$ concentrations is 25µg/m^3. The operation of the gas-fired boilers associated with the Proposed Development do not contribute to emissions of $PM_{2.5}$, therefore no PCs have been presented for existing receptors or for the gridded output. The operation of the Proposed Development is not predicted to cause a change in annual mean $PM_{2.5}$ concentrations, therefore mitigation is not required.

Baseline annual mean $PM_{2.5}$ concentrations within the boundary of the Application Site are estimated to be below 19µg/m^3 (see **Figure 11**). It is therefore unlikely that future users of the Proposed Development would be exposed to annual mean $PM_{2.5}$ concentrations that exceed the annual mean AQS objective – mitigation is not required.

5.2.5. Sensitivity Test

The following sensitivity test is also included in the assessment:

> *2013 LAEI baseline data have been used to indicate no improvement in baseline conditions over time.*

The results of the sensitivity test are given in **Appendix F.**

In summary, the sensitivity test using the 2013 LAEI baseline data gives higher concentrations at all existing receptors for both long-term and short-term NO_2.

All existing receptors are predicted to exceed the annual mean AQS objective of 40µg/m^3, however there is no change to impact descriptors defined, *i.e*. a moderate adverse impact is predicted at existing receptor E1 (ground floor commercial receptor along the A4022 Kingsway) and a negligible impact at all remaining existing receptors – this is due to unchanged PCs from the proposed gas-fired boilers. However, the annual mean objective is not generally applicable at existing commercial uses (see Table 3.14). Therefore, although the impact at existing receptor E1 is classified as moderate adverse, installing mitigation to protect existing users from long-term impacts is not required.

In terms of the 1-hour mean objective for NO_2 there are no predicted exceedances at any existing receptors, with the exception of existing receptor E2 (ground floor commercial receptor along the A4022 Kingsway). However, this receptor exceeds the 1-hour mean AQS objective with and without the Proposed Development operational (*i.e*. the operation of the Proposed Development does not lead to this exceedance). The gridded outputs indicate that the greatest short-term PC as a result of the Proposed Development is 2.2µg/m^3 which is less than 20µg/m^3 (*i.e.* 10 % of the short-term objective). Therefore, the short-term PCs from the proposed gas-fired boilers are not significant and mitigation is not required. However, due to the elevated short-term baseline

concentrations, which are above the AQS objective at existing receptor E2, under the sensitivity analysis mitigation should be considered.

With respect to particulates, the operation of the proposed gas-fired boilers are not expected to contribute to emissions of PM_{10} and $PM_{2.5}$, therefore no PCs have been presented for existing receptors or for the gridded output. The operation of the Proposed Development is not predicted to cause a change in annual mean PM_{10} or $PM_{2.5}$ concentrations, therefore mitigation is not required.

Baseline annual mean PM_{10} and $PM_{2.5}$ concentrations within the boundary of the Application Site are estimated to be below 35 and 19µg/m^3 (see **Figure 7** and **8**), respectively. It is therefore unlikely that future users of the Proposed Development would be exposed to annual mean PM_{10} or $PM_{2.5}$ concentrations that exceed the annual mean AQS objective – mitigation is not recommended.

5.2.6. Air Quality Neutral Assessment

A summary of the findings of the AQNA are presented in Table 5.4 below.

Table 5.4 Summary of AQNA

Category	Parameter	NO_x Emissions	PM_{10} Emissions
Building Emissions	Benchmark	1046.6	60.1
	Development	4.4	0
	Difference	**-1042.1**	**-60.1**
Transport Emissions	Benchmark	647.3	116.3
	Development	172	30.9
	Difference	**-475.3**	**-85.4**

The Proposed Development was found to be compliant in relation to building and transport emissions when compared to the relevant benchmarks. The Proposed Development is, therefore, air quality neutral and mitigation or additional off-setting is not required.

6. Mitigation

6.1. Construction Phase

The IAQM guidelines provide an indication of the mitigation measures that would be appropriate for inclusion within the Proposed Development, based on the level of risk of dust related impacts identified for each of the activities. Consequently, the following mitigation measures should be incorporated into the Proposed Development, and delivered through the implementation of a Construction Environment Management Plan (CEMP).

Mitigation measures that are generic to each of the activities, and therefore should be implemented for the duration of the construction related works where applicable are identified in Table 6.1, whilst activity specific mitigation measures are identified in Table 6.2.

Table 6.1 Mitigation to be implemented during the Construction Phase

Development Element	Mitigation Measure
Communication	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. Display the head or regional office contact information.
Planning	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the measures recommended in this table.
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. Make the complaints log available to the local authority when asked. Record any exceptional incidents that cause dust and/or emissions, either on- or off- site, and the action taken to resolve the situation in the log book.
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning provided if necessary. Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked. Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Development Element	Mitigation Measure
Preparing and Maintaining the Site	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period. Avoid site run-off of water or mud. Keep site fencing, barriers and scaffolding clean using wet methods. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below. Cover, seed or fence stockpiles to prevent wind whipping.
Operating Vehicle/ Vehicle Movements	Ensure all vehicles switch off engines when stationary – no idling vehicles. Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable. Impose and signpost a maximum speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, *e.g*. suitable local exhaust ventilation systems. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. Use enclosed chutes and conveyors and covered skips. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fin water sprays on such equipment wherever appropriate. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Waste Management	Avoid bonfires and burning of waste materials.

Table 6.2 Activity Specific Mitigation Measures to be implemented during the Construction Phase

Development Element	Mitigation Measure
Demolition	Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
Earthworks	Only remove the cover in small areas during work and not all at once.

Development Element	Mitigation Measure
Construction	Avoid scabbling (roughening of concrete surfaces) if possible. Ensure sand and other aggregates are stored in bunds in areas that are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
Trackout	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. Avoid dry sweeping of large areas. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. Record all inspections of haul routes and any subsequent action in a site log book. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

6.1.1. Residual Effects

The residual effects of dust and PM_{10} generated by construction activities, following the application of the mitigation measures described above and good site practice, is not significant.

The residual effects of emissions to air from construction vehicles and NRMM on local air quality is not significant, following the implementation of the recommended mitigation measures.

6.2. Operational Phase

6.2.1. Mitigation (2020 LAEI Baseline Concentrations)

The results indicate that the impact of the Proposed Development at all existing receptors, with the exception of E1 (ground floor receptor along the A4200 Kingsway (London School of Economics) – see **Figure 3**) are classified as negligible, therefore do not warrant mitigation. The impact of the Proposed Development at existing receptor E1 is classified as moderate adverse, primarily due to the existing elevated baseline. However, the annual mean objective is not generally applicable at existing commercial uses (see Table 3.14) and, therefore, installing mitigation to protect existing users from long term impacts is not required.

The long-term impact of the proposed gas-fired boilers on NO_x emissions are potentially significant as the greatest predicted long-term PC is above the 1% long term environmental standard of 0.4µg/m^3. However, the predicted PCs above 1% are generally within the Application Site boundary, or in the immediate vicinity, and given the commercial nature of the Proposed Development the long term impacts are generally not applicable (see Table 3.14), therefore mitigation is not required.

There are no predicted exceedances of the hourly mean NO_2 objective of 200µg/m^3, and the greatest short-term PC as a result of the Proposed Development is less than 20µg/m^3 (*i.e.* 10% of the short term objective). Therefore, the short-term PCs of the proposed gas-fired boilers is not significant and mitigation is not required.

With respect to particulates, the operation of the proposed gas-fired boilers are not expected to contribute to emissions of PM_{10} and $PM_{2.5}$, therefore mitigation is not required.

Baseline annual mean PM_{10} and $PM_{2.5}$ concentrations within the boundary of the Application Site are estimated to be below the relevant annual mean AQS objectives, therefore mitigation is not required.

Overall, the assessment (utilising 2020 LAEI baseline concentrations) indicates that site specific mitigation is not required.

Under the sensitivity analysis (utilising 2013 LAEI baseline concentrations) the assessment indicates that mitigation should be considered at existing receptor E2 (All Bar One). However, utilising 2013 LAEI baseline concentrations is considered to be an extreme worst case and highly conservative as this indicates no improvements have occurred in baseline concentrations and emissions since 2013. With the introduction of the Real Driving Emissions (RDE) testing and the emergence of cleaner vehicle technologies (in particular EURO 6 (VI) a, b, c and d fleet categories – which indicate lower emissions than the previous EURO 5 (V), and the uptake of electric/hybrid vehicles) that deliver improvements in vehicle emissions, in particular NO_x, ambient pollutant concentrations have the potential to be lower in the opening year than those presented using the 2013 LAEI baseline data. On this basis utilising LAEI baseline data from 2020 as part of this assessment is considered to be a reasonable and robust approach.

6.2.2. Residual Effects

The overall residual effect for the operational phase is not significant.

7. Conclusion

A qualitative assessment of construction phase impacts has been carried out. There is a low to negligible risk of dust soiling and a negligible risk of fugitive PM_{10} emissions during demolition, earthworks, construction and trackout. Through good site practice, the implementation of suitable mitigation measures, the impact of dust and PM_{10} releases will be minimised. The residual effect of the construction phase on air quality is therefore not significant.

A quantitative assessment of operational phase impacts has been carried out by modelling the emissions from the proposed gas-fired boilers using the ADMS 5.2 dispersion model. A detailed road traffic assessment has, however, not been carried out as the vehicle trip generation from the Proposed Development does not breach the criteria in air quality planning guidance for sites within an AQMA.

The results indicate that the impact of the Proposed Development at all existing receptors, with the exception of E1 (London School of Economics) are classified as negligible, therefore themselves, not warranting mitigation. The impact of the Proposed Development at existing receptor E1 is classified as moderate adverse, however, the annual mean objective is not generally applicable at existing commercial uses and therefore, mitigation is not recommended.

There are no predicted exceedances of the hourly mean NO_2 objective of 200µg/m^3, and the greatest short-term PC as a result of the Proposed Development is less than 20µg/m^3 (i.e. 10% of the short-term objective) and therefore mitigation is not required.

With respect to particulates, the operation of the proposed gas-fired boilers are not expected to contribute to emissions of PM_{10} and $PM_{2.5}$. Furthermore, baseline annual mean PM_{10} and $PM_{2.5}$ concentrations within the boundary of the Application Site are estimated to be below the relevant annual mean AQS objectives, therefore mitigation is not recommended.

Using the 2020 LAEI baseline data the overall residual effect for the operational phase is not significant.

Under the sensitivity analysis (utilising 2013 LAEI baseline concentrations) the assessment indicates that mitigation should be considered at existing receptor E2 (All Bar One), however, utilising 2013 LAEI baseline concentrations is considered to be an extreme worst case and highly conservative as this indicates no improvements have occurred in baseline concentrations and emissions since 2013. With the introduction of the Real Driving Emissions (RDE) testing and the emergence of cleaner vehicle technologies (in particular EURO 6 (VI) a, b, c and d fleet categories – which indicate lower emissions than the previous EURO 5 (V), and the uptake of electric/hybrid vehicles) that deliver improvements in vehicle emissions, in particular NO_x, ambient pollutant concentrations have the potential to be lower in the opening year than those presented using the 2013 LAEI baseline data. On this basis utilising LAEI baseline data from 2020 as part of this assessment is considered to be a reasonable and robust approach.

With regard to the AQNA, the Proposed Development was found to be compliant in relation to Building and Transport Emissions and is therefore air quality neutral. No mitigation or additional off-setting is required

Overall, with the recommended mitigation measure in place (construction phase only), the proposals would be compliant with legislation and policy.

Figure 1 – Site Boundary

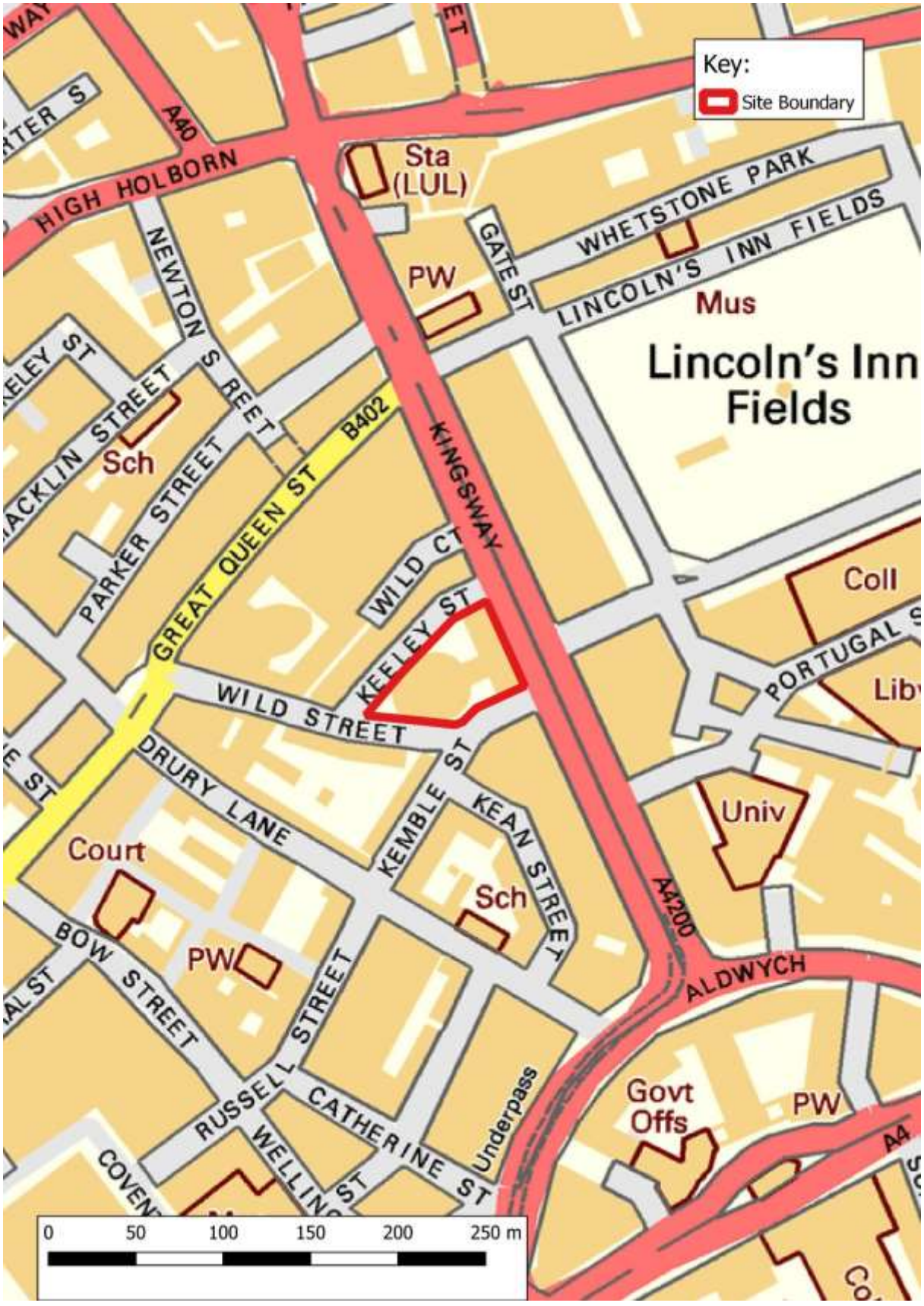


Figure 2 – Modelled Buildings

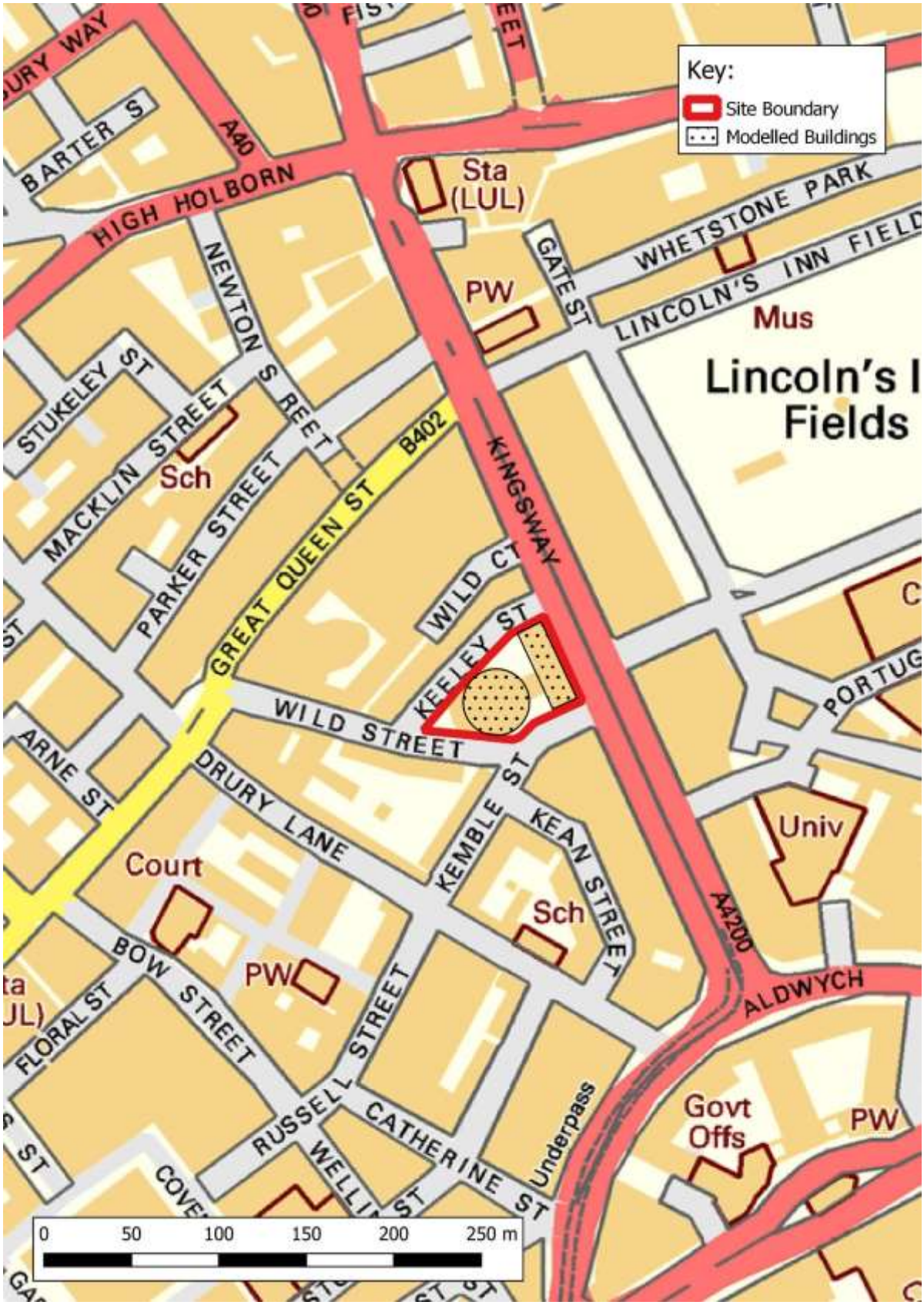


Figure 3 – Modelled Grid & Receptors

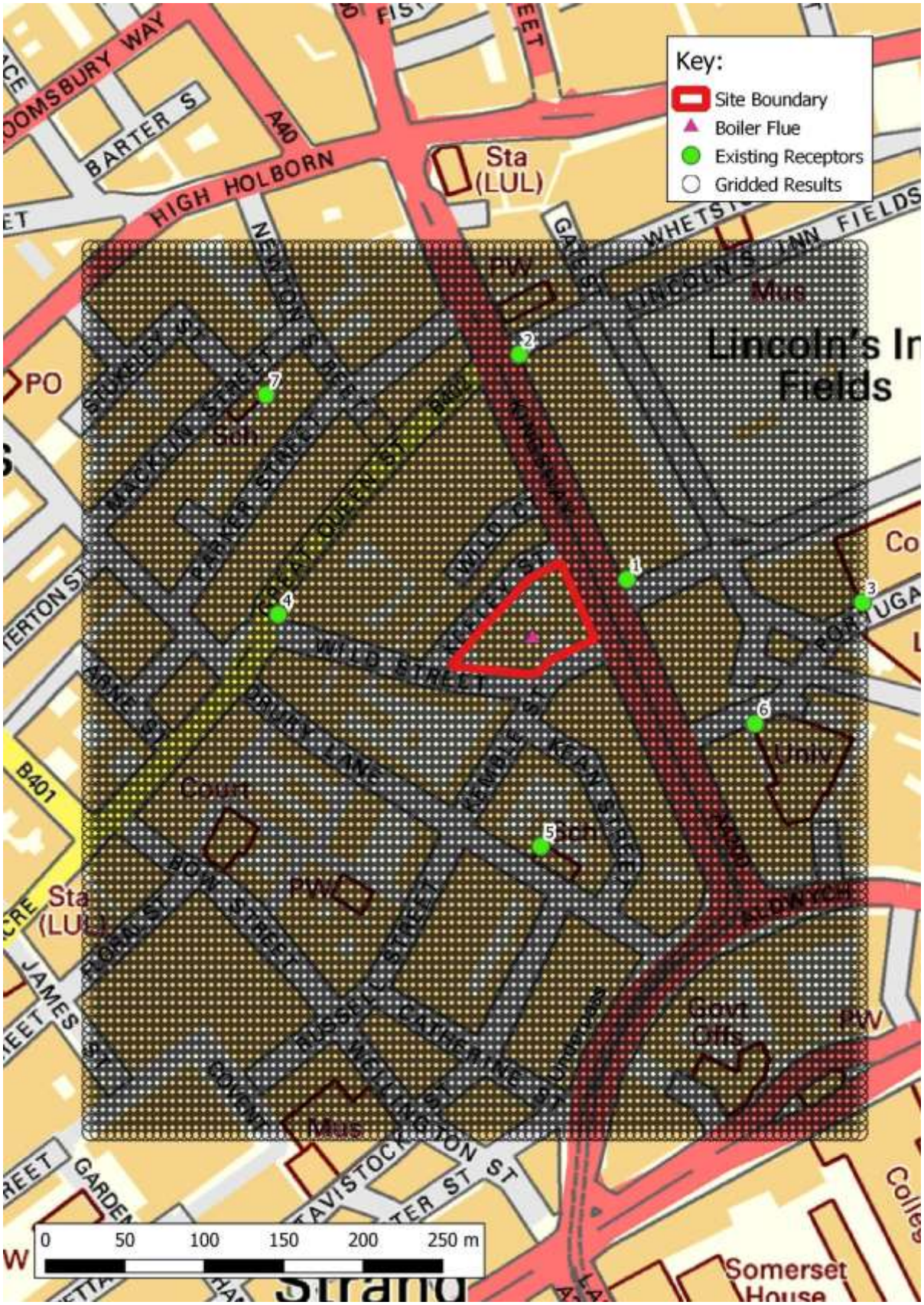


Figure 4 – Air Quality Management Area & Air Quality Focus Areas

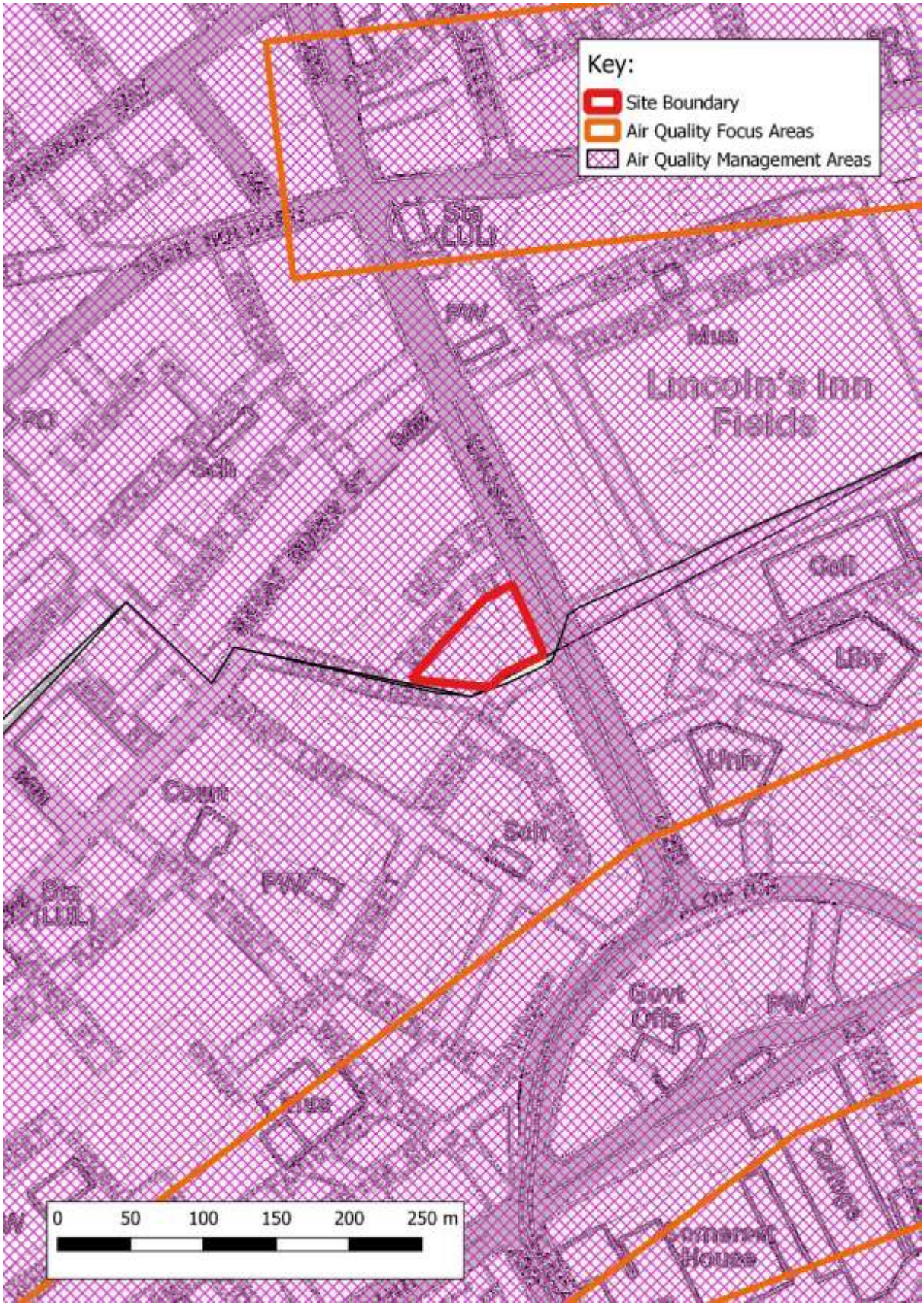


Figure 5 – Local Authority Monitoring Locations

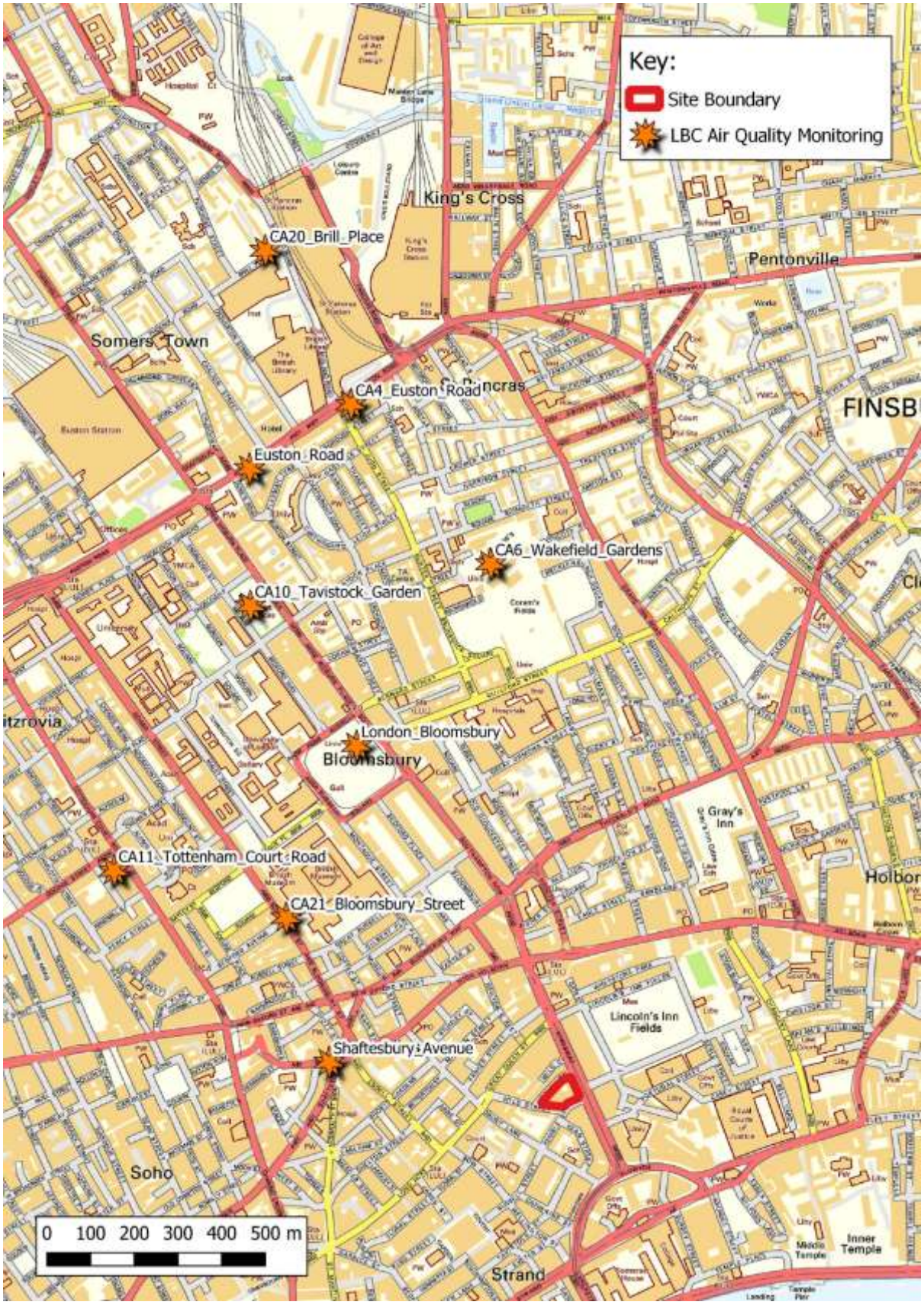


Figure 6 – 2013 LAEI Baseline NO_2 Concentrations (µg/m^3)

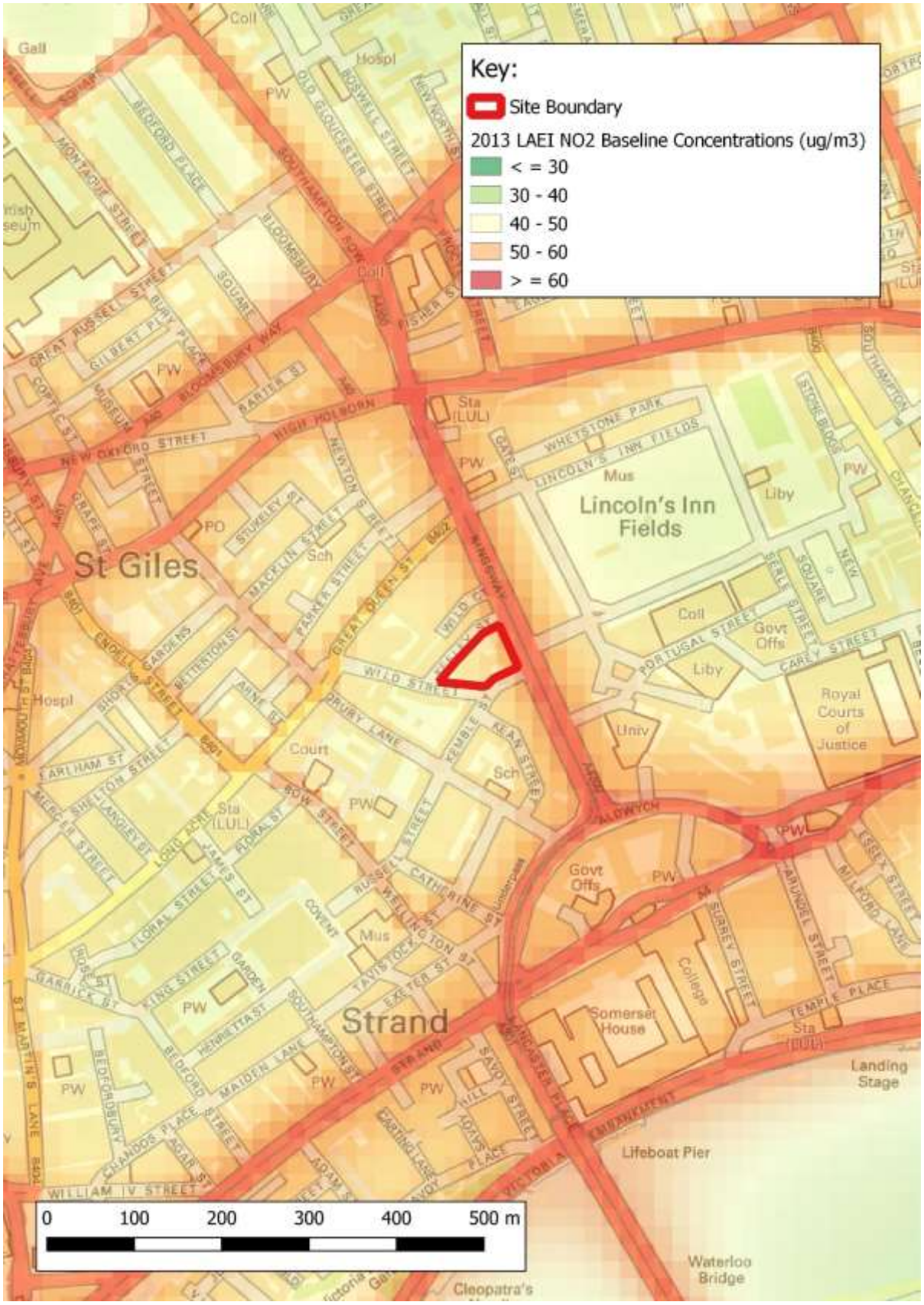


Figure 7 – 2013 LAEI Baseline PM_{10} Concentrations (µg/m^3)

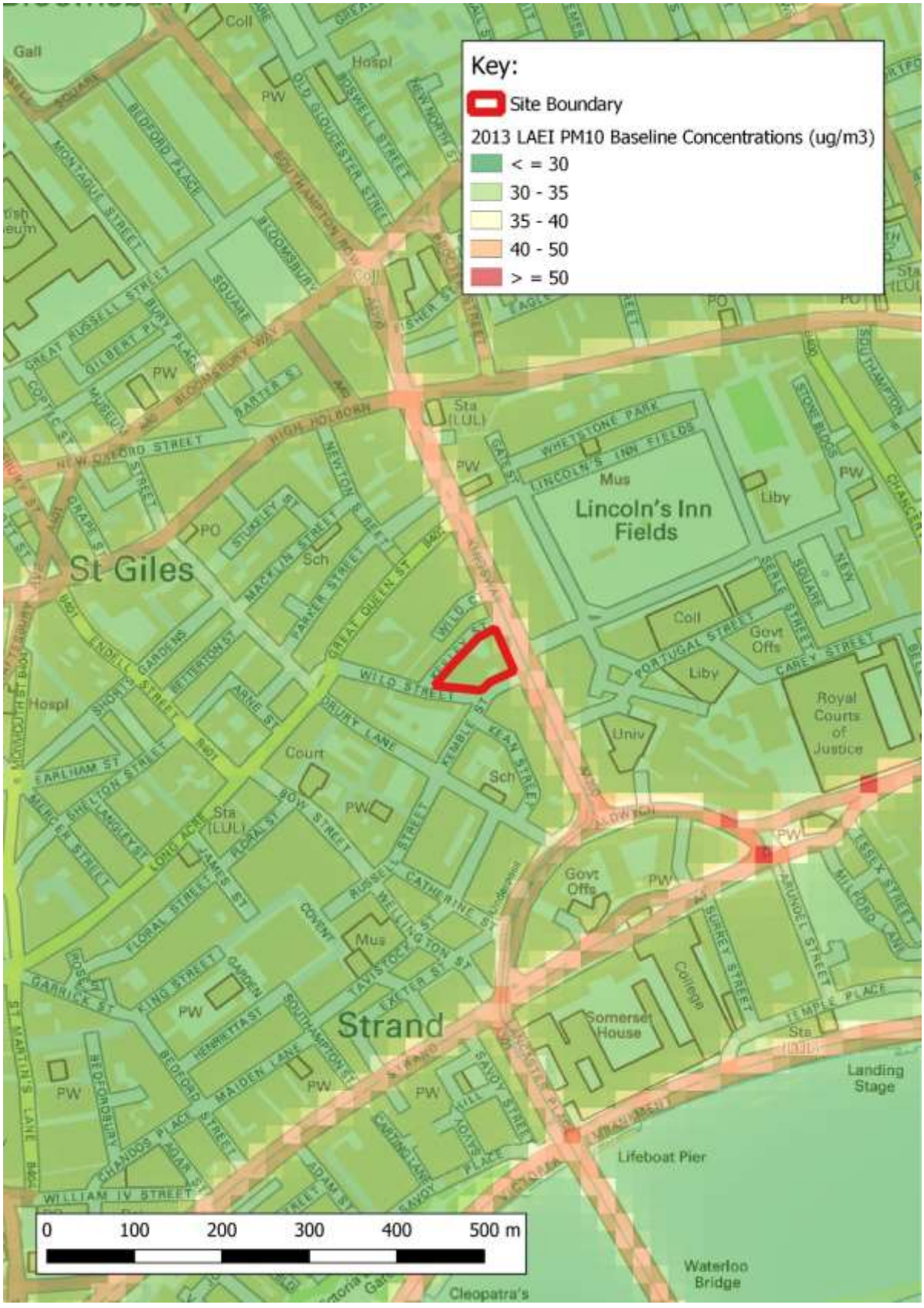


Figure 8 – 2013 LAEI Baseline $PM_{2.5}$ Concentrations (µg/m³)

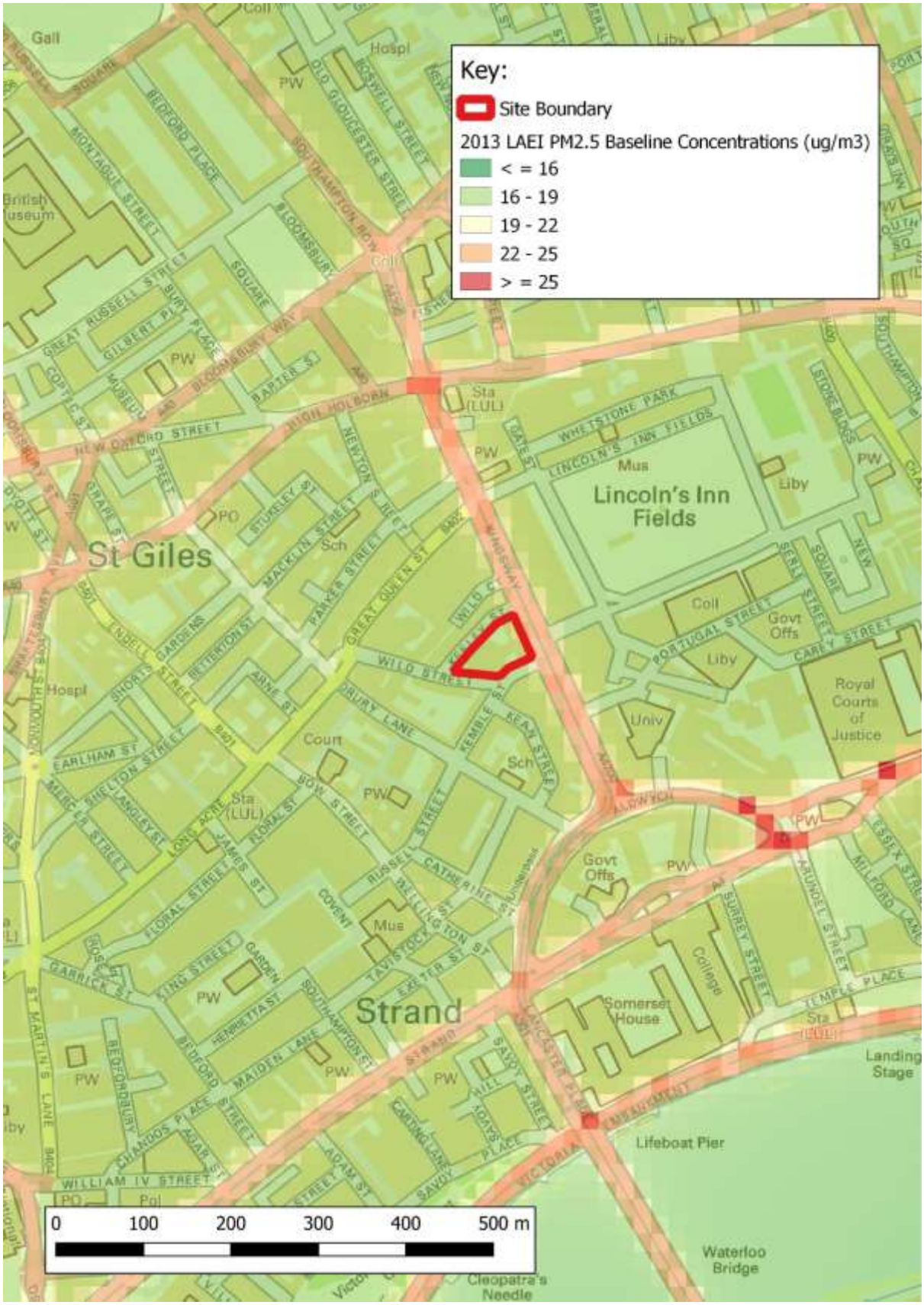


Figure 9 – 2020 LAEI Baseline NO_2 Concentrations (µg/m^3)

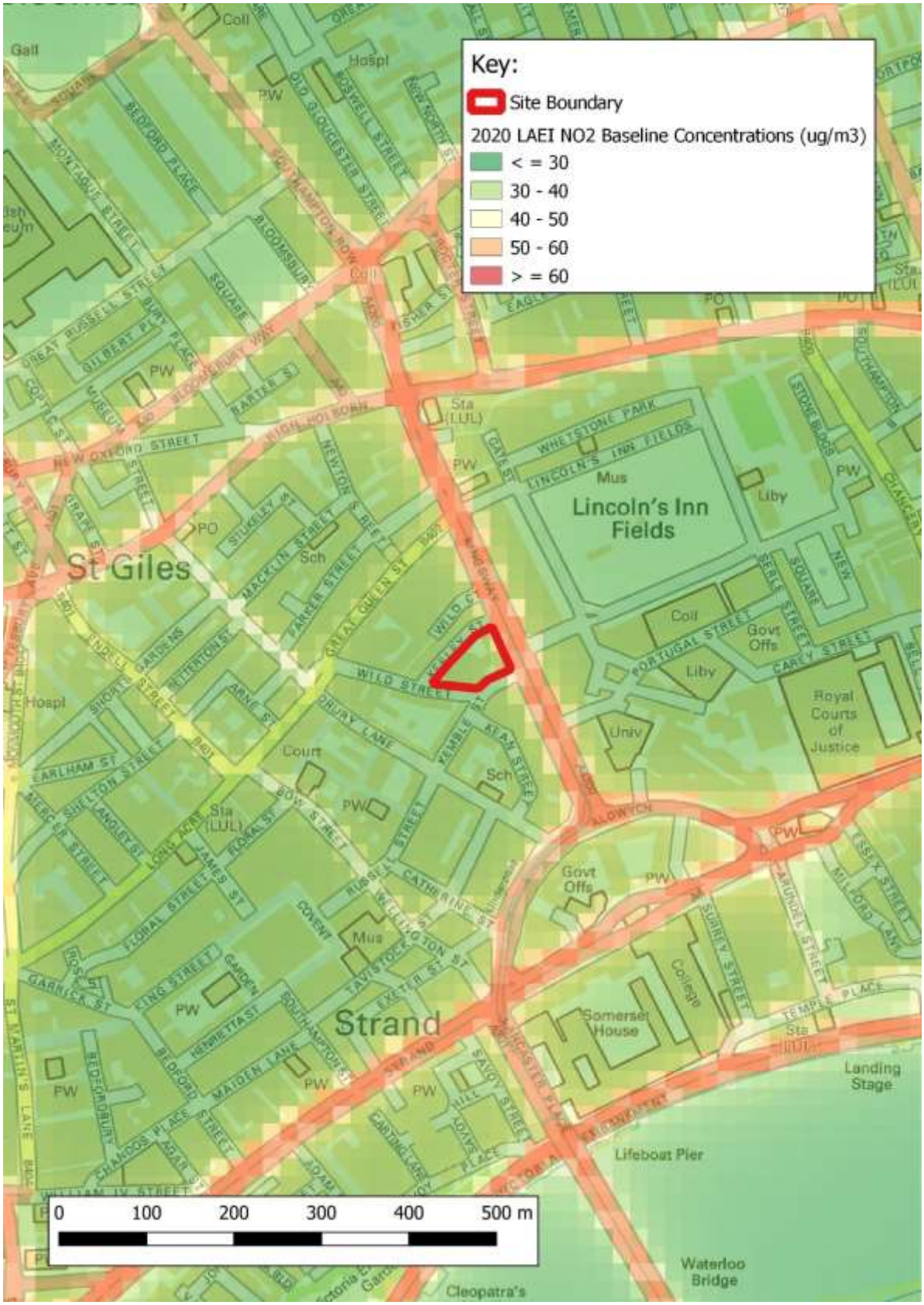


Figure 10 – 2020 LAEI Baseline PM_{10} Concentrations (µg/m³)

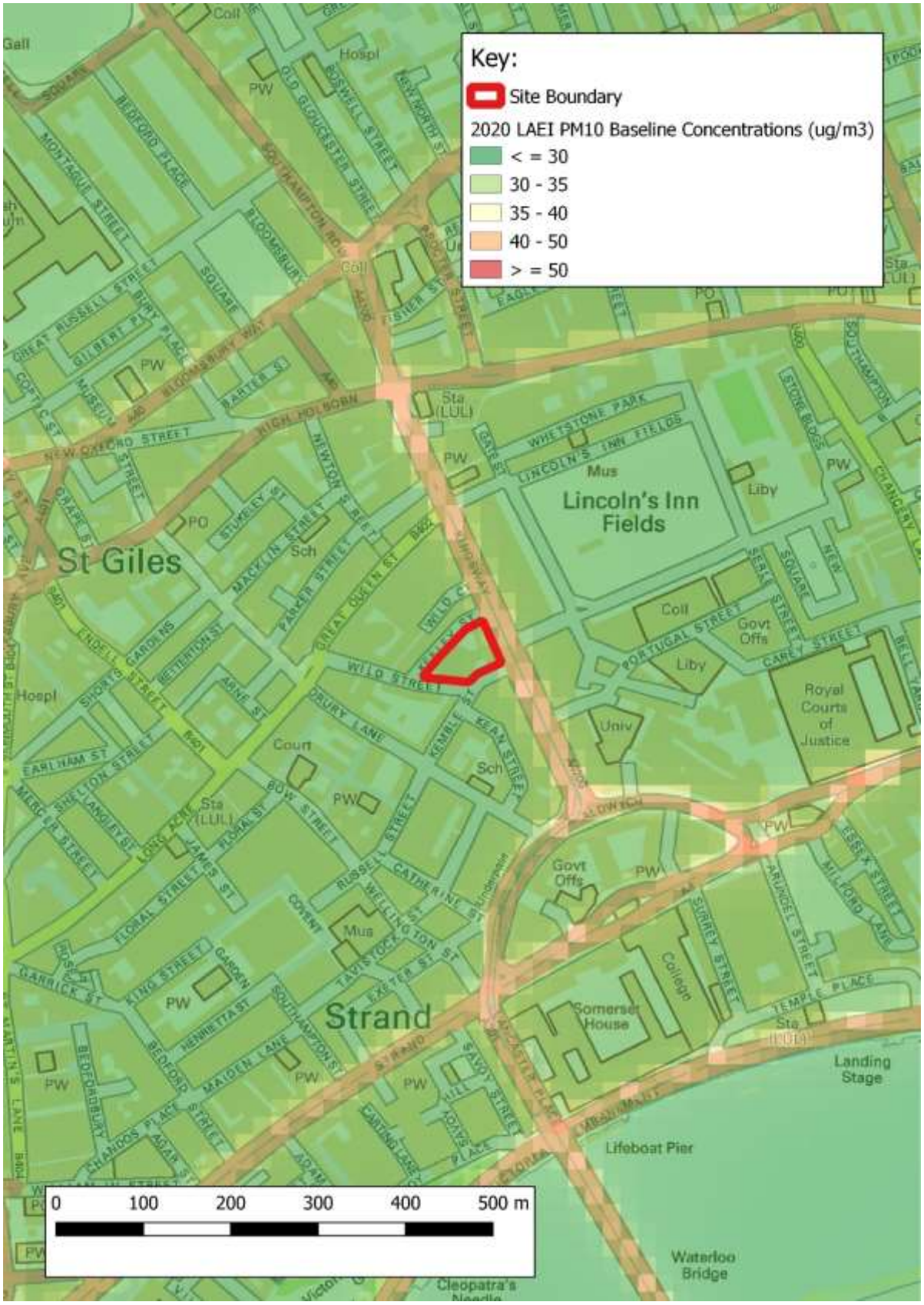


Figure 11 – 2020 LAEI Baseline $PM_{2.5}$ Concentrations (µg/m³)

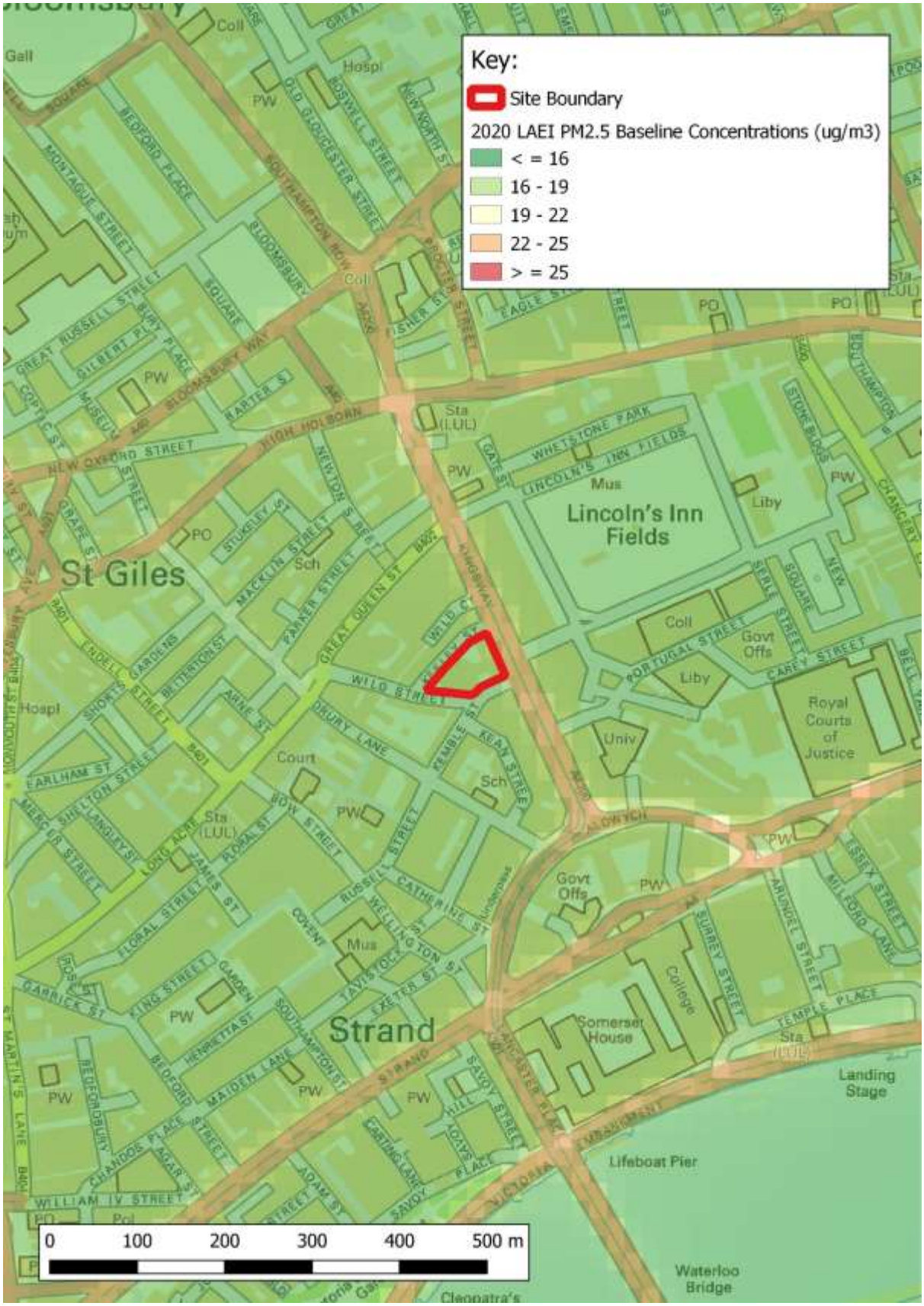


Figure 12 – Construction Zone of Influence

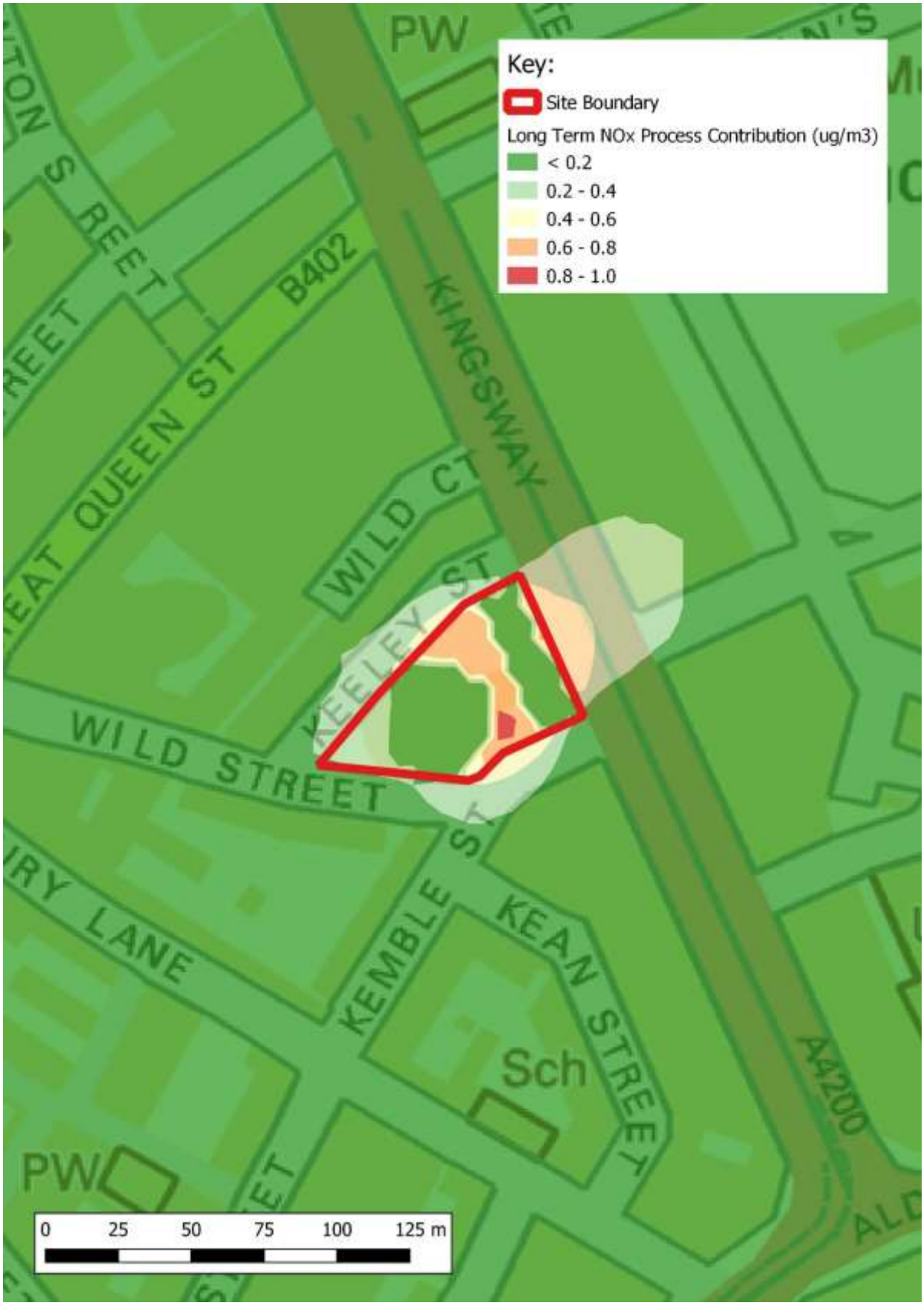
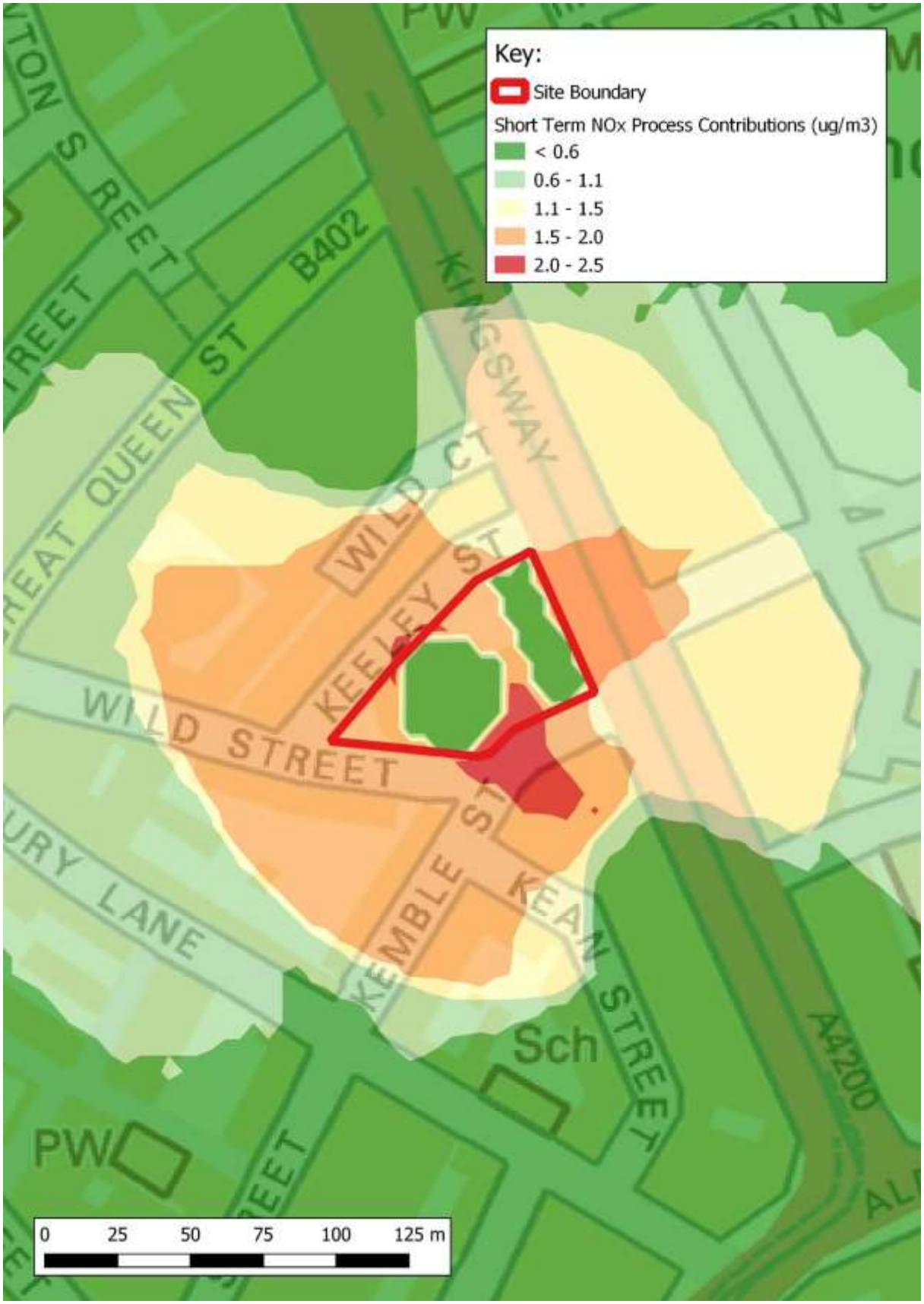


Figure 13 – Gridded Output for Short Term NOx Process Contributions



Appendix A - Glossary of Terms

Term	Definition
AADT Annual Average Daily Traffic	A daily total traffic flow (24 hrs.), expressed as a mean daily flow across all 365 days of the year.
Adjustment	Application of a correction factor to modelled results to account for uncertainties in the model.
Air Quality Objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted umber of exceedances within a specific timescale (see also air quality standard).
Air Quality Standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year.
AQMA	Air Quality Management Area.
Conservative	Tending to over-predict the impact rather than under-predict.
Data Capture	The percentage of all the possible measurements for a given period that were validly measured.
Defra	Department for Environment, Food and Rural Affairs.
DfT	Department for Transport
Exceedance	A period of time where the concentrations of a pollutant is greater than the appropriate air quality standard.
HDV/HGV	Heavy Duty Vehicle/Heavy Goods Vehicle
LAQM	Local Air Quality Management
Model adjustment	Following model verification, the process by which modelled results are amended. This corrects for systematic error.
NO_2	Nitrogen dioxide
NO_X	Nitrogen oxides
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
$\mu g/m^3$ (micrograms per cubic metre)	A measure of concentration in terms of mass per unit volume. A concentration of 1 $\mu g/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

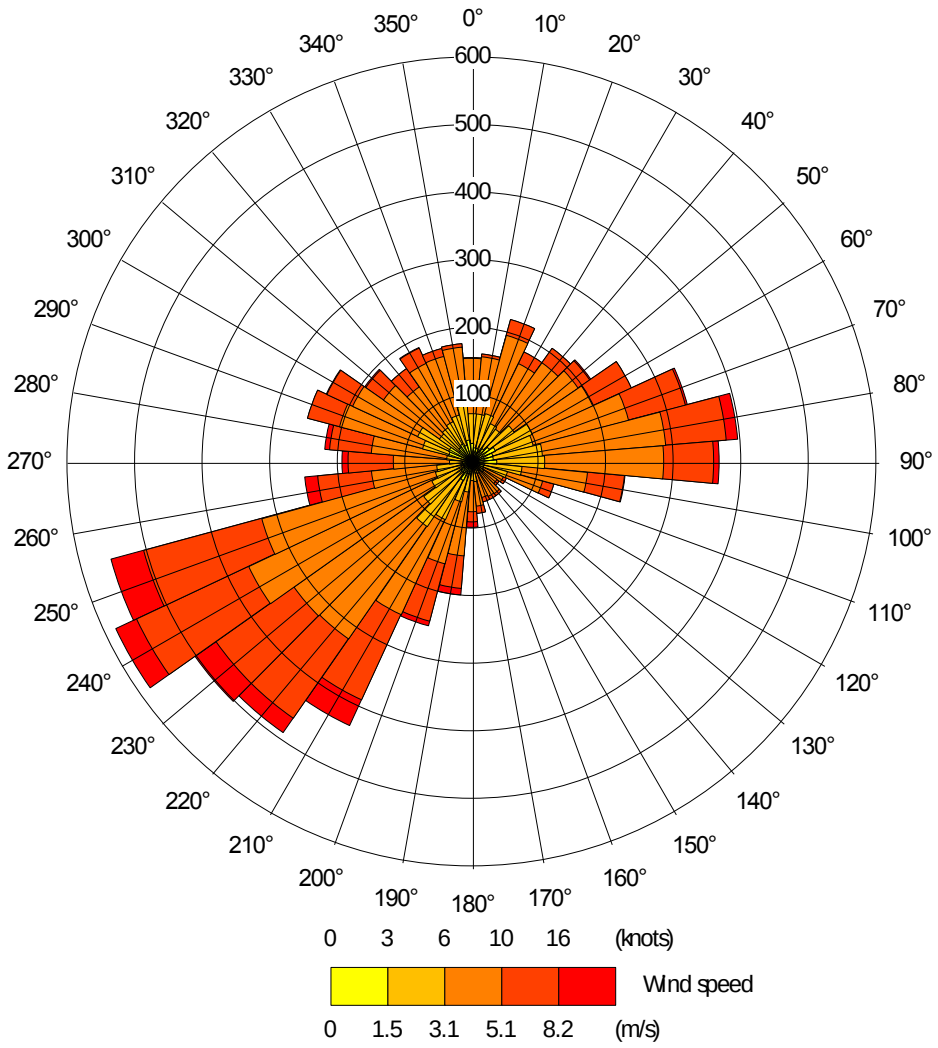
Appendix B – Modelled Buildings

Building	Grid Reference	Height (m)	Length (m)	Width (m)	Angle (°)
1 (circular)	530585, 181209	59.657	38	38	0
2	530614, 181230	30.395	48.5	15.1	335

Appendix C - Modelled Receptors & LAEI Background Concentrations*

Receptor ID	X, Y	Z (m)	2013 NO_2	2013 PM_{10}	2013 $PM_{2.5}$	2020 NO_2	2020 PM_{10}	2020 $PM_{2.5}$
E1	530654, 181247	1.5	78.6	33.3	20.1	45.2	30.5	17.6
E2	530586, 181388	1.5	128.9	42.6	23.6	66.6	38.5	19.8
E3	530802, 181233	1.5	49.4	28.4	18.3	34.6	26.2	16.4
E4	530434, 181225	1.5	53.1	29.1	18.8	36.9	26.7	16.6
E5	530600, 181079	1.5	51.4	28.7	18.5	35.6	26.5	16.5
E6	530734, 181156	1.5	55.1	29.2	18.6	36.4	26.9	16.5
E7	530427, 181363	1.5	50.2	28.6	18.6	35.3	26.4	16.6

Appendix D - 2013 Windrose from London City Airport



Appendix E - Operational Results (2020 LAEI Baseline)

Annual Mean NO_2 Results

Receptor ID	Without Development (µg/m³)	With Development (µg/m³)	Change (µg/m³)	Impact
E1	45.2	45.5	0.3	Moderate Adverse
E2	66.6	66.7	0.1	Negligible
E3	34.6	34.6	0.0	Negligible
E4	36.9	37.0	0.1	Negligible
E5	35.6	35.6	0.0	Negligible
E6	36.4	36.4	0.0	Negligible
E7	35.3	35.3	0.0	Negligible

1-hour Mean NO_2 Results

Receptor ID	Without Development (µg/m³)	With Development (µg/m³)	EC PC (µg/m³)	EC Exceed (i.e.>20µg/m³)	Exceed (i.e. >200µg/m³)
E1	90.5	92.0	1.6	No	No
E2	133.3	133.8	0.5	No	No
E3	69.2	69.7	0.5	No	No
E4	73.8	74.6	0.7	No	No
E5	71.2	71.7	0.5	No	No
E6	72.8	73.5	0.7	No	No
E7	70.6	71.1	0.5	No	No

Appendix F - Operational Results (Sensitivity Analysis) – 2013 LAEI Baseline

Annual Mean NO_2 Results

Receptor ID	Without Development (µg/m³)	With Development (µg/m³)	Change (µg/m³)	Impact
E1	78.6	78.9	0.3	Moderate Adverse
E2	128.9	129.0	0.1	Negligible
E3	49.4	49.4	0.0	Negligible
E4	53.1	53.2	0.1	Negligible
E5	51.4	51.5	0.1	Negligible
E6	55.1	55.1	0.0	Negligible
E7	50.2	50.2	0.0	Negligible

1-hour Mean NO_2 Results

Receptor ID	Without Development (µg/m³)	With Development (µg/m³)	EC PC (µg/m³)	EC Exceed (i.e.>20µg/m³)	Exceed (i.e. >200µg/m³)
E1	157.2	158.8	1.6	No	No
E2	257.9	258.4	0.5	No	Yes
E3	98.8	99.3	0.5	No	No
E4	106.2	107.0	0.7	No	No
E5	102.9	103.4	0.5	No	No
E6	110.1	110.8	0.7	No	No
E7	100.5	100.9	0.5	No	No

References

1 Department for Environment, Food and Rural Affairs (DEFRA) and the Devolved Administrations (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2)

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

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

4 The Air Quality Standards (Amendment) Regulations 2016- Statutory Instrument 2016 No. 1184

5 The Environment Act 1995

6 The Environmental Protection Act 1995.

7 Department for Communities and Local Government (February 2019). National Planning Policy Framework.

8 Mayor of London: Cleaning London's air, The Mayor's Air Quality Strategy (December 2010)

9 Mayor of London (March 2016) The London Plan: Spatial Development Strategy for Greater London Consolidated with alterations since 2011.

10 Mayor of London (August 2018) The Draft London Plan: Spatial Development Strategy for Greater London.

11 London Borough of Camden. Local Plan (Adopted 2017).

12 London Borough of Camden. Draft Clean Air Action Plan (2019-2022).

13 Mayor of London (May 2016) London Local Air Quality Management (LLAQM) Technical Guidance (LLAQM.TG(16))

14 Defra (2018) Part IV The Environment Act 1995 and Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management Technical Guidance LAQM.TG16

15 Environmental Protection UK and Institute of Air Quality Management (Version 1.2 Updated January 2017). Land Use Planning & Development Control: Planning for Air Quality

16 Institute of Air Quality Management (Version 1.1 Updated June 2016). Guidance on the Assessment of Dust from Demolition and Construction

17 Department of Communities and Local Government (DCLG) (March 2014). National Planning Practice Guidance

18 London Councils (January 2007). Air Quality and Planning Guidance – Revised Version.

19 Mayor of London (July 2014): The Control of Dust and Emissions during Construction and Demolition – Supplementary Planning Guidance.

20 Greater London Authority (April 2014): Sustainable Design and Construction - Supplementary Planning Guidance

21 London Borough of Camden. Amenity (September 2011 – updated March 2018).

22 AQC & ENVIRON UK Ltd (2014). Air Quality Neutral Planning Guidance.

23 London Borough of Camden. 2018 Air Quality Status Report.

24 Defra Local Air Quality Management (LAQM) Support Pages. Available at: http://laqm.defra.gov.uk/. [Accessed on 07/02/2019].

25 London Air Quality Network. Available at: http://www.londonair.org.uk/LondonAir/Default.aspx. [Accessed on 07/02/2019].

26 London Atmospheric Emissions Inventory (LAEI). Available at: https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory-2013. [Accessed on 07/02/2019].

27 Environment Agency Air Quality Modelling and Assessment Unit, 'Conversion ratios for NOx and NO_2'

28 London Councils (2007) Air Quality and Planning Guidance. Revised version – January 2007.