105 Judd Street, Camden, London WC1H 9NE

Odour Impact Assessment (Fumes)

784-B050553
11th April 2025

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EXECUTIVE SUMMARY

Preliminary atmospheric odour dispersion modeling has been undertaken to assess the potential odour impacts from the fume exhausts of 16 laboratory fume cupboards for the proposed development at 105 Judd Street, Camden, WC1H 9NE.

Ventilation System

Laboratory ventilation system consists of 3 No. fume extract fans each has a volumetric flow rate at 3 m^3/s. on the roof. Two fans will be on duty and one as a standby fan.

Odour Assessment Methodology

Odour assessment has been undertaken in accordance with guidance of guidance on the assessment of odour for planning, IAQM, July 2018; and H4 Odour Management, How to comply with your environmental permit, March 2011.

Odour Benchmarks for the Assessment

A benchmark odour criterion of 3.0 OUe/m^3 for moderately offensive odours has been used in this assessment. At this level it is likely that odour will be detected on occasion, however it is unlikely that odour complaints will be received.

Odour Dispersion Model

Odour releases from the fume extract fans were assessed using AERMOD modelling software. AERMOD is a US EPA regulatory model and it is an Environment Agency approved model for the prediction of pollutant concentrations from a wide range of sources that are present at typical industrial facilities.

Odour Emission Rates

Odour emission rates from the fume extract fans have been estimated using the (1) potential nitrogen dioxide emissions and VOC emissions (assessed as benzene) and (2) associated odour detection thresholds of nitrogen dioxide and VOC (assessed as benzene).

The nitrogen dioxide emission thresholds from the laboratory operating permits set by the US MassDEP's regulations at 310 CMR 7.12 have been used in the assessment. The maximum benzene emission rate published in the European Union Risk Assessment Report has been used in the odour emission rate calculations (the report consists of the measurement results taken from two periods of 1993 – 1998 and 1999 to 2000, and published in the European Union Risk Assessment Report, Benzene, CAS-No.: 71-43-2, EINECS-No.: 200-753-7, Final version of 2008). In addition, the lowest published odour thresholds for nitrogen dioxide and benzene have been used in the assessment.

Initial Modelling Assessment Results

The initial odour modelling results indicated that the predicted odour concentrations at the neighbouring receptor locations are less than 1 OU_E/m^3, which is below the odour benchmark of 3.0 OU_E/m^3. The odour effects at the receptor locations are predicted to be 'not significant'.

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
GLA	Greater London Authority
IAQM	Institute of Air Quality Management
IEMA	Institute of Environmental Management & Assessment
LEV	Local Extract Ventilation
NGR	United Kingdom National Grid Reference
NPPF	National Planning Policy Framework
NO_2	Nitrogen Dioxide
ODT	The Odour Detection Threshold
OU_E	Odour Unit. An odour unit is a measure of the concentration of a mixture of odorous compounds. It is determined by means of olfactometry. Odour unit values are determined by a standard method given in BSEN13725; 2003 on olfactometry. An odour unit as defined by the CEN standard is 1 OU_E. 1 OU_E/m^3 is the point of detection. Reference: H4 Odour Management, The Environment Agency, March 2011
OU_E/m^3	Odour Unit per cubic meter of gas/air
PC	Process Contribution
PEC	Predicted Environment Concentration
PPG	Planning Policy Guidance
PPS	Planning Policy Statements
Tetra Tech	Tetra Tech Limited
USEPA	U.S. Environmental Protection Agency
VDI	Association of German Engineers
VOC	Volatile organic compounds
UK	United Kingdom

1.0 INTRODUCTION

This report presents the findings of an odour impact assessment undertaken to assess laboratory operation odour emissions in relation to conversion combined laboratory-enabled offices at the basement, ground, first, second, third and fourth floors and creation of additional set-back fifth & sixth floors at 105 Judd Street, Camden, WC1H 9NE.

The laboratory ventilation system consists of 3 No. fume extract fans located on the roof. Two fans will be operational and one will be a standby fan. Total extract ventilation rate for the two operational fans is 6.0 m^3/s (3.0 m^3/s of each fan).

1.1 DESCRIPTION OF DEVELOPMENT

The existing building at 105 Judd St, London (near Euston) is a 4-storey office and it will go through a major redevelopment to make it a 6 storey (with additional 7th storey for roof plant) “laboratory enabled” office development.

1.2 SITE LOCATION

The central Grid Reference is approximately 530128,182665. The application site is bounded in all directions by commercial and residential properties. Reference should be made to **Figure 1-1** for a map of the application site and surrounding area.

Figure 1-1. Satellite Image of Site and Surrounding Area

Google Imagery (2021)

1.3 REPORT STRUCTURE

Following this introductory section, the remainder of this report is structured as follows:

- Section 1: Introduction
- Section 2: Relevant Legislation and Odour Assessment Methodology
- Section 3: Methodology of Odour Release
- Section 4: Odour Modelling assessment Results
- Section 5: Conclusions

All technical Appendices are included at the end of this report for information.

2.0 RELEVANT LEGISLATION AND ODOUR ASSESSMENT METHODOLOGY

2.1 PLANNING POLICY

National Policy

The National Planning Policy Framework (NPPF), revised 7th February 2025 principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policy making. The NPPF states that:

Paragraph 187

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

Paragraph 201

> *"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."*

2.2 LOCAL POLICY

The London Borough of Camden (LBoC) lies within the Greater London Authority (GLA) Area. The new London Plan addresses the improvement of air quality. Following a review of policies within the new Local Plan, the following were identified as being relevant to the proposed development from an air quality perspective:

"Policy SI1 Improving Air Quality

> *A. Development plans, through relevant strategic, site specific and area-based policies should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.*
>
> *B. To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:*
>
> *1. Development proposals should not:*

a) lead to further deterioration of existing poor air quality

b) 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

c) create unacceptable risk of high levels of exposure to poor air quality.

2. In order to meet the requirements in Part 1, as a minimum:

a) Development proposals must be at least air quality neutral

b) 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 in preference to post-design or retrofitted mitigation measures

c) Major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1

d) Development proposals 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, should demonstrate that design measures have been used to minimise exposure.

C. Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an Air Quality Positive approach. To achieve this a statement should be submitted demonstrating:

a) How proposals have considered ways to maximise benefits to local air quality, and

b) What measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this

D. In order to reduce the impact on air quality during the construction and demolition phase 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.

E. Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development."

2.3 ODOUR ASSESSMENT METHODOLOGY

The following key regulations, guidance and guidelines have been used in the assessment:

- Guidance on the assessment of odour for planning, IAQM, July 2018; and,
- H4 Odour Management, How to comply with your environmental permit, March 2011.

2.4 DEFINITION OF IMPACT AND EFFECT

IEMA Guidelines for Environmental Impact Assessment (2004) recommend a clear progression from the characterisation of 'impact' to the assessment of the significance of the 'effect' taking into account the evaluation of the sensitivity and value of the receptors. The guidelines emphasise the need to clearly define at the outset how the two terms will be used and then to apply them in a consistent fashion. In this IAQM guidance, the following definitions are used:

- **Impacts** – these are changes to the environment attributable to the development proposal.
- **Effects** – these are the results of the changes on specific receptors.
- **Receptors** – are the users of the adjacent land, which may vary in their sensitivity to odour.

An increase in odour levels (the impact) would therefore cause a particular effect (e.g. loss of amenity) if the adjacent land use was residential, and perhaps a lesser effect if the adjacent land use was an industrial facility.

2.5 ODOUR BENCHMARKS

Environment Agency Guidance H4 Odour Management (March 2011) and the latest Institute of Air Quality Management (IAQM) Guidance on the Assessment of Odour for Planning (July 2018) provides a methodology for assessing the impacts of odour based on the combinations of field odour survey observations and odour dispersion modelling.

The modelling method (if used) calculates the 98th percentile of hourly average odour concentrations ($C_{98,\ 1\text{-hour}}$) over a year, (i.e. the levels exceeded for 2% of the time) with the results being expressed as European Odour Unit contours on a map. The exposure contours can then be used to check unacceptable levels of odour pollution against exposure benchmarks at sensitive receptor locations.

The H4 benchmarks are based on the 98th percentile of hourly averages and they are presented in **Table 2-1**.

Table 2-1. H4 Benchmark Odour Criteria

Criterion C_{98} ou_E/m^3	Offensiveness	Odour Emission Sources
1.5	Most offensive odours	Processes involving decaying animal or fish remains Processes involving septic effluent or sludge Biological landfill odours
3.0	Moderately offensive odours	Intensive livestock rearing Fat frying (food processing) Sugar beet processing Well aerated green waste composting
6.0	Less offensive odours	Brewery Confectionery Coffee

The latest IAQM guidance states that the predictive, quantitative approach involves obtaining estimates of the odour source emission rate, use of the emissions in a dispersion model to predict 98th percentile concentration at sensitive receptors and comparison of these with criteria that have evolved from research and survey work. At the present time, this remains an accepted technique and the IAQM supports this.

IAQM confirm that in the absence of comprehensive dose-response information the assessor should allow the derivation of exact C98 concentration metrics for different types of odour. IAQM is *"…of the opinion that the* *practitioner should observe, from the various scientific studies, case law and practical examples of the investigation of odour annoyance cases, that in any specific case, an appropriate criterion could lie somewhere in the range of 1 to 10 ouE/m³ as a 98th percentile of hourly mean odour concentrations.*

Taking into account the available scientific evidence and the collective experience of IAQM members involved in drafting this guidance, the odour concentration change descriptors together with impact descriptors are proposed by IAQM for an odour at the offensive end of the spectrum. These adopt the C98 as the appropriate frequency metric, encompasses the 1 to 10 ouE/m³ concentration range referred to above and also considers the potential sensitivity of different receptors. It is also consistent in format and concept with other guidance in the air quality field.

*For odours that are less unpleasant, the level of odour exposure required to elicit the same effect may be somewhat higher, requiring professional judgement to be applied. For example, odours from sewage treatment works plant operating normally, i.e. non-septic conditions, would not be expected to be at the 'most offensive' end of the spectrum (*see ***Table 2-2****) and can be considered on par with 'moderately offensive' odours such as intensive livestock rearing.* ***Table 2-3*** *shows the impact descriptors proposed for a 'moderately offensive' odour."*

Table 2-2. Proposed Odour Effect Descriptors for Impacts Predicted by Modelling – 'Most Offensive' Odours

Odour Exposure Level C_{98}, ou_E/m^3	Receptor Sensitivity		
	Low	Medium	High
≥10	Moderate	Substantial	Substantial
5-<10	Moderate	Moderate	Substantial
3-<5	Slight	Moderate	Moderate
1.5-<3	Negligible	Slight	Moderate
0.5-<1.5	Negligible	Negligible	Slight
<0.5	Negligible	Negligible	Negligible

It should be noted that the Table applies equally to cases where there are increases and decreases in odour exposure as a result of this development, in which case the appropriate terms "adverse" or "beneficial "should be added to the descriptors.

Table 2-3. Proposed Odour Effect Descriptors for Impacts Predicted by Modelling – 'Moderately Offensive' Odours

Odour Exposure Level C_{98}, ou_E/m^3	Receptor Sensitivity		
	Low	Medium	High
≥10	Moderate	Substantial	Substantial
5-<10	Slight	Moderate	Moderate
3-<5	Negligible	Slight	Moderate
1.5-<3	Negligible	Negligible	Slight
0.5-<1.5	Negligible	Negligible	Negligible
<0.5	Negligible	Negligible	Negligible

It should be noted that the Table applies equally to cases where there are increases and decreases in odour exposure as a result of this development, in which case the appropriate terms "adverse" or "beneficial "should be added to the descriptors.

A benchmark odour criterion of $C_{98,\ 1\text{-hour}}$ = 3.0 OUe/m^3 for moderately offensive odours has been used in this assessment. This benchmark/criterion is defined in terms of a minimum odour concentration expressed in odour units and a minimum exposure period, which is 2% of the time or the 98th percentile of hourly average concentrations in a given year. At this level it is likely that odour will be detected on occasion, however it is unlikely that odour complaints will be received.

3.0 MODELLING OF ODOUR RELEASE

An assessment of odour releases from the lab operations was undertaken using AERMOD modelling software. AERMOD is a US EPA regulatory model and it is an Environment Agency approved model for the prediction of pollutant concentrations from a wide range of sources that are present at typical industrial facilities.

3.1 AERMOD DISPERSION MODEL

The AERMOD model accepts hourly meteorological data to define the conditions for plume rise, transport, diffusion and deposition. It estimates the concentration or deposition value for each source and receptor combination for each hour of input meteorology and calculates annual and user-selected short-term averages. The model also takes into account the local terrain surrounding the facility. Since most air quality standards are stipulated as averages or percentiles, AERMOD allows further analysis of the results for comparison purposes.

3.2 EMISSION SOURCES AND EMISSION RATES

3.2.1 Laboratory Ventilation System

There are 16 No. fume cupboards and 10No. LEV (Local extract ventilation points). The laboratory ventilation system consists of 3 No. fume extract fans located on the roof. Two fans will be operational and one will be a standby fan. Total extract ventilation rate for the two operational fans is 6.0m^3/s (3.0 m^3/s of each fan).

3.2.2 Emissions from Laboratories

<u>**Nitrogen Dioxide Emission Rates**</u>

It is noted that there are currently no specific policy, legislation, or guidance requirements on laboratory pollutant emission limits or the methodology for undertaking a laboratory air quality impact assessment in the UK.

Laboratories may conduct experiments involving chemical reactions or use chemical reactions and other techniques to analyse various products or substances (e.g., chemicals, drugs, and environmental media).

However, studies show that there is some information on the emission thresholds available from the laboratory operating permits set by the US MassDEP's regulations at 310 CMR 7.12.

The US MassDEP's regulations state that:

> *"MassDEP's regulations require laboratory facilities to report emissions to MassDEP if their federal potential air emissions exceed specific thresholds. Source Registration is based on facility-wide emissions and there are different thresholds for combustion equipment and non-combustion equipment and processes. The reporting thresholds for non-combustion emissions are listed below:*

Contaminant	***Threshold***
Nitrogen dioxide	*4.4 tonnes per year"*

The US MassDEP's regulations do not clarify how to apply these thresholds to different sizes of the laboratories.

The proposed laboratory will be operating only 16 fume cupboards and it is likely the operations would emit quantities of NO_2 that are within the above thresholds.

Benzene Emission Rates

The benzene emission rate for the laboratory operations were derived from the measurement results taken from two periods of 1993 – 1998 and 1999 to 2000, and published in the European Union Risk Assessment Report, Benzene, CAS-No.: 71-43-2, EINECS-No.: 200-753-7, Final version of 2008. The emission concentrations of the measurement data at laboratory range from 0.03 to 7.1 mg/m^3 with an average concentration of 0.8 mg/m^3.

3.2.3 Odour Emission Rates

Odour emission rates from the fume extract fans have been estimated using:

(1) the potential nitrogen dioxide emissions and VOC emissions (assessed as benzene); and
(2) associated odour detection thresholds of nitrogen dioxide and VOC (assessed as benzene).

The nitrogen dioxide emission thresholds from the laboratory operating permits set by the US MassDEP's regulations at 310 CMR 7.12 have been used in the assessment. The maximum benzene emission rate published in the European Union Risk Assessment Report has been used in the odour emission rate calculations (the report consists of the measurement results taken from two periods of 1993 – 1998 and 1999 to 2000, and published in the European Union Risk Assessment Report, Benzene, CAS-No.: 71-43-2, EINECS-No.: 200-753-7, Final version of 2008). In addition, the lowest published odour thresholds for nitrogen dioxide and benzene have been used in the assessment.

Following information have been used in the estimation of odour emission rates.

- There are 2 operational extract fans, and each fan has a peak volume flue rate of 3.0 m^3/s.
- Each fan has a flue located on the roof of the building and disperse the extracted air into atmosphere.
- The nitrogen dioxide emission thresholds from the laboratory operating permit of 4.4 tonnes per year set by the US MassDEP's regulations at 310 CMR 7.12 have been used in the assessment.

  It should be noted that (1) the annual NO_2 background concentrations are already above the air quality objective of 40 µg/m^3 at the receptors surrounding the site; (2) an air quality impact assessment has been undertaken by working backwards (back calculate) to establishes the emission limits for NO_x in order to ensure that the effects of the NO_2, impacts on the surrounding receptors to be insignificant.
  The air quality assessment has established a NO_2 emission limit of "*100 kg NO_x per year for the laboratory operation to meet the Camden Interim Pollution Targets of 20 µg/m^3 to be achieved in 2030*". However, the US MassDEP's laboratory operating permit of 4.4 tonnes per year has been used to produce a worst-case assessment.

- The maximum benzene emission rate published in the European Union Risk Assessment Report has been used in the odour emission rate calculations (the report consists of the measurement results taken from two periods of 1993 – 1998 and 1999 to 2000, and published in the European Union Risk Assessment Report, Benzene, CAS-No.: 71-43-2, EINECS-No.: 200-753-7, Final version of 2008);
- Assumption of the NO_x emission activities to be within 24-hour period per day to produce a worst-case assessment.

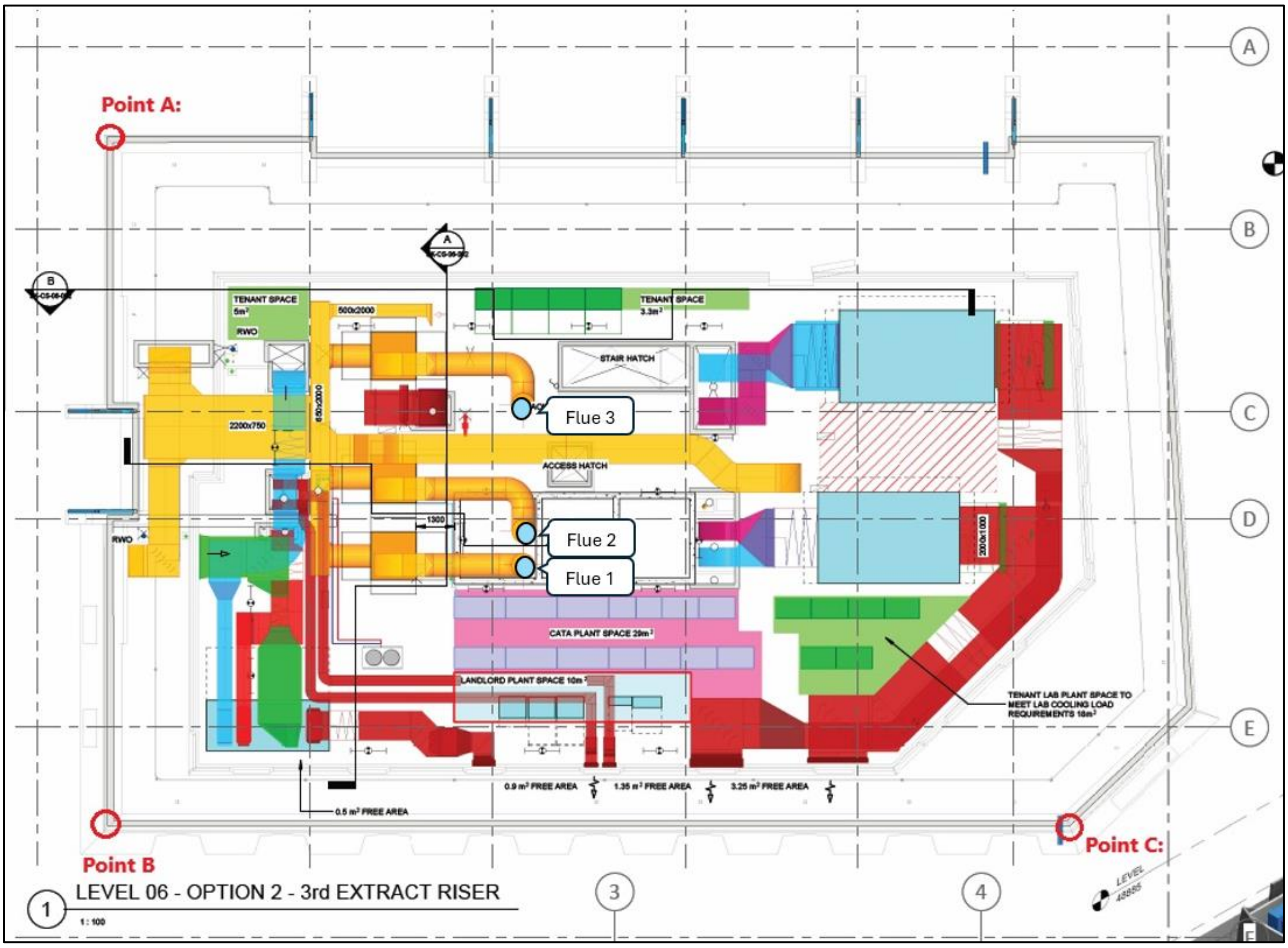
The laboratory exhaust fan pollutant mass emission rates used within AERMOD are presented in **Table 3-1**.

The flue locations of the laboratory exhaust fans are presented in **Figure 3-1**.

Table 3-1. Laboratory Exhaust Fan Flues Stack Emissions

Parameter	Emission Rate (single Flue)	Total Emission Rate	Unit
Fume Cupboard Flues			
Number of Flues	3 (2 in operational)		-
Flue volume	3.0	6.0	m^3/s
Flue gas temperature	25	-	°C
Modelled stack exhaust velocity	10	-	m/s
Modelled flue diameter	0.618	-	m
Operating Hours	24	-	Hour/day
Stack Height	33.365 m above the ground level (3 m above the roof plant enclosure level)	-	m
Pollutant Mass Emission Calculations from Laboratory			
Nitrogen Dioxide Odour Threshold	0.11	-	mg/m^3 per Odour Unit
Benzene Odour Threshold	1.5		mg/m^3 per Odour Unit
Nitrogen Dioxide Emission Concentration	404	-	mg/m^3
Benzene Emission Concentration	7.1	-	mg/m^3
Benzene Concentrations	0.8	-	mg/m^3
Odour Emission from Nitrogen Dioxide Emissions	3,674.3	-	OU_E/s
Odour Emission from Benzene Emissions	14.2	-	OU_E/s
Total Odour Emissions	3,689	-	OU_E/s

Figure 3-1. Odour Emission Points



3.3 RECEPTORS

3.3.1 Discrete Receptors

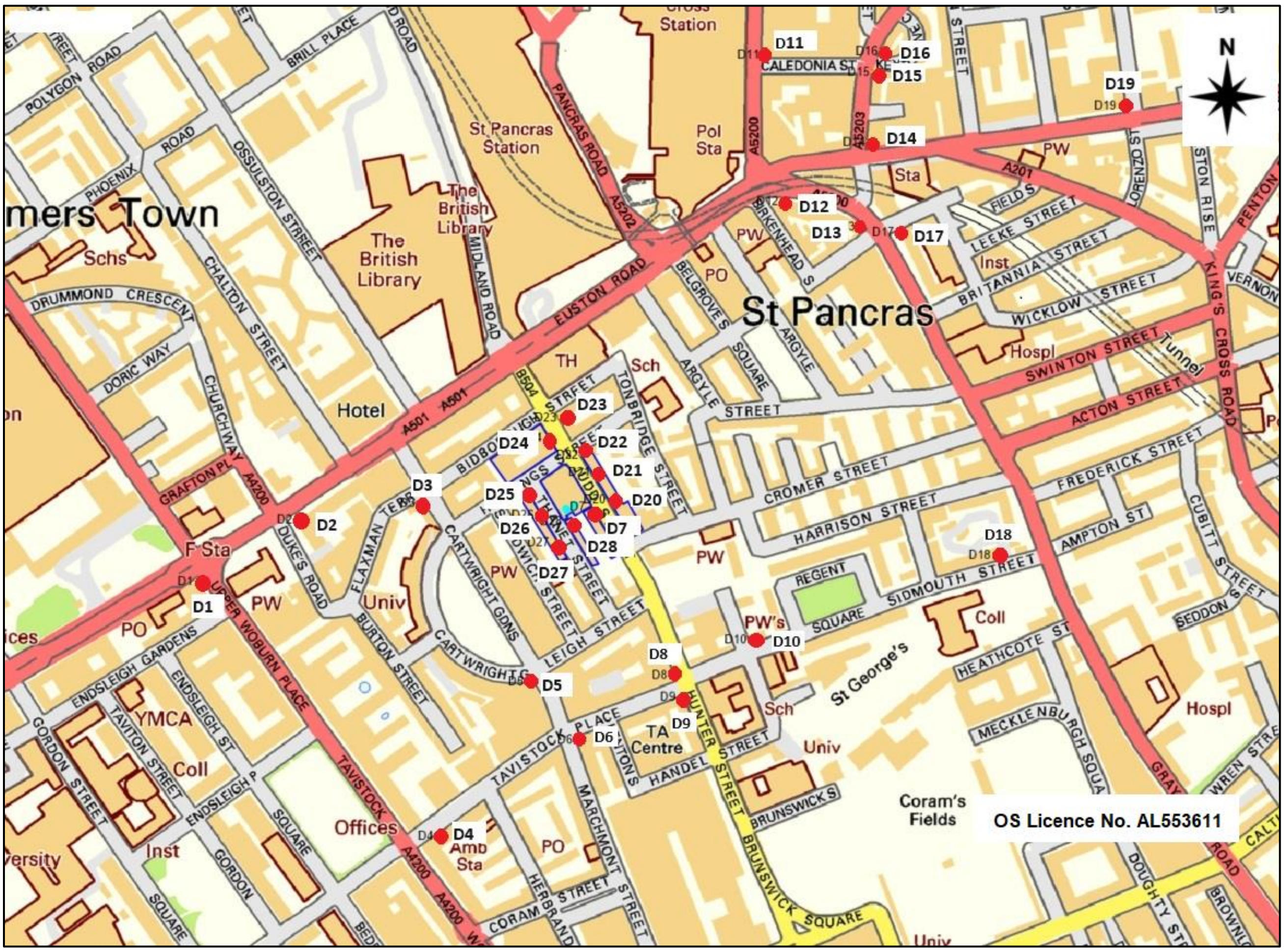
The discrete sensitive receptors identified for the purposes of this air quality assessment are contained in **Table 3-2** and shown in **Figure 3-2**. The assessment was undertaken to determine the potential impacts on those selected receptors.

It should be noted that these do not represent an exhaustive list of all receptors within the vicinity of the Site, rather worst-case representative locations within and adjacent to the site.

Table 3-2. Modelled Sensitive Receptor Locations

Existing Sensitive Receptor		X	Y	Receptor Height (m)
D1	161 Euston Road	529761	182571	1.5
D2	117 Euston Road	529862	182633	1.5
D3	9 Mabledon Place	529987	182650	1.5
D4	2 Tavistock Place	530005	182312	1.5
D5	101 Marchmont Street	530097	182469	1.5
D6	74 Marchmont Street	530147	182410	1.5
D7	103 Judd Street	530160	182646	1.5
D8	305 Judd Street	530243	182475	1.5
D9	Cambria House 37 Hunter Street	530251	182453	1.5
D10	Selsey Tavistock Place	530323	182511	1.5
D11	Premier Inn Kings Cross	530335	183106	1.5
D12	341 Gray's Inn Road	530356	182957	1.5
D13	2 Saint Chad's Street	530433	182931	1.5
D14	272 Pentonviille Road	530443	183017	1.5
D15	26b Caledonian Road	530448	183088	1.5
D16	44 Caledonian Road	530456	183109	1.5
D17	Travelodge Kings Cross	530473	182925	1.5
D18	Linfield Sidmouth Street	530571	182597	1.5
D19	200 Pentonville Road	530698	183054	1.5
D20	100 Judd Street	530180.2	182654.1	1.5
D21	108 Judd Street	530164.5	182681.5	1.5
D22	114 Judd Street	530152.6	182699.4	1.5
D23	118 Judd Street	530130	182736.5	1.5
D24	123 Judd Street	530115.3	182717	1.5
D25	181 Sinclair House, Hastings Street	530093.9	182658.2	1.5
D26	160 Thanet Street	530107.3	182638.2	1.5
D27	112 Thanet Street	530122.6	182610.6	1.5
D28	17 Thanet Street	530136	182631.4	1.5

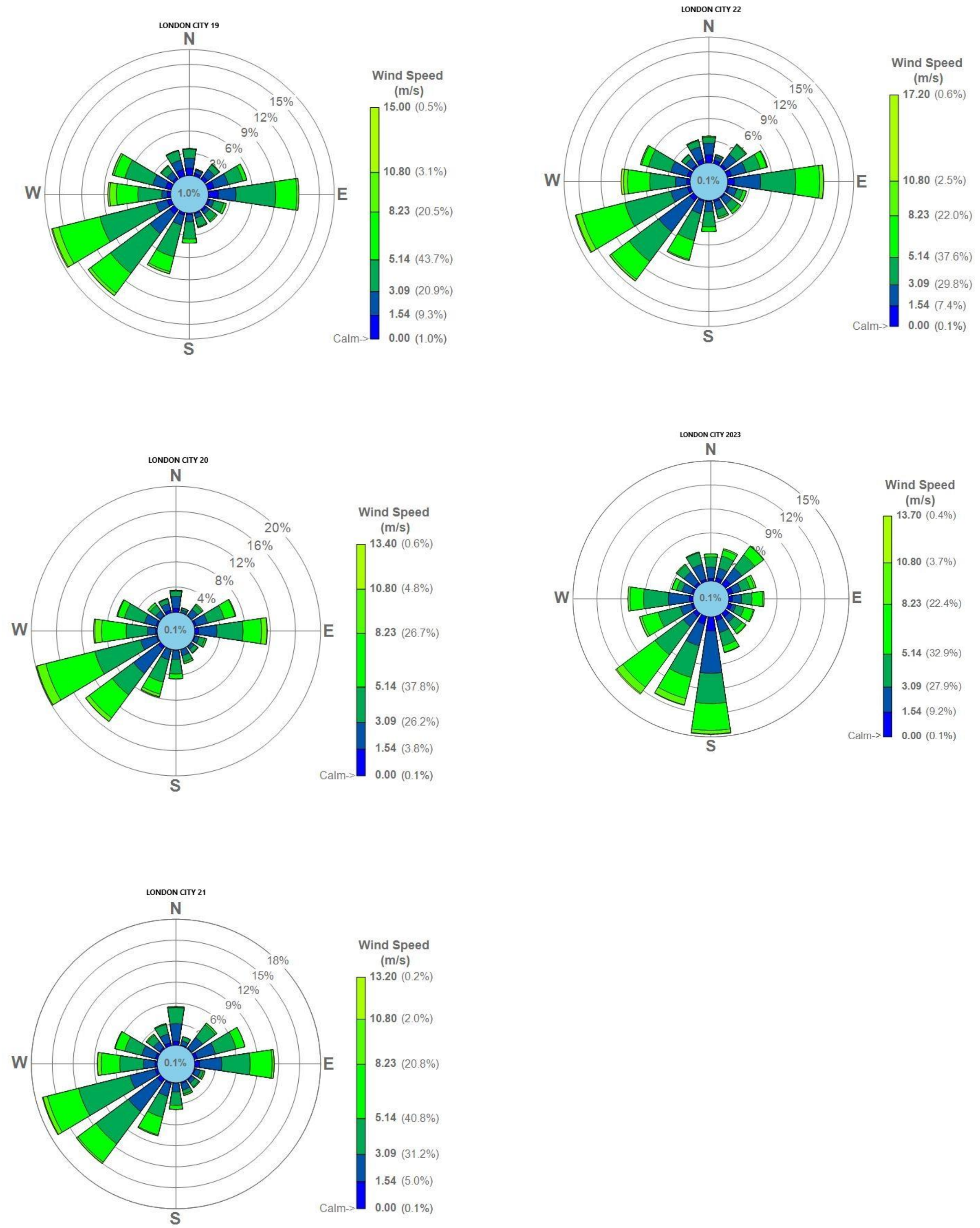
Figure 3-2. Sensitive Receptor Locations



3.4 METEOROLOGICAL DATA

The 5-year meteorological data (2019 – 2023 inclusive) used in the assessment is derived from London City Airport weather station, which is considered representative of conditions within the vicinity of the site, with all the complete parameters necessary for the AERMOD model. Reference should be made to **Figure 3-3** for an illustration of the prevalent wind conditions at this site.

Figure 3-3. Meteorological Station Windrose



3.5 SURFACE ROUGHNESS LENGTH

The land uses surrounding the site are described mainly as open fields and industrial area. A typical surface roughness value of 1.5 m for Large Urban Areas has been used as it is considered that they are representative of the characteristics of the area surrounding the site.

3.6 BUILDINGS IN THE MODELLING ASSESSMENT

Buildings nearby or immediately adjacent to the emission source could potentially cause building downwash effects on emission sources and have therefore been modelled. The locations and dimensions of the buildings used in the model are given in **Table 3-3**.

Table 3-3. Locations and Heights of Building Used in the Model

Name		NIGHT (m)		Height (m)
		X	Y	
1	105 Judd Street building	530160	182648	27.4
2	123 Judd Street	530075	182670	16.0
3	39 - 180 Thanet Street	530135	182596	20.0
4	8 - 17 Thanet Street	530167	182589	7.0
5	85 - 99 Judd Street	530189	182599	14.0
6	8 - 22 Judd Street	530201	182616	22.0

3.7 TREATMENT OF TERRAIN

The presence of steep terrain can influence the dispersion of emissions and the resulting pollutant concentrations. USEPA guidance indicates that terrain effects should be considered if the gradient exceeds 1:10. Digital terrain file was used in the assessment.

3.8 GRID RECEPTORS

A Cartesian receptor grid was also used in the model in order to produce the concentration contour lines. The Cartesian receptor grid consists of receptors identified by their x (east-west) and y (north-south) coordinates. The grid was constructed with grid spacing (x, y) of 25m x 25m over an area covering 750 by 750m with south-west corner UK NGR (m) of529770, 182290.

3.9 MODELLING UNCERTAINTY

Uncertainty in dispersion modelling predictions can be associated with a variety of factors, including:

- Model uncertainty - due to model limitations;
- Data uncertainty - including emissions estimates, background estimates and meteorology; and,
- Variability - randomness of measurements used.

However, potential uncertainties in model results have been minimised as far as practicable and worst-case inputs considered in order to provide a robust assessment. This included the following:

- Choice of model - AERMOD is a commonly used atmospheric dispersion model and results have been verified through a number of studies to ensure predictions are as accurate as possible.
- Considering the site-specific topographic effects (due to being at the base of a quarry), it is believed that AERMOD is the most suitable model for this assessment. This is because that (1) there is no other suitable model available and (2) AERMOD has advanced building downwash and plume rise capabilities for dealing with the complex terrain and the structures/buildings near the emission sources.
- Facility operating parameters - Operational parameters were provided for the facility.
- Background concentrations - Background pollutant concentrations were obtained from a number of recognised sources in order to consider baseline levels in the vicinity of the site, as detailed within the main report text.
- Variability - All model inputs are as accurate as possible and worst-case conditions have been considered where necessary in order to ensure a robust assessment of potential pollutant concentrations.

4.0 ODOUR MODELLING ASSESSMENT RESULTS

4.1 ODOUR MODELLING RESULTS

The results of the model predictions at each discrete receptor using 2019, 2020, 2021,2022 and 2023 met data (odour concentration at the ground level) are summarised in **Table 4-1**. The results are presented at the 98th%ile of hourly averages (Environment Agency, March 2011).

From the meteorological dataset, the year resulting in maximum total short-term odour concentrations was identified as 2023.

Table 4-1. The 98th%ile Maximum Short-Term (Hourly) Concentrations of Odour

Receptors		Predicted Hourly PEC (Contribution from the WwTW) OU_E/m^3				
		2019 Met Data	2020 Met Data	2021 Met Data	2022 Met Data	2023 Met Data
D1	161 Euston Road	0.10	0.08	0.09	0.09	<0.01
D2	117 Euston Road	0.17	0.15	0.16	0.16	<0.01
D3	9 Mabledon Place	0.32	0.29	0.31	0.31	0.01
D4	2 Tavistock Place	0.03	0.03	0.04	0.04	0.11
D5	101 Marchmont Street	0.16	0.15	0.18	0.18	0.43
D6	74 Marchmont Street	0.15	0.15	0.15	0.15	0.37
D7	103 Judd Street	0.60	0.54	0.58	0.58	0.70
D8	305 Judd Street	0.18	0.13	0.18	0.18	0.22
D9	Cambria House 37 Hunter Street	0.16	0.11	0.15	0.15	0.13
D10	Selsey Tavistock Place	0.18	0.15	0.15	0.15	0.37
D11	Premier Inn Kings Cross	0.06	0.05	0.06	0.06	0.29
D12	341 Gray's Inn Road	0.13	0.12	0.15	0.15	0.35
D13	2 Saint Chad's Street	0.14	0.14	0.13	0.13	0.17
D14	272 Pentonviille Road	0.09	0.10	0.12	0.12	0.18
D15	26b Caledonian Road	0.07	0.07	0.09	0.09	0.26
D16	44 Caledonian Road	0.07	0.06	0.08	0.08	0.27
D17	Travelodge Kings Cross	0.12	0.12	0.12	0.12	0.13
D18	Linfield Sidmouth Street	0.05	0.05	0.06	0.06	0.25
D19	200 Pentonville Road	0.05	0.05	0.05	0.05	0.04
D20	100 Judd Street	0.49	0.44	0.48	0.48	0.59
D21	108 Judd Street	0.67	0.66	0.67	0.67	0.91
D22	114 Judd Street	0.54	0.51	0.53	0.53	0.75
D23	118 Judd Street	0.45	0.44	0.46	0.46	0.75
D24	123 Judd Street	0.53	0.54	0.58	0.58	0.54
D25	181 Sinclair House, Hastings Street	0.61	0.57	0.60	0.60	0.08
D26	160 Thanet Street	0.63	0.57	0.60	0.60	0.35
D27	112 Thanet Street	0.46	0.42	0.48	0.48	0.58
D28	17 Thanet Street	0.62	0.59	0.62	0.62	0.63

Notes:

1. *There is no background for odour and hence the PC = PEC.*

The results indicate that the predicted odour concentrations at the modelled existing receptors using 2023 meteorological data range from <0.01 OU_E/m^3 to 0.91 OU_E/m^3, which is below the odour benchmark of 3.0 OU_E/m^3 .

Odour Effects on the Receptors

The magnitudes of odour effects for the modelled receptors using 2023 met data, the year resulting in maximum short-term odour concentrations, are presented in **Table 4-2**. The receptors have been assessed as high sensitivity receptors.

Table 4-2. The 98th %ile Maximum Short-Term (Hourly) Concentrations of Odour

Receptors		Predicted Hourly PEC OU_E/m^3	Odour Effect
		2023 Met Data	2023 Met Data
D1	161 Euston Road	<0.01	Negligible
D2	117 Euston Road	<0.01	Negligible
D3	9 Mabledon Place	0.01	Negligible
D4	2 Tavistock Place	0.11	Negligible
D5	101 Marchmont Street	0.43	Negligible
D6	74 Marchmont Street	0.37	Negligible
D7	103 Judd Street	0.70	Negligible
D8	305 Judd Street	0.22	Negligible
D9	Cambria House 37 Hunter Street	0.13	Negligible
D10	Selsey Tavistock Place	0.37	Negligible
D11	Premier Inn Kings Cross	0.29	Negligible
D12	341 Gray's Inn Road	0.35	Negligible
D13	2 Saint Chad's Street	0.17	Negligible
D14	272 Pentonviille Road	0.18	Negligible
D15	26b Caledonian Road	0.26	Negligible
D16	44 Caledonian Road	0.27	Negligible
D17	Travelodge Kings Cross	0.13	Negligible
D18	Linfield Sidmouth Street	0.25	Negligible
D19	200 Pentonville Road	0.04	Negligible
D20	100 Judd Street	0.59	Negligible
D21	108 Judd Street	0.91	Negligible
D22	114 Judd Street	0.75	Negligible
D23	118 Judd Street	0.75	Negligible
D24	123 Judd Street	0.54	Negligible
D25	181 Sinclair House, Hastings Street	0.08	Negligible
D26	160 Thanet Street	0.35	Negligible
D27	112 Thanet Street	0.58	Negligible
D28	17 Thanet Street	0.63	Negligible

Notes:

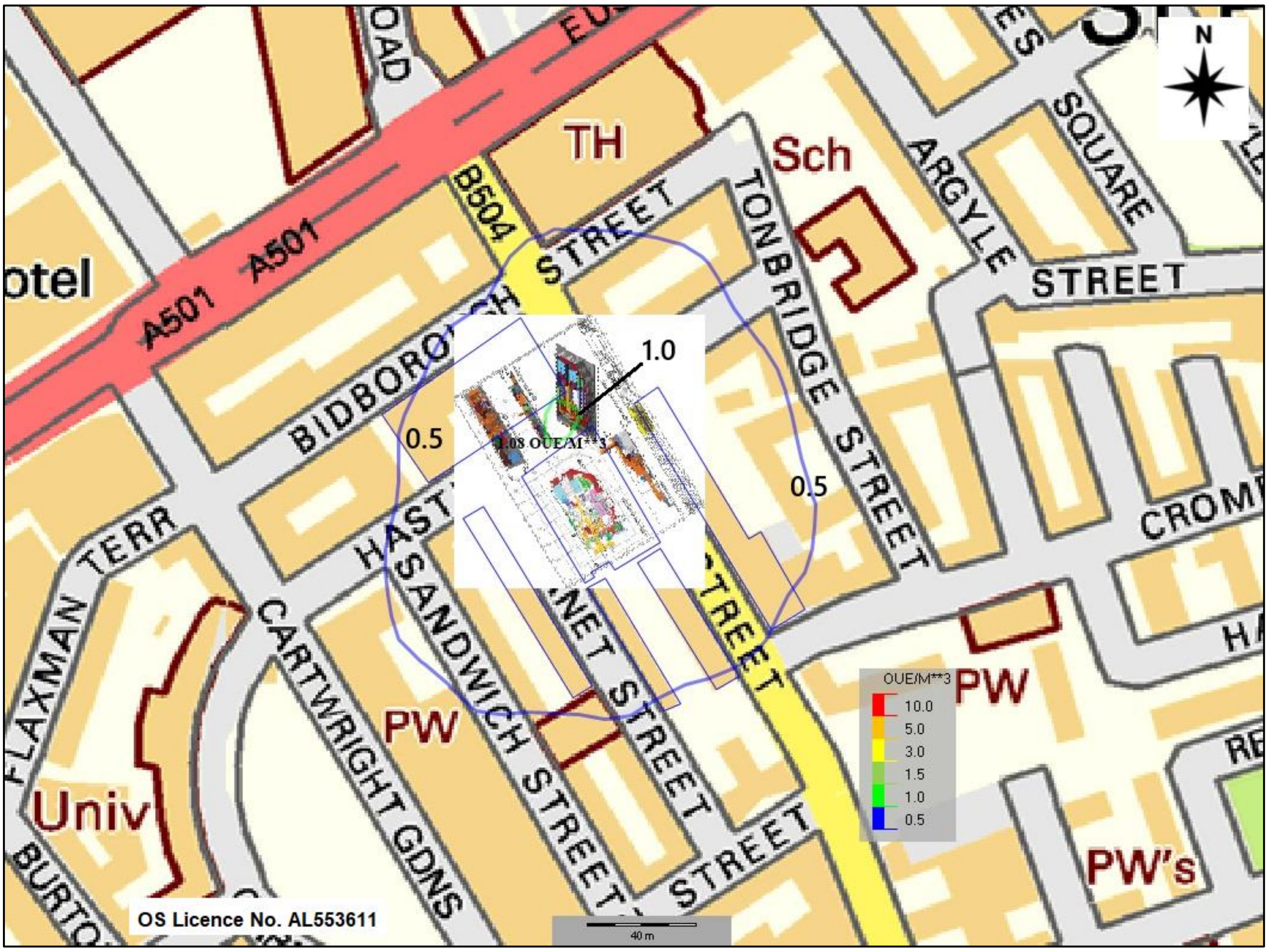
1. *There is no background for odour and hence the PC = PEC.*

The odour effects at the modelled existing receptor are predicted to be ‘Negligible’.

The odour effects at the modelled proposed new development receptors are predicted to be ‘Negligible’ at all receptor locations.

The contour plot of the predicted odour concentrations adjacent to the emission sources at the proposed development using 2023 meteorological data is presented in **Figure 4-1**.

Figure 4-1. Contour Plot of Predicted Odour Concentrations (the 98th %ile) Using 2023 Meteorological Data



It can be seen that no residential properties are all located outside of the 1.0 OU_E/m^3 odour contour line.

5.0 CONCLUSIONS

This report presents the findings of an odour impact assessment undertaken to assess laboratory operation odour emissions in relation to conversion combined laboratory-enabled offices at the basement, ground, first, second, third and fourth floors and creation of additional set-back fifth & sixth floors at 105 Judd Street, Camden, WC1H 9NE.

The laboratory ventilation system consists of 3 No. fume extract fans located on the roof. Two fans will be operational and one will be a standby fan. Total extract ventilation rate for the two operational fans is 6.0m^3/s (3.0 m^3/s of each fan).

The odour modelling results indicated that the predicted odour concentrations at the neighbouring receptor locations are less than $C_{98,\ 1\text{-hour}}$ = 1 OU_E/m^3, which is well below the odour benchmark of $C_{98,\ 1\text{-hour}}$ = 3.0 OU_E/m^3.

It should be noted that the NO_2 emissions of 4.4 tonnes per year for the US MassDEP's laboratory operating permit has been used in the assessment. Considering, however, (1) the annual NO_2 background concentrations are already above the air quality objective of 40 µg/m^3 at the receptors surrounding the site; (2) an air quality impact assessment has established a NO_2 emission limit of "*100 kg NO_x per year for the laboratory operation to meet the Camden Interim Pollution Targets of 20 µg/m^3 to be achieved in 2030*", the actual NO_2 emissions will be approximately only 3% of the emissions used in the assessment .

As such, it is very unlikely that odour complaints will be received in the real operational conditions. As such, the odour effects at the receptor locations are predicted to be 'not significant' and odour impacts from the laboratory operations on the local receptors are acceptable.