AIR QUALITY ASSESSMENT

369 – 377 Kentish Town Road

Produced by XCO2 for dMFK Architects

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XCO2
56 Kingsway Place, Sans Walk
London EC1R 0LU

+44 (0)20 7700 1000
mail@xco2.com
xco2.com

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Remarks	Draft	Draft					
Prepared by	SD	SD					
Checked by	SP	SP					
Authorised by	RM	RM					
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EXECUTIVE SUMMARY

An assessment has been undertaken to quantify the potential impacts on local air quality associated with the construction and operation of the proposed development. Based on the results of the assessment, it is considered that redevelopment of the site would not cause a significant impact on local air quality.

An assessment of potential air quality impacts arising from the construction and operation of the proposed development on Kentish Town Road Road in the London Borough of Camden has been undertaken.

During the construction phase, the site has the potential to generate dust nuisance beyond the application boundary. However, through the implementation of a Dust Management Plan, the impacts will be effectively minimised and are unlikely to be significant.

Emissions from operational traffic associated with the proposed development are not anticipated to significantly affect local air quality however dispersion modelling of emissions from traffic on the local road network has been undertaken to ascertain the likely level of exposure of future occupants of the proposed development to elevated nitrogen dioxide and particulate concentrations. The assessment indicates that there will be an exceedance of the annual mean NO_2 objective up to first-floor level. Mechanical ventilation with NOx filtration has therefore been recommended.

The proposed development has been assessed as air quality neutral with respect to building and transport-related emissions.

INTRODUCTION

This report presents an assessment of the potential impact on local air quality of the construction and operation of a proposed development at 369 – 377 Kentish Town Road in the London Borough of Camden.

The site is currently occupied by number of single storey buildings and is currently a car wash facility. The proposal is to construct a new seven storey building consisting of fourteen new residential dwellings with commercial space at ground-floor level.

The location of the proposed development is presented in Figure 1. The site falls within the Camden Air Quality Management Area (AQMA), which is a borough-wide designation due to measured and modelled exceedances of the air quality objectives for nitrogen dioxide (NO_2) and particulate matter (as PM_{10}). The primary source of these pollutants in the Borough is road traffic.

The proposed development has potential to introduce the following air quality impacts:

- Suspended and re suspended fugitive dust emissions from demolition / construction activities;
- Emissions from construction traffic, including re suspended dust from HGV movements; and
- Emissions from operational traffic.

An assessment has been undertaken to determine the potential impact on local air quality during both the construction and operational phases of the development, with recommendations made for mitigation where appropriate.

Figure 1: Site Location

POLICY CONTEXT

An overview of the relevant policy drivers for the assessment is provided in the following section.

EUROPEAN LEGISLATION

Within the European Union, ambient air quality is currently regulated through the Ambient Air Quality Directive 2008/50/EC[1] and the Fourth Daughter Directive 2004/107/EC[2]. These directives set limit values and target values for ambient pollutant concentrations. The limit values are legally binding and must not be exceeded, whereas the target values are to be attained where it is cost effective to do so.

The Ambient Air Quality Directive provides limit values for sulphur dioxide (SO_2), nitrogen dioxide (NO_2), benzene (C_6H_6), carbon monoxide (CO), lead (Pb) and particulate matter (PM_{10} and $PM_{2.5}$)[3]. The Fourth Daughter Directive provides target values for arsenic (As), cadmium (Cd), nickel (Ni), benzo(a)pyrene (B(a)P), mercury (Hg) and polycyclic aromatic hydrocarbons (PAH)[4].

The EU limit values have been adopted into UK law via the Air Quality Standards Regulations 2010[5].

In the context of the proposed development, the primary pollutants of concern are NO_2, PM_{10} and $PM_{2.5}$ from traffic on roads close to the site. A summary of the European limit values for the protection of human health for these pollutants is presented in Table 1.

Table 1: Pollutant Limiting Values

Pollutant	Averaging Period	Limit Value (µg/m^3)	Comments
NO_2	1-hour	<200	Not to be exceeded more than 18 times per calendar year (equivalent to the 99.8th percentile of 1-hour means)
	Calendar year	40	-
PM_{10}	1-day	50	Not to be exceeded more than 35 times per year (equivalent to the 90.4th percentile of 24-hour means)
	Calendar Year	40	-
$PM_{2.5}$	Calendar Year	25	Stage 1 LV (to be met by 01/01/15)
	Calendar Year	20	Stage 2 LV (to be met by 01/01/20)>

[1] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.
[2] Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.
[3] Particulate matter with an aerodynamic diameter below 10 µm and below 2.5 µm.
[4] Polycyclic aromatic hydrocarbons other than benzo(a)pyrene.
[5] The Air Quality Standards Regulations 2010, Statutory Instrument 2010 No. 1001, Environmental Protection.

NATIONAL LEGISLATION

THE AIR QUALITY STRATEGY FOR ENGLAND, SCOTLAND, WALES AND NORTHERN IRELAND

The Air Quality Strategy for England, Wales and Northern Ireland[6] was published in 2007 and sets out policy targets (objectives) for SO_2, NO_2, C_6H_6, CO, Pb, PM_{10}, $PM_{2.5}$, 1,3-butadiene (C_4H_6) and PAH. These objectives are generally in line with those set by the European Directives, although more stringent particulate and benzene objectives apply in Scotland (and in Northern Ireland for benzene).

The air quality objectives (AQO) for NO_2, PM_{10} and $PM_{2.5}$ in England do not differ from those presented in Table 1.

In January 2019 the UK government published a Clean Air Strategy[7], which outlines measures to reduce emissions from a wide range of sources including transport, farming and industry. The Strategy proposes new local powers to implement Clean Air Zones in problem areas, backed up by clear enforcement mechanisms. Whilst the UK has already adopted legally binding international targets to reduce emissions of key pollutants such as nitrogen oxides and particulate matter (as PM_{10}), the Strategy aims to reduce fine particulate emissions ($PM_{2.5}$) to ensure that public exposure to concentrations above the more stringent WHO annual mean guideline value of 10 µg/m^3 is halved by 2025.

LOCAL AIR QUALITY MANAGEMENT

The framework for Local Air Quality Management (LAQM) in the UK was introduced by the Environment Act 1995[8]. Local Authorities are required to regularly review and assess air quality to establish whether there are any locations where pollutant concentrations exceed the relevant air quality objectives or EU limit values. Where an exceedance is identified the local authority is obliged to declare an Air Quality Management Area (AQMA) and prepare an Action Plan setting out measures to improve air quality and achieve compliance with the objective(s).

THE NATIONAL PLANNING POLICY FRAMEWORK

The National Planning Policy Framework (NPPF)[9] sets out the Government's policies for planning and how these should be applied. With regard to air quality, the NPPF states that local "Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."

The revised NPPF[10] was published in July 2018 (updated in February 2019) and states that "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

[6] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Department for Environment, Food and Rural Affairs in partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland, July 2007.
[7] Clean Air Strategy 2019, Defra, January 2019
[8] Part IV of the Environment Act 1995
[9] National Planning Policy Framework, Department for Communities and Local Government, March 2012.
[10] Department for Communities and Local Government, National Planning Policy Framework, July 2018 (updated February 2019)

impacts from individual sites in local areas". It outlines the principles upon which the planning process can take account of air quality impacts associated with new developments. It outlines the role of Local Plans in promoting sustainability and providing limitations on development in areas of poor air quality. An emphasis is placed on consultation with the planning authority to determine whether there are any local issues with the potential to affect the scope of an air quality assessment. Typical air quality mitigation measures are outlined highlighting the use of planning conditions and funding obligations to off-set any significant impacts.

REGIONAL POLICY

THE LONDON PLAN

Policy 7.14 of the London Plan[11] sets out the Mayor of London's commitment to improving air quality and public health. It states that development proposals should 'minimise increased exposure to poor air quality' by:

- Promoting sustainable transport;
- Promoting sustainable design and construction;
- Being air quality neutral, particularly in AQMAs;
- Ensuring that where a potential impact on air quality is identified, appropriate mitigation measures are proposed which demonstrate a clear benefit to local air quality; and
- Providing detailed air quality assessments for non-transport sources such as on-site biomass boilers and combined heat and power (CHP) plants to assess the potential impact of emissions on air quality.

A draft New London Plan[12] was published in November 2017 and includes Policy SI1 (Improving Air Quality) which states that '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) reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality
d) create unacceptable risk of high levels of exposure to poor air quality.'

THE MAYOR OF LONDON'S AIR QUALITY STRATEGY (2010)

The Mayor of London's Air Quality Strategy[13] outlines the Mayor's commitment to improving air quality in London. The objective of the plan is to significantly reduce NO_2 and PM_{10} concentrations through a number of measures including:

- Ensuring all buses meet Euro IV emission standards;
- Introducing age limits for taxis and Private Hire Vehicles to remove older, more polluting vehicles from the roads;
- Including large vans and minibuses in the Low Emission Zone (LEZ)
- Introducing a new NOx standard in the LEZ; and
- Working with Borough to implement traffic management strategies to reduce congestion.

[11] The London Plan, The Spatial Development Strategy for London Consolidated with Alterations Since 2011, March 2016
[12] The London Plan, Draft for Consultation, November 2017
[13] Clearing the Air, The Mayor's Air Quality Strategy, December 2010.

LOCAL POLICY

THE LONDON BOROUGH OF CAMDEN LOCAL AIR QUALITY MANAGEMENT

The London Borough of Camden carries out frequent assessments of air quality within the area and produces annual reports in accordance with the requirements of Defra.

Historically, routine monitoring has identified widespread exceedances of the air quality objectives for NO_2 and PM_{10}. As a consequence, in 2002, the Council declared a Borough-wide AQMA for these pollutants. More recent monitoring indicates that the NO_2 objectives are still widely exceeded at roadside locations within the Borough, but PM_{10} concentrations are now generally within the objective.

A number of policies relating to improving air quality are contained within the London Borough of Camden's Core Strategy[14]. In particular policy CS16 (Improving Camden's health and wellbeing) recognises the impact of poor air quality on public health.

CAMDEN'S CLEAN AIR ACTION PLAN

Camden's Clean Air Action Plan[15] outlines the Councils commitment to improving air quality in the Borough. The key objectives of the plan are to reduce PM_{10} and NO_2 concentrations by:

- encouraging the use of clean fuels and technologies;
- promoting energy efficient to reduce fossil fuel usage;
- raising awareness of air quality issues and promoting lifestyle changes which reduce air pollution and improve the health of local residents; and
- working in partnership with other organisations to foster improvements in air quality.

The Action Plan is supported by The Camden Plan[16] and Camden's Environmental Sustainability Plan[17] drawing on European and National legislation in conjunction with national, regional and local policy to manage and improve air quality across the Borough.

The Borough has been designated a 'Clear Zone' focussing on reducing traffic congestion and promoting sustainable transport initiatives. Development Policy DP32 (Air Quality and Camden's Clear Zone)[18] states that planning permission will only be granted for developments that are likely to significantly increase travel demands where 'appropriate measures to minimise impacts are incorporated'.

[14] Camden Core Strategy 2010 – 2025, Adopted 2010.
[15] London Borough of Camden, Camden's Clean Air Action Plan 2016-2018.
[16] The Camden Plan 2012 - 2017
[17] Green Action for Change 2012 – 2020.
[18] Camden Development Policies 2010 – 2025

METHODOLOGY

This section outlines the assessment methodology, taking into account all relevant national and local policies and technical guidance relating to air quality.

CONSTRUCTION DUST

The potential impact of dust generated during site enabling, earthworks and construction works at the proposed development has been undertaken in accordance with the Mayor of London's SPG for the control of dust and emissions during construction and demolition[19], which is closely aligned with the Institute of Air Quality Management (IAQM) construction dust guidance[20] . A full description of the construction dust methodology is provided in Appendix A.

A detailed assessment of dust impacts is required where there are human or ecological receptors within:

- 50m of the site boundary; or
- 50m of the route(s) used by construction vehicles on public roads, up to 500m from the site entrance(s).

The IAQM/ SPG methodology allows the potential risk of dust soiling and human health effects to be determined, based primarily on the sensitivity of nearby receptors (human and ecological) and the anticipated magnitude of the dust emission due to:

- Demolition;
- Earthworks;
- Construction; and
- Track-out (re-suspended dust from vehicle movements).

The assessment of dust risk is also based on professional judgement taking into account factors such as the prevailing wind direction, the proposed construction phasing, the likely duration of dust raising activities, local topography and existing air quality.

A range of best practice mitigation measures are provided within the guidance, which are dependent on the level of dust risk attributed to the site. It is recommended that these measures are incorporated into a Dust Management Plan (DMP) for the proposed development.

The significance of the residual impacts following appropriate mitigation is determined by professional judgement.

CONSTRUCTION TRAFFIC

Construction traffic will contribute to existing traffic levels on the surrounding road network. However, the temporary increase in traffic is considered unlikely to be significant in terms of total flow or construction duration.

[19] The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance, The Mayor of London, July 2014
[20] Guidance on the assessment of dust from demolition and construction, IAQM,v1.1 June 2016

All non-road mobile machinery (NRMM) will comply with the emission standards specified in the Mayor of London's Control of Dust and Emissions during Construction and Demolition SPG.

The impact of vehicular emissions of NO_2 and PM_{10} from construction traffic and on-site machinery on local air quality is considered to be negligible.

OPERATIONAL TRAFFIC

The Environmental Protection UK (EPUK)/ IAQM planning guidance[21] , states that for developments within or near an AQMA, a detailed assessment of traffic-related impacts is required where:

- There is a change in the annual average daily traffic (AADT) flow of light goods vehicles (LGV) of more than 100 vehicles; and/or
- There is a change in the AADT flow of heavy goods vehicles (HGV) of more than 25 vehicles; and/or
- There is a change in the road re-alignment by more than 5m; and/or
- A new junction is introduced, which will significantly alter vehicle speeds.

The proposed development will be car-free and therefore the impact of the operational traffic on local air quality has therefore been scoped out of the assessment. However, modelling of emissions from traffic on the local road network has been undertaken using the ADMS-Roads dispersion model to predict pollutant concentrations at the development site and determine whether on-site mitigation will be required to protect future occupants from poor air quality.

A summary of the model input parameters is presented in Appendix B.

EMISSION FACTORS

Concentrations of NOx, PM_{10} and $PM_{2.5}$ have been predicted using 2016 vehicle emission factors from the latest version of the Emissions Factor Toolkit (v8.0.1) [22]. The predicted NOx concentrations have been converted to NO_2 using version 6.1 of the NOx to NO_2 calculator, available from the Defra air quality website[23].

The Emission Factor Toolkit predicts a year on year reduction in emissions due to improvements in vehicle abatement technologies. Using emission factors from 2016 is considered to provide a conservative assessment of future air quality at the proposed development.

METEOROLOGICAL DATA

Meteorological data from London City Airport (approximately 12 km southeast of the proposed development) has been used in the dispersion modelling.

21 Land-use Planning and Development Control: Planning for Air Quality, Guidance from Environmental Protection UK and the Institute of Air Quality Management for the consideration of air quality within the land use planning and development control process, January 2017.
22 http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html
23 http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

SENSITIVE RECEPTORS

Concentrations of NO_2 have been predicted at ground, first and second using Cartesian grid of 5 m resolution over the full extent of the development site, allowing an additional 1.5m elevation within each floor for the potential exposure and breathing zone.

Concentrations of PM_{10} and $PM_{2.5}$ have been predicted at ground floor level only.

VERIFICATION

There is an inherent level of uncertainty associated with any assessment process; however, the methodology presented has been developed to minimise errors where possible. Potential errors in predicted concentrations due to uncertainties in the assessment source activity data (e.g. traffic flows and emission factors) and the estimated background concentration are minimised by the verification of modelled concentrations using local monitoring data.

The 2016 Local Air Quality Management Technical Guidance (LAQM.TG16) [24] recommends that modelled concentrations should be within 25% of monitored concentrations, ideally within 10%. Where there is a large discrepancy between modelled and measured concentrations, it is considered necessary to adjust the model results to more accurately reflect local air quality.

The modelled NO_2 concentrations have been verified using 2016 data from a London Borough of Camden diffusion tube CA16 on Kentish Town Road, approximately 150m south of the proposed development. Full details of the model verification process are presented in Appendix C.

BUILDING-RELATED EMISSIONS

The proposed energy strategy for the development is Air Source Heat Pumps and therefore there will be no fossil-fuel combustion on site.

24 Local Air Quality Management Technical Guidance (LAQM.TG16), Defra, February 2018

BASELINE AIR QUALITY

Through an analysis of local monitoring data, a description of existing air quality near the proposed development is provided and appropriate baseline pollutant concentrations are determined for use in the assessment.

LOCAL AIR QUALITY MONITORING

Automatic monitoring of ambient air quality is not undertaken in the vicinity of the proposed development. The nearest monitor site that is considered relevant to the assessment is operated by the London Borough of Islington at an urban background location in Highbury, approximately 2.5 km east-northeast of the site. The site is affiliated to the London Air Quality Network (LAQN) and therefore the measured data are subject to high levels of quality assurance (QA) and quality control (QC). A description of the sites is presented in Table 2.

Table 2: Automatic Monitoring Sites

Site Name	Type	Easting	Northing	Pollutants Monitored	Approximate Location Relative to Proposed Development
IS6 Arsenal	Urban Background	531328	186067	NO_2, PM_{10}	2.5km east-northeast

Annual mean NO_2 and PM_{10} concentrations measured at these locations between 2014 and 2018 and are summarised in Table 5, together with the number of measured exceedances of the short-term AQO's.

The automatic monitoring data indicates that annual mean background NO_2 concentrations are well within the AQO of 40 µg/m^3 and the number of measured exceedances of the 1-hour mean objective is also well below the 18 allowable.

Annual mean PM_{10} concentrations are 50% or less than the AQO of 40 µg/m^3 and the number of exceedances of the 24-mean AQO was also well within the 35 allowable.

Table 3: Automatic Monitoring Data

Site Name	2014	2015	2016	2017	2018
Annual Mean NO_2 (µg/m^3)	35	29	33	31	27
Number of Predicted Exceedances of the 1-Hour Mean AQO of 200 µg/m^3 (b)	0	0	0	1	0
Annual Mean PM_{10} (µg/m^3)	16	15	18	18	20
Number of Predicted Exceedances of the 24-Hour Mean AQO of 50 µg/m^3 (b)	0	1	3	3	1

There are two NO_2 diffusion tube monitoring sites that are considered relevant to the proposed development, details of which are presented in Table 4.

Table 4: Diffusion Tube Monitoring Sites

Site ID	Location	Type	Easting	Northing	Approximate Location Relative to Proposed Development
CA16	Kentish Town Road	Roadside	521447	188730	150 m south
BIS005/12	Lady Margaret Road	Urban background	521885	190489	640 m northeast

Five years of annual mean NO_2 concentrations measured at these locations are summarised in Table 5.

The data indicate that the annual mean AQO for NO_2 of 40 µg/m^3 is routinely exceeded at the Kentish Town Road monitoring site. This location is highly congested and poor air quality is likely to be exasperated by street canyon effects. Measurements across the UK[25] have shown that the 1-hour NO_2 objective may be exceeded if the annual mean concentration is greater than 60 µg/m^3. Based on the measured concentrations, there is a risk that the short-term objective is also being exceeded at locations close to Kentish Town Road.

Annual mean NO_2 concentrations at Lady Margaret Road urban background site are less than 90% of the air quality objective.

Table 5: Annual Mean NO_2 Concentrations (µg/m^3)

Site Name	2013	2014	2015	2016	2017
Kentish Town Road (roadside)	**65.3**	**57.8**	**63.6**	**58.7**	**74.9** (a)
Lady Margaret Road (background)	33	33	35	36	34
(a) Data capture < 90%					

DEFRA MAPPED BACKGROUND CONCENTRATIONS

Background NO_2, PM_{10} and $PM_{2.5}$ concentrations have been obtained from the Defra UK Background Air Pollution maps[26] for comparison with the measured data. These 1km grid resolution maps are derived from a complex modelling exercise that takes into account emissions inventories and measurements of ambient air pollution from both automated and non-automated sites. The latest background maps were issued in November 2017 and are based on 2015 monitoring data, with projections for future years.

A summary of the 2016 mapped annual mean background concentrations at the proposed development is presented in Table 6. The concentrations have been determined from contour plots of the mapped data.

The mapped annual mean NO_2 concentration (31.8 µg/m^3) is lower than both the concentration measured by diffusion tube at Lady Margaret Road (36 µg/m^3) and the concentration measured at the Arsenal automatic monitoring site (33 µg/m^3). The concentration measured at Lady Margaret Road in 2016 was the highest measured between 2013 and

[25] D Laxen and B Marner: Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites, July 2003
26 http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

2017. This concentration has been used in the assessment to ensure that that the predicted concentrations at the proposed development are as conservative as possible.

The mapped PM_{10} concentration is slightly higher than the concentration measured at the Arsenal automatic monitoring station and therefore the mapped particulate data are considered to provide a reasonable estimate of existing a future background air quality at the proposed development.

Table 6: Background Pollutant Concentrations for 2016 (µg/m^3)

Pollutant	Mapped	Assessment Value	AQO/ EAL (µg/m^3)
NO_2	31.8	36.0	40
PM_{10}	18.8	18.8	40
$PM_{2.5}$	12.0	12.0	25

POTENTIAL IMPACTS

The potential impacts and significance of these impacts on air quality during the construction and operational phases of the development are identified in this section. Suggested mitigation measures are outlined in a subsequent section of the report.

CONSTRUCTION DUST

SENSITIVITY OF THE AREA TO DUST IMPACTS

The assessment of dust impacts is dependent on the proximity of the most sensitive receptors to the site boundary. A summary of the receptor and area sensitivity to health and dust soiling impacts is presented in Table 7Table 7. The sensitivity of the area to health impacts is dependent on the existing PM_{10} concentration. There are no local particulate monitoring sites to establish existing concentrations at sensitive receptor locations, however based on the estimated background concentration and the level of congestion on Kentish Town Road and the close proximity of the railway, it is considered likely that roadside annual mean PM_{10} concentrations in the area are between 24 and 28 µg/m^3.

Table 7: Sensitivity of Receptors and the Local Area to Dust Impacts

Receptor	Distance from Site Boundary	Number of Receptors	Sensitivity to Health Impacts		Sensitivity to Dust Soiling Impacts	
			Receptor	**Area**	**Receptor**	**Area**
Residential Properties	<20 m	10 - 100	High	High	High	High
	<50 m	10 - 100		Medium		Medium
	< 100 m	>100		Low		Medium
Shops	< 20m	10 - 100	Medium	Low	Medium	Medium
Primary School	220 m	>100	High	Low	High	Medium
Overall Sensitivity of the Area			**Low**		**High**	

The precise behaviour of the dust, its residence time in the atmosphere and the distance it may travel before being deposited, will depend upon several factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

Wind roses for London City Airport are presented in Appendix D, which show that the prevailing wind is from the southwest, therefore receptors to the northeast of the site are most likely to experience dust impacts during the construction phase.

There are no dust sensitive ecological sites within 50m of the site; therefore, impacts on ecology have not been considered in the assessment.

DUST EMISSION MAGNITUDE

- **Demolition** - The existing light industrial buildings on-site will require demolition as part of the proposals. The buildings are a mixture of steel framed/metal clad and low level brick-built structures. Whilst the scale of the proposed demolition is small, the material is potentially dusty, and the works may not be restricted to wetter

months. On this basis the magnitude of the dust emission during the demolition phase is considered to be 'medium'.

- **Earthworks -** Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. It may also involve levelling of the site and landscaping. Based on the size of the site (355 m^2) it is unlikely that there will be sufficient space for long-term stockpiling of dusty materials or large numbers of earth moving vehicles. However, the soil type is considered to be moderately dusty, and the earthworks may not be restricted to wetter months. The magnitude of the dust emission during the earthworks phase is therefore considered to be 'medium'.

- **Construction** - Dust emissions during construction depend on the scale of the works, method of construction, materials used and the duration of the build. The proposed development is likely to comprise a reinforced concrete frame with external brick finish. It is not currently known whether concrete batching will be undertaken on site. Based on the scale of the development (approximately 6,000 m^3), the magnitude of the emission during construction is considered to be 'medium'.

- **Trackout** - Access to the site during the construction phase to the wider road network will be via Kentish Town Road, where there are sensitive receptors within 20m of the carriageway. There is limited potential for HGVs to be travelling over un-made surfaces on site, however the soil type is potentially dusty and therefore the likely dust emission magnitude due to trackout is considered to be 'medium'.

ASSESSMENT OF DUST RISK PRIOR TO MITIGATION

A summary of the potential risk of dust impacts prior to mitigation, based on the low sensitivity of the area to human health impacts and high sensitivity to dust soiling impacts is presented in Table 8. The overall risk of dust impacts, prior to mitigation is assessed as 'medium'.

Table 8: Risk of Dust Impacts Prior to Mitigation

Dust Source	Emission Magnitude	Human Health Risk	Dust Soiling Risk	Overall Risk
Demolition	Medium	Low	Medium	**Medium**
Earthworks	Medium	Low	Medium	**Medium**
Construction	Medium	Low	Medium	**Medium**
Trackout	Medium	Low	Medium	**Medium**

PREDICTED CONCENTRATIONS AT THE PROPOSED DEVELOPMENT SITE

NITROGEN DIOXIDE

Contour plots showing the ground-level annual mean NO_2 concentrations across the development site at ground, first and second floor level are presented in Figures 2 to 4.

The annual mean NO_2 concentrations are predicted to exceed the air quality objective of 40 µg/m^3 at ground and first floor level. By second-floor level the concentrations are predicted to be below the objective across the site.

The ground-floor of the development will be used for retail purposes and providing access to the residential dwellings (which are situated at first-floor level and above). Consequently, public exposure to poor air quality at ground-floor level will be short-term only. The predicted annual mean NO_2 concentrations at the façade of the proposed

development are below 60 µg/m^3 and therefore the risk of an exceedance of the 1-hour mean AQO is considered to be negligible.

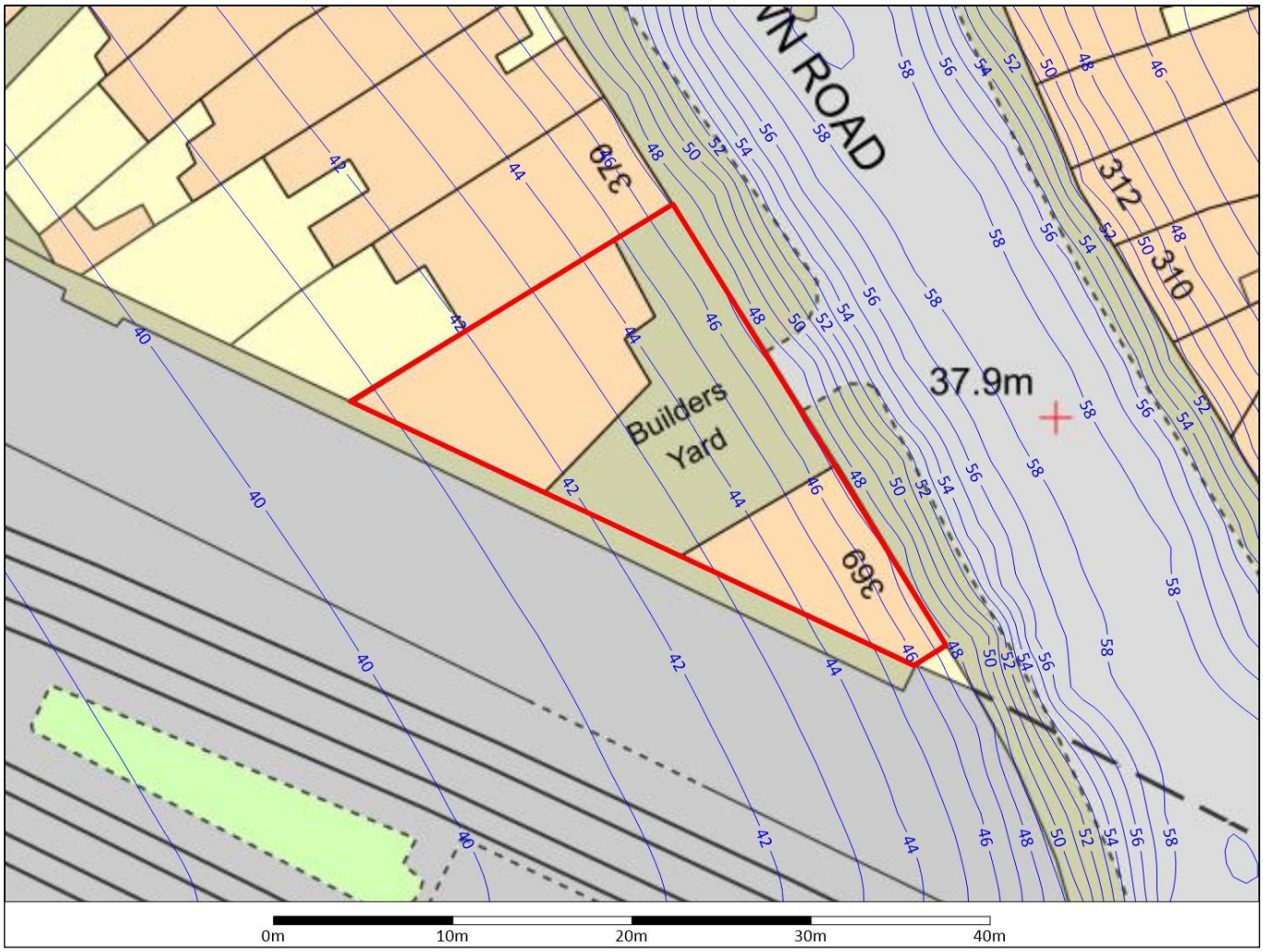

Figure 2: Predicted Ground-Floor Level Annual Mean NO_2 Concentrations (µg/m^3)

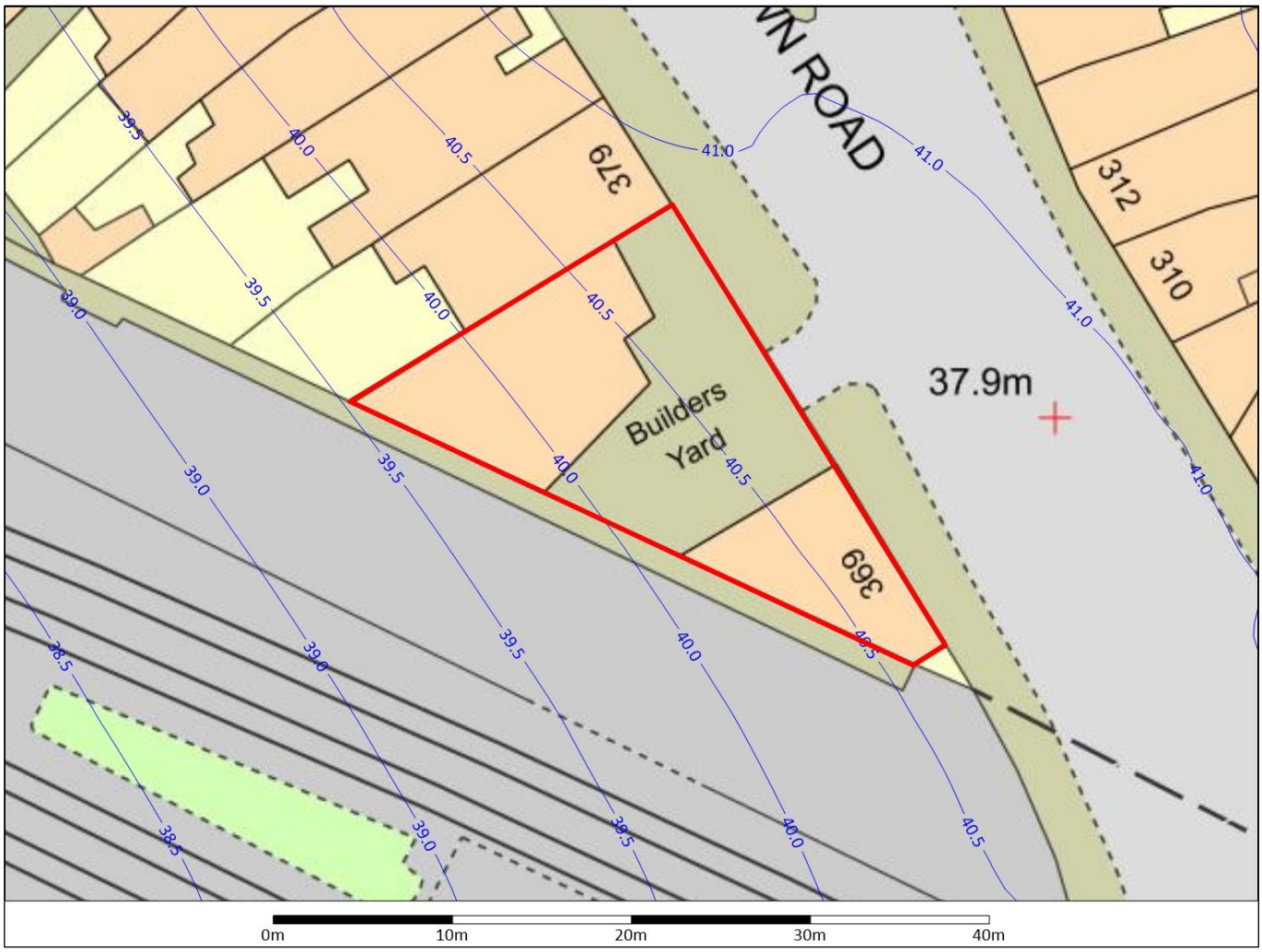

Figure 3: Predicted First-Floor Level Annual Mean NO_2 Concentrations (µg/m^3)

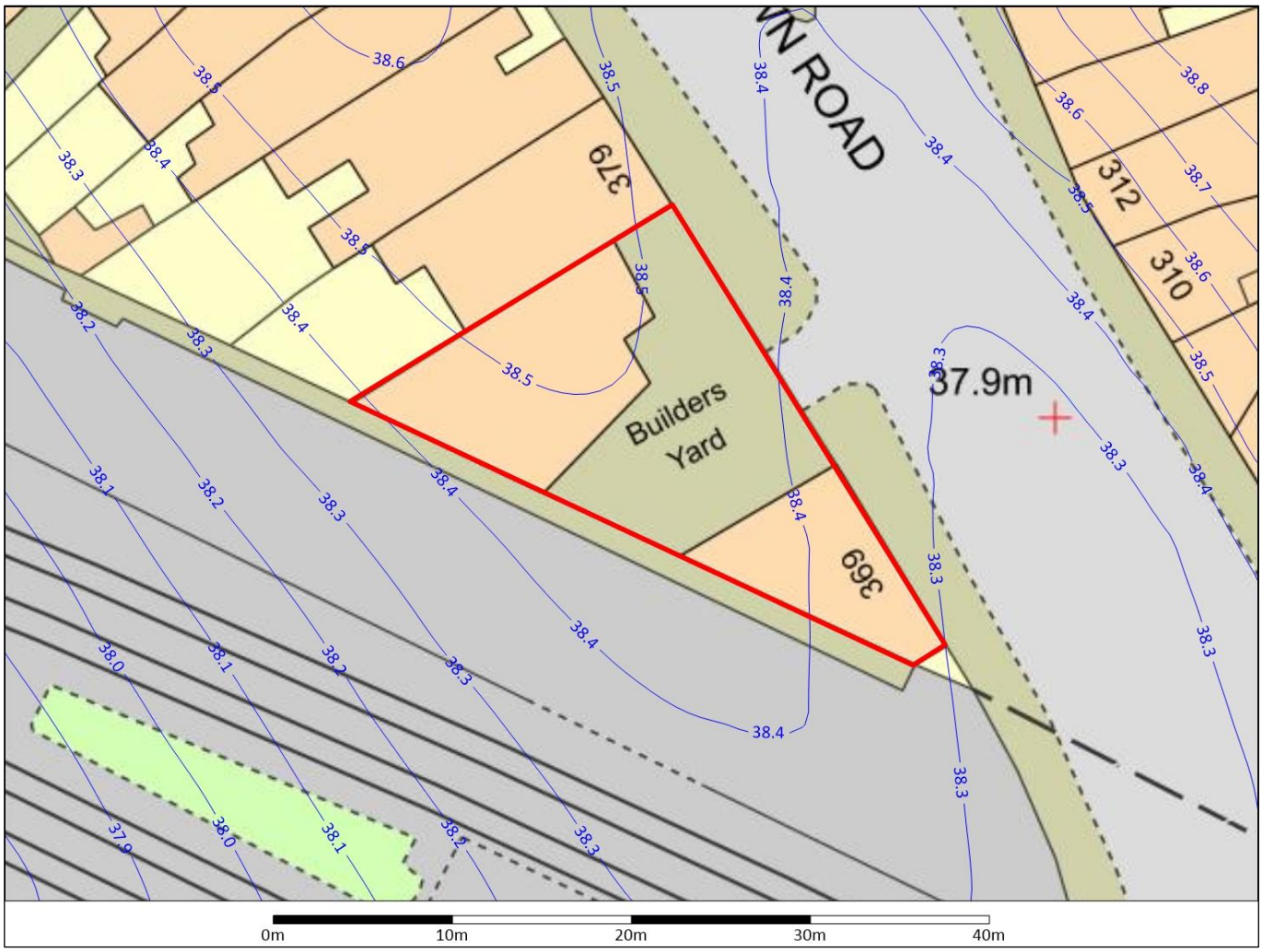

Figure 4: Predicted Second-Floor Level Annual Mean NO_2 Concentrations (µg/m^3)

PARTICULATE MATTER

Contour plots showing the ground-level annual mean PM_{10} and $PM_{2.5}$ concentrations across the development site at ground and first-floor level are presented in Figure 5 and Figure 6. The predicted concentrations are well within the relevant long-term air quality standards across the development site.

LAQM.TG(16) provides a relationship between predicted annual mean PM_{10} concentrations and the likely number of exceedances of the short-term (24-hour mean) PM_{10} objective of 50 µg/m^3. The objective allows 35 exceedances per year, which is equivalent to an annual mean of 32 µg/m^3. On this basis, the dispersion modelling indicates that compliance with the short-term PM_{10} objective is also likely to be achieved at all locations on site.

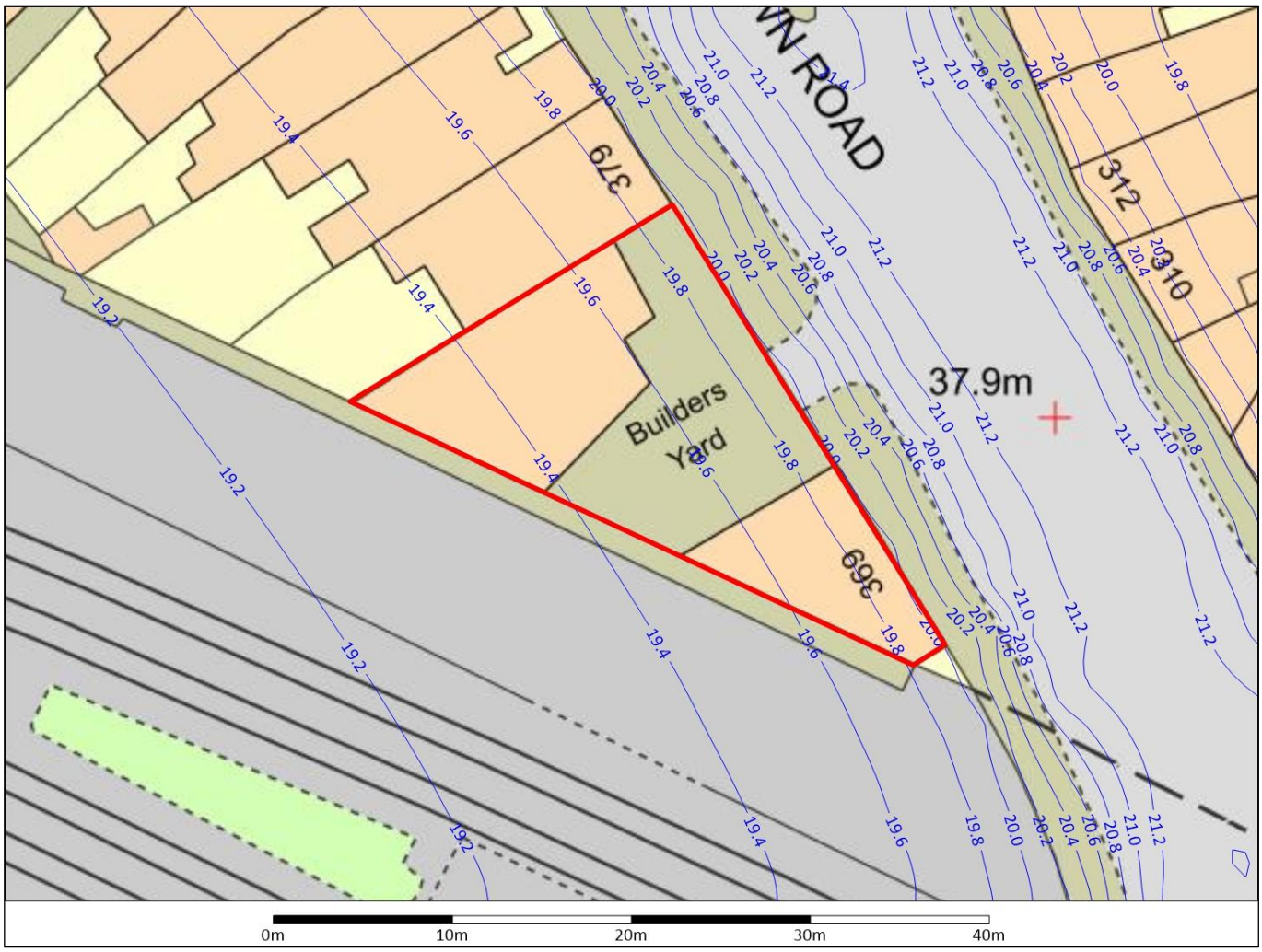

Figure 5: Predicted Ground Level Annual Mean PM_{10} Concentrations (µg/m^3).

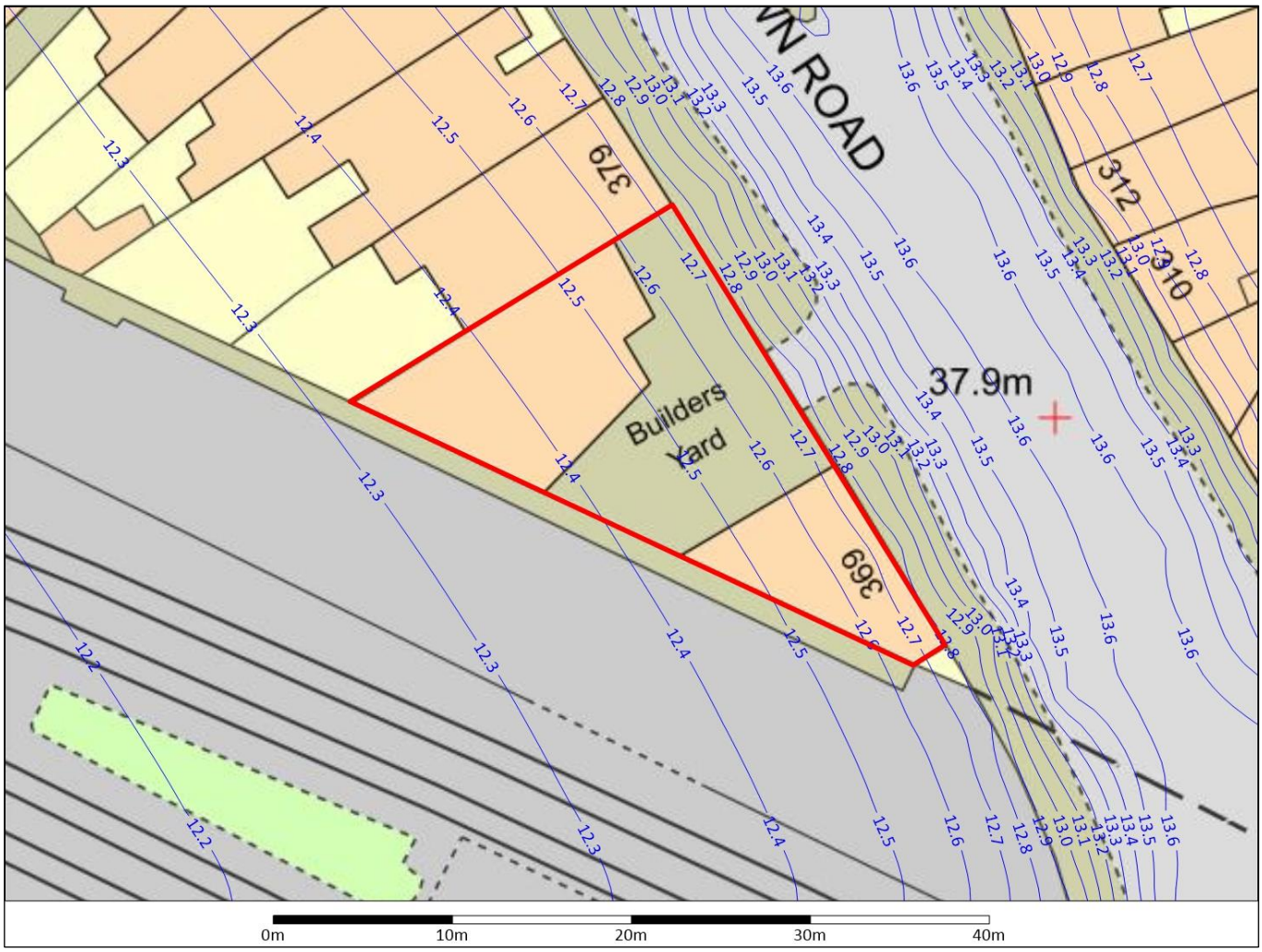

Figure 6: Predicted First Floor Level Annual Mean $PM_{2.5}$ Concentrations (µg/m^3). © Crown copyright, All rights reserved. 2019 Licence number 0100031673

AIR QUALITY NEUTRAL ASSESSMENT

This section presents an air quality neutral assessment in accordance with The London Plan. It is found that the proposed development will be Air Quality Neutral with respect to building and transport-related emissions.

BUILDING EMISSIONS

The proposed energy strategy for the development is Air Source Heat Pumps. There will be no fossil-fuel combustion on site and therefore the proposed development is Air Quality Neutral with respect to building-related emissions.

TRANSPORT EMISSIONS

The proposed development will be car-free and is therefore Air Quality Neutral with respect to transport-related emissions.

MITIGATION

The following mitigation measures will be required during the construction and operational phases to minimise the air quality impacts arising from the development.

CONSTRUCTION PHASE

London Best Practice Guidance for dust control will be implemented, as appropriate, during the construction phase through the Dust Management Plan (DMP) for the proposed development.

The risk of dust soiling and human health impacts from the site has been assessed as 'medium', prior to mitigation. In accordance with the IAQM and Mayor of London guidance, it is therefore recommended that the 'highly recommended' measures detailed in Table 9 are incorporated into the DMP. The 'desirable' measures detailed in Table 10 should also be considered for inclusion.

The significance of dust impacts on nearby receptors following the implementation of appropriate and best practice mitigation is considered to be negligible.

Table 9: Highly Recommended Mitigation Measures

Description	Mitigation Measure
Site management	- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. - 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. - Record and respond to all dust and air quality pollutant emissions complaints. - Make the complaints log available to the local authority when asked. - Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book. - 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. - Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation is recorded in the log book.

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 at the site boundary that are at least as high as any stockpiles on site. - Fully enclosure site or specific operations where there is a high potential for dust production and the site is active for an extensive period. - Avoid site runoff of water or mud. - Keep site fencing, barriers and scaffolding clean using wet methods. - Remove materials from site as soon as possible. - Cover, seed or fence stockpiles to prevent wind whipping. - Agree monitoring locations with the Local Authority. - Where possible, commence baseline monitoring at least three months before phase begins. - Put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly.
Operating vehicle/machinery and sustainable travel	- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone. - Ensure all non-road mobile machinery (NRMM) comply with the standards set within this guidance. - 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. - Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials. - Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
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 fine 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	- Reuse and recycle waste to reduce dust from waste materials - Avoid bonfires and burning of waste materials
Demolition	- Ensure water suppression is used during demolition operations. - Avoid explosive blasting, using appropriate manual or mechanical alternatives. - Bag and remove any biological debris or damp down such material before demolition.
Construction	- Ensure sand and other aggregates are stored in bunded areas and 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	- Regularly use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site. - Avoid dry sweeping of large areas. - Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport. - Record all inspections of haul routes and any subsequent action in a site log book. - Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems and regularly cleaned. - Inspect haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable; - Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). - Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits. - Access gates to be located at least 10m from receptors where possible.

Table 10: Desirable Mitigation Measures

Description	Mitigation Measure
Preparing and maintaining the site	- Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution. - Carry out regular dust soiling checks of buildings within 100m of site boundary and cleaning to be provided if necessary.
Operating vehicle/machinery and sustainable travel	- Impose and signpost a maximum-speed-limit of 10mph on surfaced haul routes 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).
Demolition	- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
Earthworks	- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces. - Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil. - Only remove secure covers in small areas during work and not all at once.

Construction	- Avoid scabbling (roughening of concrete surfaces) if possible. - Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery. - For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout	- Apply dust suppressants to locations where a large volume of vehicles enter and exit the construction site.

OPERATIONAL PHASE

The proposed development will include secure cycle spaces to encourage sustainable transport.

Dispersion modelling of existing traffic on the local road network indicates that annual concentrations of NO_2 may exceed the air quality objective of 40 µg/m^3 at the ground and first-floor of the proposed development. Mechanical Ventilation with Heat Recovery (MVHR) will be installed throughout the development, however it is recommended that NOx filtration is included at first-floor level to protect future residential occupants from poor air quality. NOx Filtration will not be required at ground-floor level where public exposure will be short-term.

SUMMARY AND CONCLUSIONS

The following summarise the outcomes of the assessment and provide details of any air quality constraints to the development of the site. Based on the results of the assessment, it is considered that redevelopment of the site would not cause a significant impact on local air quality.

An assessment has been undertaken to assess the potential impacts on local air quality associated with the construction and operation of the proposed development.

An assessment of the potential impacts during the construction phase has been carried out in accordance with the latest Institute of Air Quality Management guidance; this has shown that releases of dust and PM_{10} are likely to occur during site activities. However, through good site practice and the implementation of suitable mitigation measures, the impact of dust and PM_{10} releases may be effectively mitigated and the resultant impacts are considered to be negligible.

Traffic associated with the proposed development during the operational phase is not anticipated to significantly affect local air quality. However, dispersion modelling has been undertaken to predict concentrations of NO_2, PM_{10} and $PM_{2.5}$ at the proposed development site to determine whether mitigation will be required to protect future occupants from poor air quality. The predicted particulate concentrations are well within the relevant air quality standards, however an exceedance of the annual mean NO_2 objective is predicted at ground and first-floor level . Mechanical ventilation with NOx filtration has therefore been recommended for the first floor residential dwellings to minimise exposure to poor air quality. The dispersion modelling indicates that there will not be an exceedance of the short-term air quality objective on site and therefore NOx filtration will not be required at ground-floor level which will be used for commercial and access purposes.

The development has been assessed as Air Quality Neutral with respect to building and transport-related emissions.

Based on the results of the assessment, it is considered that air quality would not pose a constraint to the redevelopment of the site as proposed.

APPENDIX A – IAQM CONSTRUCTION DUST METHODOLOGY

Factors defining the sensitivity of a receptor to dust impacts are presented in Table A1.

Table A1: Receptor Sensitivity

Receptor Sensitivity	Human Health	Dust Soiling	Ecological
High	- Locations where members of the public are exposed over a time period relevant to the air quality objectives for PM_{10} (a) - Examples include residential dwellings, hospitals, schools and residential care homes.	- Regular exposure - High level of amenity expected. - Appearance, aesthetics or value of the property would be affected by dust soiling. - Examples include residential dwellings, museums, medium and long-term car parks and car showrooms.	- Nationally or Internationally designated site with dust sensitive features (b) - Locations with vascular species (c)
Medium	- Locations where workers are exposed over a time period relevant to the air quality objectives for PM_{10} (a) - Examples include office and shop workers (d)	- Short-term exposure - Moderate level of amenity expected - Possible diminished appearance or aesthetics of property due to dust soiling - Examples include parks and places of work	- Nationally designated site with dust sensitive features (b) - Nationally designated site with a particularly important plant species where dust sensitivity is unknown
Low	- Transient human exposure - Examples include public footpaths, playing fields, parks and shopping streets	- Transient exposure - Enjoyment of amenity not expected. - Appearance and aesthetics of property unaffected - Examples include playing fields, farmland (e), footpaths, short-term car parks and roads	- Locally designated site with dust sensitive features (b)

a) In the case of the 24-hour objective, a relevant location would be one where individuals may be exposed for eight hours or more in a day.

b) Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete).

c) Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.

d) Does not include workers' exposure to PM_{10} as protection is covered by Health and Safety at Work legislation.

e) Except commercially sensitive horticulture.

The sensitivity of the area is dependent on the number of receptors within each sensitivity class and their distance from the source. Human health impacts are also dependent on the existing PM_{10} concentrations in the area.

Table A2 and Table A3 summarise the criteria for determining the overall sensitivity of the area to dust soiling and health impacts respectively. The sensitivity of the area to ecological impacts is presented in Table A4.

Table A2: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the 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 A3: Sensitivity of the Area to Health Impacts from Dust

Receptor Sensitivity	Annual Mean PM_{10} Concentration ($\mu g/m^3$)	Number of Receptors	Distance from the 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
	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 A4: Sensitivity of the Area to Ecological Impacts from Dust

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

The magnitude of the dust impacts for demolition, earthworks, construction and trackout is classified as small, medium or large depending on the scale of the proposed works as detailed in Table A5.

Table A5: Dust Emission Magnitude

Receptor Sensitivity	Large	Medium	Small
Demolition	- Total building volume >50,000m^3 - Potentially dusty material (e.g. concrete) - Onsite crushing and screening - Demolition activities >20m above ground level.	- Total building volume 20,000 - 50,000m^3 - Potentially dusty material - Demolition activities 10 - 20m above ground level.	- Total building volume <20,000m^3 - Construction material with low potential for dust release - Demolition activities <10m above ground level - Demolition during wetter months
Earthworks	- Total site area >10,000m^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	- Total site area 2,500 - 10,000m^2 - Moderately dusty soil type (e.g. silt) - 10 heavy earth moving vehicles active at any one time - Formation of bunds 4 - 8m in height - Total material moved 20,000 - 100,000 tonnes	- 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
Construction	- Total building volume >100,000m^3 - On site concrete batching - Sandblasting	- Total building volume 25,000 - 100,000m^3 - Potentially dusty construction material (e.g. concrete) - On site concrete batching	- Total building volume <25,000m^3 - Material with low potential for dust release (e.g. metal cladding or timber
Trackout	- >50 HGV movements in any one day (a) - Potentially dusty surface material (e.g. high clay content) - Unpaved road length >100m	- 10 - 50 HGV movements in any one day (a) - Moderately dusty surface material (e.g. silt) - Unpaved road length 50 - 100m	- <10 HGV movements in any one day (a) - Surface material with low potential for dust release

			- Unpaved road length <50m
a) HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes			

For each dust emission source, the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts prior to mitigation as illustrated in Tables A6, A7 and A8.

Table A6: Risk of Dust Impacts from Demolition

Area Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible Risk

Table A7: Risk of Dust Impacts from Earthworks and Construction

Area Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible Risk

Table A8: Risk of Dust Impacts from Trackout

Area Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible Risk
Low	Low Risk	Low Risk	Negligible Risk

APPENDIX B – ADMS-ROADS INPUT PARAMETERS

Table B1: Summary of ADMS-Roads Input Parameters

Parameter	Value
ADMS-Roads Model Version	4.1
Vehicle Emission Factors	EFT v8.0.1 for 2016
Meteorological Data	Hourly sequential data from London City Airport (2016)
Surface Roughness	1.0m
Monin-Obukhov Length	75m

Table B2: Summary of Traffic Data

Road Link	Baseline		Average Speed (kph)
	AADT	HGV (%), including buses and coaches	
Kentish Town Road (a)	14,161 (DfT 17001, 2016)	12.1%	16
Highbury Road	12,428 (DfT 930345, 2009)	8.9%	16
Fortess Road	15,927 (DfT 38562, 2016)	10.6%	16
(a) Street canyon effects have been included in the model, where appropriate.			

APPENDIX C – MODEL VERIFICATION

Most nitrogen dioxide (NO_2) is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions. Verification of concentrations predicted by the ADMS-Roads model has followed the methodology presented in LAQM.TG16.

Predicted annual mean NO_2 concentrations have been compared with the 2016 annual mean concentrations measured by diffusion tube CA16 on Kentish Town Road.

The measured NO_2 concentration has been converted into an equivalent measured Road-NOx (i.e. the component of total NOx coming from road traffic) concentrations using the Defra NOx from NO_2 calculator.

The ratio of the measured and modelled Road-NOx contributions provides an adjustment factor for the modelled Road-NOx concentrations. This factor is then applied to the modelled road NOx concentrations, before they are converted to Road-NO_2 using the Defra NOx to NO_2 calculator and added to the background NO_2 concentration for to produce a total adjusted modelled NO_2 concentration.

The model verification calculation is presented in Table C1. In the absence of particulate monitoring data suitable for verification, the adjustment factor has also been applied to the modelled Road-PM_{10} and Road-$PM_{2.5}$ concentrations, in accordance with the guidance.

Table C1: Verification Calculation

Parameter	Value
Measured NO_2 Concentration (2016)	58.7 µg/m^3
Measured Road-NOx Concentration	59.3 µg/m^3
Modelled Road-NOx Concentration	36.2 µg/m^3
Adjustment Factor	**1.64**

APPENDIX D – WIND ROSES

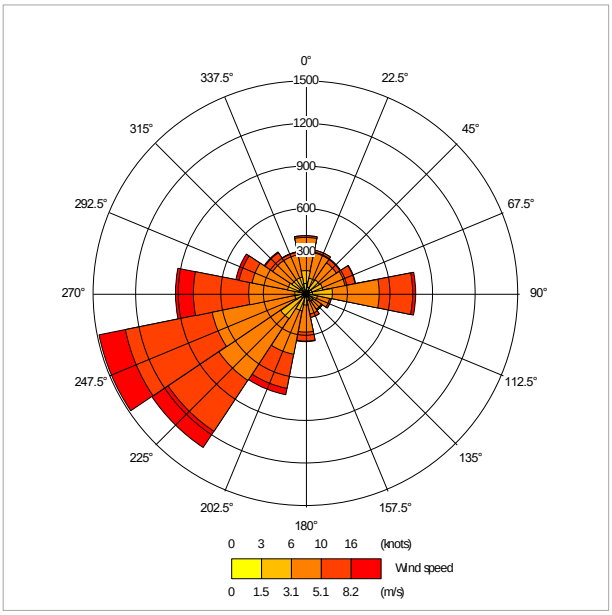

Figure D1: Wind Rose London City Airport 2015

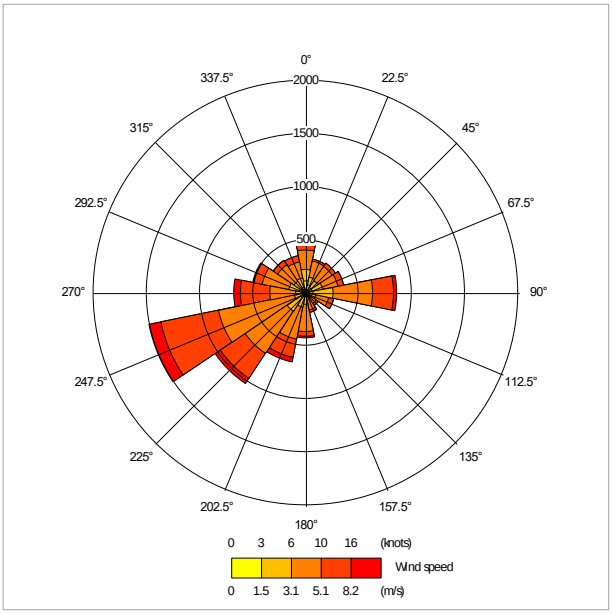

Figure D2: Wind Rose London City Airport 2016

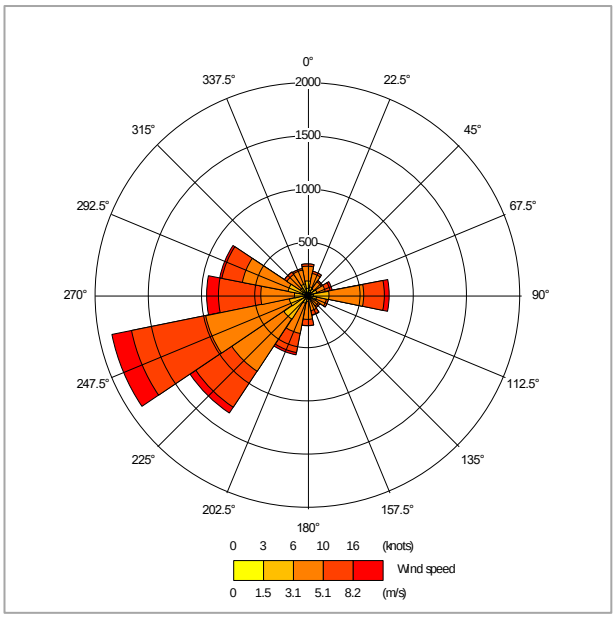

Figure D3: Wind Rose London City Airport 2017

XCO2
56 Kingsway Place, Sans Walk
London EC1R 0LU

+44 (0)20 7700 1000
mail@xco2.com
xco2.com