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ONE HOUSING GROUP
BANGOR WHARF, GEORGIANA STREET,
CAMDEN, LONDON

AIR QUALITY ASSESSMENT

FEBRUARY 2017

the journey is the reward

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One Housing Group
Bangor Wharf, Georgiana Street, Camden, London
Air Quality Assessment

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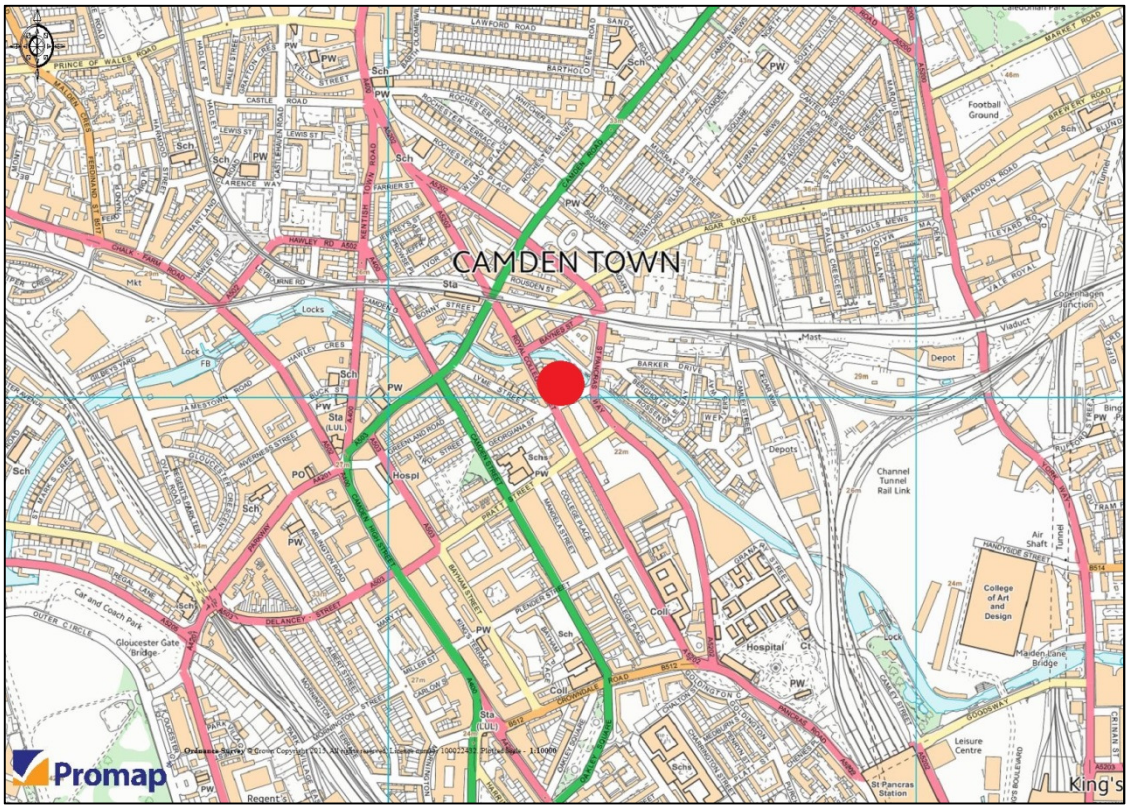
1 Introduction

1.1 Mayer Brown Ltd has been appointed by One Housing Group on behalf of One Housing Group to undertake this air quality assessment in support of a planning application for a proposed mixed-use development of land off Georgiana Street, Camden (known as Bangor Wharf – The Application Site). The location of the Proposed Development area is illustrated in **Figure 1.1**: Site Location in Relation to the Local Highway Network.



(Source: Ordnance Survey, Licence: AL100002189)

Figure 1.1: Site in Relation to the Local Highway Network

1.2 The Application Site is bounded to the south by Georgiana Street, to the east by the Grand Union canal and to the north and west by existing dwellings along Royal College Street. This is illustrated in **Figure 1.2**: Existing Site Layout.

(Source: Ordnance Survey, Licence: AL100002189)

Figure 1.2: Existing Site Layout

1.3 This Air Quality Assessment has been undertaken to support a planning application for the demolition of all buildings on-site and new buildings of 1-6 storeys in height to include 40 residential (C3) units (16 x 1 bed, 15 x 2 bed and 9 x 3 bed) of which 34 would be market units and 6 affordable, 813 sq.m (GEA) office floorspace (B1a), 55 sq.m (GEA) storage and distribution floorspace (B8) and associated works to highways and landscaping.

1.4 The main issue in terms of air quality for a development of this nature will be from vehicular emissions of Nitrogen Dioxide (NO_2) and Particulate Matter (PM_{10} and $PM_{2.5}$). Emissions from road traffic are most likely to affect receptors within 200m of a road[1], which is subject to a traffic change. These receptors may include new residents as part of the new development and existing residential receptors in the surrounding area.

1.5 A qualitative assessment of the air quality impacts of the construction phase upon local residents is provided, based upon the scale of the development and appropriate referenced guidance.

[1] Design Manual for Roads and Bridges Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

1.6 As advised by the associated Transport Statement[2] prepared in support of the application, the Proposed Development is car free and likely to contribute a negligible increase in daily vehicular trips. Therefore, the requirement for an impact assessment of the proposed development traffic has been considered unnecessary. Further details regarding the predicted traffic can be seen in Section 5.

1.7 At this stage of the application, it is not possible to fully quantify the likely conservative impact of construction traffic upon sensitive receptors, as the routeing of any construction vehicles will be considered within a routeing plan built into the Construction Environmental Management Plan (CEMP).

1.8 An Air Quality Neutral Assessment has been undertaken, in accordance with the Air Quality Neutral Planning Support Update: GLA 80371 (Air Quality Consultants and Environ, 2014).

1.9 This assessment scope of works undertaken has been forwarded to London Borough of Camden.

1.10 This Air Quality Assessment is divided into the following sections:

- National and Local Policies & Principles;
- Assessment Guidance;
- Existing Baseline Conditions;
- Construction Phase Criteria and Impact;
- Road Traffic Emissions Criteria and Impact;
- Air Quality Neutral Assessment;
- Mitigation Measures and Residual Impacts; and
- Conclusions.

[2] Vectos (2015) Transport Statement for Bangor Wharf, Camden, Vectos,London.

2 National and Local Policies & Principles

2.1 Part IV of the Environment Act 1995[3] requires local authorities to review and assess the air quality within their boundaries. As a result, the Air Quality Strategy was adopted in 1997, with national health based standards and objectives set out for the then, key eight air pollutants of benzene, 1-3 butadiene, carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter and sulphur dioxide.

2.2 The purpose of the Air Quality Strategy was to identify areas where air quality was unlikely to meet the objectives prescribed in the regulations. The strategy was reviewed in 2000 and the amended Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2000) was published. This was followed by an Addendum in February 2003 and in July 2007, an updated Air Quality Strategy was published.

2.3 The pollutant standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence based on how each pollutant affects human health. Pollutant objectives are the future dates by which each standard is to be achieved, taking into account economic considerations, practical and technical feasibility.

2.4 The air quality objectives applicable in LAQM in England are set out in the Air Quality (England) Regulations 2000, (SI 928), The Air Quality (England) (Amendment) Regulations 2002, (SI 3043) and are shown in **Table 2.1** below. This table shows the objectives in units of micrograms per cubic metre µg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedances in each year that are permitted (where applicable).

2.5 The main air quality pollutants of concern with regards to new developments such as the one proposed at this Application Site, are the traffic related pollutants of Nitrogen Dioxide (NO_2), Particulate Matter (PM_{10} and $PM_{2.5}$).

[3] Department for Environment, Food and Rural Affairs (1995) The Environment Act. HMSO, London.

Pollutant	Air Quality Objectives		Date to be Achieved by
	Concentration	Measured As	
Benzene	16.25 µg/m^3	Running annual Mean	31.12.2003
	5.00 µg/m^3	Running annual Mean	31.12.2010
1,3 Butadiene	2.25 µg/m^3	Running annual Mean	31.12.2003
Carbon monoxide	10mg/m^3	Running 8 –hour Mean	31.12.2003
Lead	0.5 µg/m^3	Annual Mean	31.12.2004
	0.25 µg/m^3	Annual Mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 µg/m^3 not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3 not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

Table 2.1: Air Quality Objectives

Air Quality Standards Regulations, 2010

2.6 The air quality limit values set out in EU Directive (2008/50/EC, 2008) are transposed in English law by the Air Quality Standards Regulations (2010). This imposes duties on the Secretary of State relating to achieving the limit values.

2.7 With regards to dust, it is recognised that major construction works may give rise to dust emissions within the PM_{10} and $PM_{2.5}$ size fraction. It is noted within section 79 of the Environmental Protection Act 1990 that a statutory nuisance is defined as:

'Any dust or effluvia arising from an industrial, trade or business premises and being prejudicial to health or a nuisance'

National Policy

National Planning Policy Framework, March 2012

2.8 In March 2012, the current Planning Policy Guidance documents were superseded by the National Planning Policy Framework (NPPF). The aim of this document is to set out the Government's requirements for the planning system, only to the extent that it is relevant, proportionate and necessary to do so. It also aims to enable local people and councils to produce their own distinctive local and neighbourhood plans.

2.9 The NPPF is based upon 12 Core planning principles, two of which have relevance to the proposals:

2.10 Number 4 states that planning should:

"...contribute to conserving and enhancing the natural environment and reducing pollution..."

2.11 Policy 11 Conserving and Enhancing the Natural Environment also states that the planning system should contribute to and enhance the natural and local environment by:

"...preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability;

2.12 The core principle and Policy 11 are reflected in the provision of this assessment which seeks to provide evidence that there will be no adverse effects upon air quality.

2.13 The NPPF states that the effects of pollution on health and the sensitivity of the area along with the development itself, should be taken into account.

2.14 More specifically the NPPF makes clear that:

> *"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."*

2.15 The NPPF also sets out the National planning policy on biodiversity and conservation. This emphasises that the planning system should seek to minimise effects on biodiversity and provide net gains in biodiversity wherever possible as part of the Government's commitment to halting declines in biodiversity and establishing coherent and resilient ecological networks.

National Planning Policy Guidance (NPPG, 2014)

2.16 The NPPF is now supported by Planning Practice Guidance (NPPG) (DCLG, 2014), which includes guiding principles on how planning can take account of the impacts of new development on air quality. The NPPG states that

"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values."

and

"It is important that the potential impact of new development on air quality is taken into account … where the national assessment indicates that relevant limits have been exceeded or are near the limit".

2.17 The role of the local authorities is covered by the LAQM regime, with the NPPG stating that local authority Air Quality Action Plans "identify measures that will be introduced in pursuit of the objectives". The NPPG makes clear that:

"Air quality can also affect biodiversity and may therefore impact on our international obligation under the Habitats Directive".

2.18 In addition, the NPPG makes clear that:

"Odour and dust can also be a planning concern, for example, because of the effect on local amenity"

2.19 The NPPG states that:

"Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife)".

2.20 The NPPG sets out the information that may be required in an air quality assessment, making clear that:

"Assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality". It also provides guidance on options for mitigating air quality impacts, as well as examples of the types of measures to be considered. It makes clear that "Mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact".

Regional Planning Policy

The London Plan[4]

2.21 The London Plan is the overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20–25 years.

2.22 In Chapter 5 – London's Response to Climate Change, policy 5.1, Climate change mitigation, states:

"The Mayor seeks to achieve an overall reduction in London's carbon dioxide emissions of 60 per cent (below 1990 levels) by 2025. It is expected that the GLA Group, London boroughs and other organisations will contribute to meeting the strategic reduction target..."

2.23 Policy 5.2, Minimising carbon dioxide emissions states:

"A. Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

1. Be lean: use less energy

2. Be clean: supply energy efficiently

3. Be green: use renewable energy..."

2.24 Policy 5.3, Sustainable design and construction states:

"The highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments."

2.25 In Chapter 7 – London's Living Places and Spaces, policy 7.14, Improving Air Quality and under planning decisions, it states the following:

"…Development proposals should:

[4] Greater London Authority (GLA) (2015) The London Plan. Spatial Development Strategy for London Consolidated with Alterations Since 2011. GLA, London.

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

b. *promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition'*

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

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

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

The Mayor's Air Quality Strategy – Clearing the Air[5]

2.26 The Strategy has been developed in conjunction with the Mayor's London Plan and the first priority of this Strategy is to achieve European Union limit values, which will be the most effective means to reduce the impact of air pollution on Londoners.

2.27 Chapter 3 – Transport Measures, proposes to reduce vehicle emissions through people making smarter choices about which mode they use to travel and, for all vehicles, using them as efficiently as possible, through policy 1, Encouraging smarter choices and sustainable travel behaviour:

"The Mayor, working with boroughs and stakeholders, will support Londoners and those working in and visiting the capital in making behavioural changes to the way they

5 Greater London Authority (GLA) (2010) Clearing the Air – The Mayor's Air Quality Strategy for public consultation.GLA, London.

travel to reduce emissions from transport and promote more efficient use of vehicles by individual and organisations."

2.28 In addition, this chapter proposes to improve air quality through a new generation of cleaner, greener private vehicles operating in London with a long-term aspiration of zero tailpipe emissions, through policy 2, Promoting technological change and cleaner vehicles:

"The Mayor, through TfL, working with central Government and boroughs and encouraging others will promote the transfer to and the uptake and use of low emission vehicles for both private and freight transport."

2.29 In Chapter 4 – Non-transport Measures, policy 7, Reducing emissions from construction and demolition sites, states:

"The Mayor, working with London boroughs, the GLA group and the construction industry to encourage implementation of the Best Practice Guidance for construction and demolition sites across London."*

**Now known as the London Councils Transport and Environment Committee*

2.30 Policy 8 aims to implement a planning process that ensures that no new development has a negative impact on air quality in London and states:

"The Mayor will ensure that new developments in London shall as a minimum be 'air quality neutral' through the adoption of best practice in the management and mitigation of emissions."

London Councils Air Quality and Planning Guidance[6]

2.31 This guidance updates and replaces the Association of London Government's Planning Technical Guidance (2001) and Circular 01/03. The guidance takes into account the now superseded Planning Policy Statement 23: Planning and Pollution Control, with a view of reducing exposure to air pollution across the whole of London.

2.32 The guidance produced by Air Pollution Planning and Local Environment (APPLE) working group, provides a useful guidance for assessing the significance of air quality concentrations across the UK (and not only in London).

2.33 In determining both the significance of the exposure to air pollution and the level of mitigation required, the guidance recommends that consideration should be given to the Air Pollution Exposure Criteria (APEC) as set out in **Table 2.2**.

[6] London Councils. (2007),Air Quality and Planning Guidance, The London Air Pollution Planning and the Local Environment (APPLE) working group, London

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

Table 2.2: Air Pollution Exposure Criteria

Local Planning Policy

London Borough of Camden Core Strategy[7]

2.34 The LBC adopted its core strategy in 2010, and at this time no specific policies are in place for Air Quality.

[7] London Borough of Camden (LBC) (2010). Core Strategy. LBC, London.

London Borough of Camden Development Policies Document (2010 – 2025)[8]

2.35 Policy DP32 – Air Quality and Camden's Clear Zone states:

"The Council will require air quality assessments where development could potentially cause significant harm to air quality. Mitigation measures will be expected in developments that are located in areas of poor air quality."

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

London Borough of Camden Supplementary Planning Guidance – CPG6 Amenity[9]

2.36 This Supplementary Planning Document builds upon the Core Strategy and Development Policies document and provides further advice on the requirements for Air Quality assessments.

[8] London Borough of Camden (LBC) (2010). Camden Development Policies Document (2010 – 2025). LBC, London.
[9] London Borough of Camden (LBC) (2010). Camden Supplementary Planning Guidance – CPG6 Amenity. LBC, London.

3 Standards and Guidelines

3.1 The assessments have been undertaken using the parameters set out in the recognised standards and guidelines below.

Standards and Guidelines

Data Sources	Details
Department for Environment, Food and Rural Affairs (Defra)	The Local Air Quality Management Tools contain information pertaining to monitoring networks across the UK and provides tools, which aid in the estimation of pollutant concentrations with reference to the year of study.
	Defra (2011). LAQM Background Maps - 1 x 1 km grid background maps for NO_x, NO_2, PM10 and $PM_{2.5}$ (2011-2030)
Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM)	EPUK (2010). Development Control: Planning For Air Quality, (2010 Update) This guidance has been produced to help ensure that air quality is properly accounted for in local development control processes.
	IAQM (2014). Guidance on the assessment of dust from demolition and construction
	The EPUK & IAQM Land-Use Planning & Development Control: Planning for Air Quality (2017) [10] provides updated advice and guidance on how an air quality assessment should be undertaken.
The National Atmospheric Emissions Inventory (NAEI)[11]	This is a website run by Ricardo AEA Technology where emission data can be obtained which relates the vehicle fleet composition for the year of study.
London Councils	Air Quality and Planning Guidance[12]. This guidance is aimed at local authorities, developers and their consultants, and provides technical advice on how to deal with planning applications that could have an impact on air quality.
Department for Transport (DfT) Highways Agency	Highways Agency (2007) [13]. Design Manual for Roads and Bridges (DMRB), Volume 11: Environmental Assessment, Section 3: Environmental Assessment Techniques, Part 1, HA 207/07
	Highways Agency (2013). Interim Advice Note 170/12 v3: Updating air quality advice of the future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality'
Greater London Authority (GLA), Air Quality Consultants and Environ	Sustainable Design and Construction – Supplementary planning Guidance(2014) [14].
	Air Quality Neutral Planning Support Update: GLA 80371(2014) [15]. This report has been commissioned by the GLA to provide support to the development of the Mayor's policy related to "air quality neutral" developments.
	Non Road Mobile Machinery (NRMM) Low Emissions Zone. From 1st of September 2015 the NRMM regulations apply to all major developments, within London, using NRMM between 37 and 560kW.
	LLAQM Technical Guidance, TG (16) [16:] Published by GLA in 2016 in order to support London Boroughs in carrying out their duties under the Environmental Act 1995 and connected regulations.

Table 3.1: Key Information Sources

[10] Environmental Protection UK & Institute of Air Quality Management (EPUK & IAQM) (2017) Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, London
[11] http://naei.defra.gov.uk
[12] London Councils. (2007),Air Quality and Planning Guidance, The London Air Pollution Planning and the Local Environment (APPLE) working group, London
[13] Department for Transport (2007).Design Manual for Roads and Bridges (DMRB), Volume 11: Environmental Assessment, Section 3: Environmental Assessment Techniques. HMSO, London.
[14] Mayor of London (2014). Sustainable Design and Construction – Supplementary Planning Guidance (SPG). Greater London Authority (GLA). London.
[15] Air Quality Consultants (AQC) (2014). Air Quality Neutral Planning Support Update: GLA80371. AQC. Bristol
[16] Greater London Authority (GLA) (2016) London Local Air Quality Management (LLAQM)Technical Guidance (LLAQM.TG (16)). DEFRA. London

4 Existing Baseline Conditions

4.1 Under the Air Quality Strategy there is a duty on all Local Authorities to consider the air quality within their boundaries and to report annually to Defra. The air quality situation in the London Borough of Camden has been assessed by the Local Authority through the national Review and Assessment process, which has lead the declaration of an Air Quality Management Area for the whole borough.

London Borough of Camden Air Quality Monitoring

4.2 A review of the most recently available air quality monitoring data has been extrapolated from the 2015 Updating and Screening Assessment Report. A review of the extensive monitoring programme indicates that the Borough has four automatic and fourteen non-automatic monitoring sites. Of these sites, four are *Urban Background* and the rest are kerbside / roadside. The results of the 2014 monitored NO_2 and PM_{10} results are set out in **Table 4.1** below.

Automatic				
ID	**Name**	**Type**	**NO_2 (µg/m^3)**	**PM_{10} (µg/m^3)**
LB	London Bloomsbury	UB	45	20
CD1	Swiss Cottage	K	63	22
CD3	Shaftesbury Avenue	R	74	25
CD9	Euston Road	R	106	29
Non-Automatic				
CA4	Euston Road	R	89.74	N/A
CA6	Wakefield Gardens	UB	36.44	
CA7	Frognal Way	UB	28.55	
CA10	Tavistock Gardens	UB	46.50	
CA11	Tottenham Court Road	K	86.75	
CA15	Swiss Cottage	K	74.34	
CA16	Kentish Town Road	R	57.83	
CA17	47 Fitzjohn's Road	R	60.30	
CA20	Brill Place	R	**52.34***	
CA21	Bloomsbury Street	R	80.82	
CA23	Camden Road	R	**72.21***	
CA24	Chetwynd Road	R	44.76	
CA25	Emmanuel Primary	R	48.36	
WITT	Wittanhurst Lane	R	48.26	

***closest monitoring locations to the Application Site**

Table 4.1: 2013 Monitored NO_2 and PM_{10} Pollution Levels

4.3 A review of the monitored pollution levels indicates that across the Borough the annual mean objective (40µg/m^3) is consistently being exceeded.

4.4 The results of the local monitoring have been compared against the Air Pollution Exposure Criteria (APEC) contained within the London Councils Air Quality and Planning Guidance[17] from the London Air Pollution Planning and Local Environment (APPLE) working group. These are outlined in **Table 2.2.**

4.5 A review of the nearest monitored pollution levels and the criteria in **Table 2.2** would put the Application Site in APEC C which states the following:

"*Refusal on air quality grounds should be anticipated, unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures."*

4.6 However, it should be noted that a large portion of inner city areas would fall under APEC – C due to the high NO_2 concentrations throughout London. The inclusion of suitable mitigation measures to protect future residents is therefore considered a suitable way to progress sustainable schemes in these locations and has been considered within Section 8.

[17] London Councils. (2007),Air Quality and Planning Guidance, The London Air Pollution Planning and the Local Environment (APPLE) working group, London

5 Construction Phase Criteria and Impact

Construction Related Air Quality Criteria

5.1 Emissions from construction traffic, from the proposed development would generate vehicle movements on to the local highway network. These would potentially include:

- Contractors' vehicles;
- Heavy Goods Vehicles;
- Diggers; and
- Other diesel Powered vehicles.

5.2 This will result in elevated levels of NO_x, particulates and other combustion related pollutants. However, these would be considered localised and of a temporary nature.

5.3 The EPUK & IAQM (2014)[18] indicates that an air quality assessment should be undertaken when it is likely that there will be*:*

- A change of LDV flow of:
  - More than 100 AADT within or adjacent to an AQMA; or
  - More than 500 AADT elsewhere.
- A change of HDV flow of:
  - More than 25 AADT within or adjacent to an AQMA; or
  - More than 100 AADT elsewhere.

5.4 Based upon previous experience of working on similar sized sites in London it is not anticipated this Application Site will generate more than 100 LDV's or 25 HDV's a day and therefore the impact is considered negligible. As a result a detailed assessment of construction vehicle impact has been scoped out of this assessment.

Construction Dust

5.5 Construction related dust effects cannot be easily quantified as the exact time and duration of any demolition/construction activity is not known at this stage. Therefore, in line with recognised guidance (Institute of Air Quality Management, 2014) a more qualitative approach has been employed to predict potential effects.

[18] Environmental Protection UK & Institute of Air Quality Management (EPUK & IAQM) (2014) Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, London

Step 1 – Screening the need for a Detailed Assessment

5.6 An assessment will normally be required where there are sensitive receptors within 350m of the site boundary and/or within 50m of the routes used by construction vehicles on the local highway network and 500m from site entrances. Ecological receptors within 50m of the site boundary or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s), are also identified at this stage and any ecological assessment should consider the sensitivity of present habitats and plant communities to potential dust deposition.

5.7 An ecological receptor refers to any sensitive habitat that is affected by dust soiling. For locations with a statutory designation, such as a Site of Specific Scientific Interest (SSSI), Special Area of Conservation (SACs) and Special Protection Areas (SPAs), consideration should be given as to whether the particular site is sensitive to dust. Some non-statutory sites may also be considered if appropriate.

5.8 Having reviewed the Natural England 'Magic[19]' website as illustrated in **Figure 5.1**, no Ramsar, SSSI's, SACs or SPAs are located in the vicinity of the Application Site.

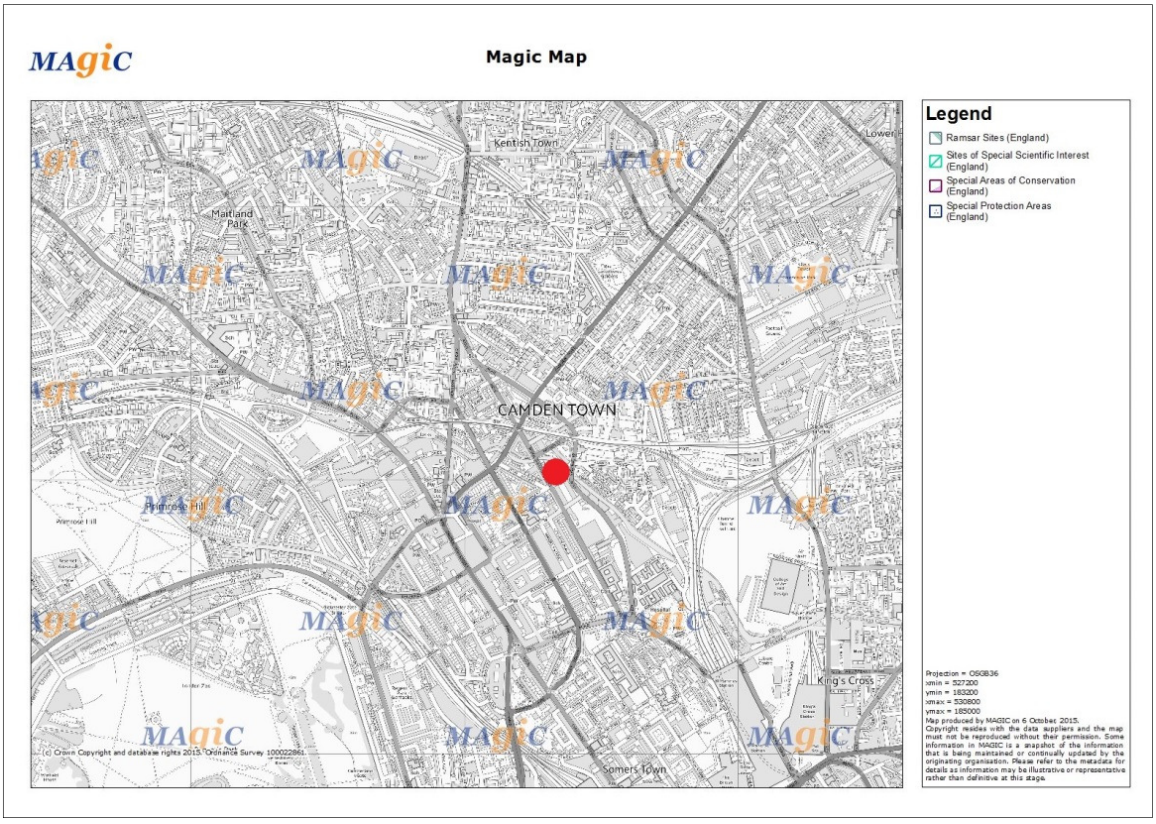


Figure 5.1: Ecological Designated Sites

[19] http://www.natureonthemap.naturalengland.org.uk/MagicMap.aspx

5.9 Where an assessment can be screened out, it can be concluded that the level of risk impact is 'negligible.'

5.10 As set out earlier in this section, the requirement for a detailed construction vehicle assessment has been screened out. However, as residential receptors are located within 350m of the site boundary a more detailed assessment of potential dust impacts is required.

5.11 To note, not all the criteria for a particular class need to be met for magnitude or significance. Other criteria maybe (such as professional judgement) can be used to justify the assessment.

Step 2 – Assess the Risk of Dust Arising

5.12 A site is allocated to a risk category on the basis of the scale and nature of the works (Step 2A) and the sensitivity of the area to dust impacts (Step 2B). These two factors are combined in Step 2C to determine the risk of dust impacts before the implementation of mitigation measures. The assigned risk categories may be different for each of the construction activities (demolition, construction, earthworks and trackout).

Step 2A – Define the Potential Dust Emission Magnitude

5.13 The dust emission magnitude is determined for demolition, earthworks, construction and Trackout based upon the scale of the anticipated works. **Table 5.1** describes the potential dust emission categories for each construction activity.

Activity	Small	Medium	Large
Demolition	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20m above ground level.	total building area >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20m above ground floor.
Earthworks	Total site area less than 2,500 m^2. Soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4 m in height, total material moved < 10,000 tonnes earthworks during winter months.	Total site area between 2,500 to 10,000 m^2, moderately dusty soil type (e.g. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds 4 - 8 m in height, total material moved 20,000 to 100,000 tonnes.	Total site area over 10,000 m^2, potentially dusty soil type (e.g. clay), >10 heavy earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved > 100,000 tonnes.
Construction	Total building volume below 25,000m^3, use of construction materials with low potential for dust release (e.g. metal cladding or timber). Period of construction	Total building volume between 25,000 and 100,000 m^3, use of construction materials with high potential for dust release (e.g. concrete), activities include piling, on-	Total building volume over 100,000 m^3, activities include piling, on-site concrete batching, and sand blasting. Period of activities more than two years.

	activities less than one year.	site concrete batching. Period of construction activities between one and two years.	
Trackout	<10HDV (>3,5t) outward movements in any one day. (Trackout may occur up to 50m from the site entrance).	10-50 HDV (>3.5t) outwards movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m. (Trackout may occur up to 200m from the site entrance).	> 50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m. (Trackout may occur up to 500m from the site entrance).

Table 5.1: Criteria Used to Determine the Dust Emission Magnitude

5.14 The potential dust emission categories for the Proposed Development have been determined by the criteria in **Table 5.1**:

- Demolition:
  - Total building volume is anticipated to be less than 20,000m^3;
  - Building made out of potentially dusty material;
  - The dust emission magnitude is therefore defined as **Medium**.
- Earthworks
  - The total site area is less than 2,500m^2;
  - Less than 5 HGV earth moving vehicles are assumed to be in operation at one time;
  - The dust emission magnitude is therefore defined as **Small**.
- Construction
  - The total building volume is anticipated to be less than 25,000m^2;
  - Potentially dusty material (e.g. concrete)
  - The dust emission magnitude is therefore defined as **Medium**.
- Trackout
  - It has been anticipated that less than 10 HGV outward movements will occur in one day;
  - The dust emission magnitude is therefore defined as **Small**.

5.15 To summarise the dust emission magnitudes are in **Table 5.2**.

Activity	Dust Emission Magnitude
Demolition	Medium
Earthworks	Small
Construction	Medium
Trackout	Small

Table 5.2: Summary of Risk Impacts

Step 2B – Define the Sensitivity of the Area

5.16 Step 2b also requires a definition of the sensitivity of the area. For the purpose of this assessment, receptors have been classified using the dust magnitude criteria set out previously within this section. This will include:

- The specific sensitivities of the receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10} the local background concentration; and
- Site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

5.17 The criteria for determining the sensitivity of receptors is detailed in **Table 5.3** for dust soiling effects and health effects of PM_{10}.

Sensitivity of Receptor	Criteria for Determining Sensitivity	
	Dust Soiling Effects	Health Effects of PM_{10}
High	• Dwellings • Museums • Long/Medium-term car park	• Dwellings • Hospitals • Schools • Care Homes
Medium	• Place of work • Parks	• Office and shop works not occupationally exposed to PM_{10}
Low	• Playing fields • Farmland • Footpaths • Short term car park	• Playing fields • Farmland • Footpaths • Shopping streets

Table 5.3: Criteria for Determining Sensitivity of Receptors

5.18 Once identified, the relative receptor sensitivities have been applied to **Tables 5.4** and **5.5**.

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
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 5.4: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m³	>100	High	High	High	Medium	Low
		10 – 100	High	High	Medium	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	28 - 32 µg/m³	>100	High	High	Medium	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	24 - 28 µg/m³	>100	High	Medium	Low	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	<24 µg/m³	>100	Medium	Low	Low	Low	Low
		10 – 100	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 5.5: Sensitivity of the Area to Human Health Impacts

Sensitivity to Dust Soiling

5.19 *Demolition, construction and earthworks*: There are between 10 to 100 receptor 'High' sensitive residential receptors within 20m of the site boundary. Therefore, based upon **Table 5.4** this would put the area within a '**High**' sensitivity to dust soiling.

5.20 *Trackout:* There are between 10 to 100 'High' sensitive residential receptors within 20m of the site boundary of the construction access along Royal College Street. Therefore, based upon **Table 5.4** this would put the area within a '**High**' sensitivity to dust soiling.

Sensitivity to Human Health Effects

5.21 *Demolition, construction and earthworks*: There are between 10 to 100 'High' sensitive residential receptors within 20m of the site boundary. The background PM_{10} monitored concentrations for the Application Site are 18 µg/m³ (based upon London Bloomsbury). Therefore, based upon **Table 5.5** this would put the area within a '**Low**' sensitivity to human health effects.

5.22 *Trackout:* There are between 10 to 100 'High' sensitive residential receptors within 20m of the site boundary of the construction access along Royal College Street. The background PM_{10} monitored concentrations for the Application Site are 18 µg/m³ (based upon London Bloomsbury). Therefore, based upon **Table 5.5** this would put the area within a '**Low**' sensitivity to human health effects.

Sensitivity to Ecological Effects

5.23 There are no ecological sites within the surrounding area of the Application Site, and so these have been scoped out of the dust assessment in Paragraph 4.8 due to distance.

Step 2C – Define the Risk of Impacts

5.24 The dust emission magnitude and sensitivity of the area are combined and the risk of impacts from each activity (demolition, earthworks, construction and trackout), before mitigation is applied. The risks of dust soiling and human health before mitigation are summarised in **Table 5.6**.

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium Risk	Low Risk	Medium Risk	Low Risk
Human Health	Negligible	Negligible	Low Risk	Negligible

Table 5.6: Summary of Dust Risk to Define Site-specific Mitigation

Step 3 – Identify the need for Site Specific Mitigation

5.25 The results of these steps allow an assessment of the overall dust risk and enable the identification of site specific mitigation. These measures are related to whether the site is a Low, Medium or High risk site.

Step 4 – Define Effects and their Significance

5.26 The significance of any effect is best determined upon professional judgement, taking into account the sensitivity of the surrounding area and overall correlation of potential risks.

5.27 The preference within the IAQM guidance is to assign the significance to the impact with mitigation in place. **Table 5.7** below, therefore, indicates that, with the implementation of a Construction Environmental Management Plan, the residual effects are anticipated to be negligible for the receptors identified.

Sensitivity of Surrounding Area	Risk of Site Giving Rise of Dust Effects		
	High	Medium	Low
High	**Slight Adverse**	**Slight Adverse**	Negligible
Medium	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible

Table 5.7: Significance of Effects of Each Activity with Mitigation

5.28 The dust emissions magnitude described in the sections above is combined with the sensitivity of the area and the significance criteria with mitigation measures (in **Table 5.7** to determine the significance of risk of dust impacts for each construction activity as detailed in **Table 5.8** below.

Potential Impact	Risk Significance			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Slight Adverse	Negligible	Slight Adverse	Negligible
Human Health	Negligible	Negligible	Negligible	Negligible

Table 5.8: Significance of Risk Effect

6 Emissions Criteria and Impact

Road Traffic Emissions

6.1 Three key guidance documents the Design Manual for Roads and Bridges (DMRB)[20], Environmental Protection UK (EPUK) Development Control: Planning for Air Quality (2010 update)[21] and the EPUK & IAQM (2014)[22] Land-Use Planning & Development Control: Planning for Air Quality guidance documents to determine the potential for trips generated by the development to affect local air quality.

6.2 The DMRB provides the following criteria for determination of road links potentially affected by changes in traffic flow:

- Daily Annual Average Daily Traffic (AADT) flows change by 1,000 or more;
- Daily HDV AADT flows change by 200 or more;
- Daily average speed changes by 10km/hr or more; or,
- Peak hour speed changes by 20km/hr or more.

6.3 The EPUK Development Control: Planning for Air Quality (2010 update) guidance document states the following criteria to help establish when an air quality assessment is likely to be considered necessary:

- Proposals that will generate or increase traffic congestion, where 'congestion' manifests itself as an increase in periods with stop start driving;
- Proposals that will give rise to a significant change in either traffic volumes, typically a change in AADT or peak traffic flows of greater than ±5% or ±10%, depending on local circumstances (a change of ±5% will be appropriate for traffic flows within an (AQMA), or in vehicle speed (typically of more than ±10km/hr), or both, usually on a road with more than 10,000 AADT (5,000 if 'narrow and congested');
- Proposals that would significantly alter the traffic composition on local roads, for instance, increase the number of HDVs by 200 movements or more per day; or,
- Proposals that include significant new car parking, which may be taken to be more than 100 spaces outside and AQMA or 50 spaces inside an AQMA.

6.4 The EPUK & IAQM (2017) provides indicative criteria for the requirement of an Air Quality Assessment. Of which the following criteria have been considered as part of this assessment:

[20] Design Manual for Roads and Bridges Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

[21] Development Control: Planning for Air Quality (2010 update), Environmental Protection UK, 2010.

[22] Environmental Protection Uk & Institute of Air Quality Management (EPUK & IAQM) (2015) Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, London

- A change of LDV flow of:
  - More than 100 AADT within or adjacent to an AQMA; or
  - More than 500 AADT elsewhere.
- A change of HDV flow of:
  - More than 25 AADT within or adjacent to an AQMA; or
  - More than 100 AADT elsewhere.

6.5 Should these criteria not be met, then the guidance documents consider air quality impacts associated with a scheme to be negligible and no further assessment is required.

6.6 The supporting Transport Statement with the planning application indicates that the Proposed Development is car-free and the only trips associated with it will be occasional deliveries and taxi movements. **Tables 6.1**, **6.2** and **6.3** set out the existing, proposed and net change peak-hour predicted vehicular generation associated with the Application Site.

Mode	08:00 – 09:00			17:00 – 18:00		
	In	Out	Total	In	Out	Total
Car	1	0	1	0	1	1
HGV	0	0	0	0	0	0
Total	1	0	1	0	1	1

Table 6.1: Existing Site Vehicle Trips

Period	Residential			Office		
	In	Out	Total	In	Out	Total
08:00 – 09:00	0	0	1	0	0	1
17:00 – 18:00	0	0	1	0	0	0

Table 6.2: Proposed Development Servicing Vehicle Trips

Period	Net Change		
	In	Out	Total
08:00 – 09:00	-1	0	+1
17:00 – 18:00	0	-1	0

Table 6.3: Net Change: Proposed Vehicles during Peak Hours

6.7 Based upon the negligible vehicular generation and the assessment criteria threshold, it is considered that no further assessment is required.

6.8 However, for completeness, due to the site being within an AQMA and the high pollutant concentrations in the area, a baseline dispersion modelling exercise has been undertaken to derive suitable mitigation measures to protect future sensitive receptors.

6.9 Detailed dispersion modelling has been undertaken at all proposed facades and every floor level. The modelling locations considered are listed and illustrated below.

- 1 – South - 529348.1,184002.7
- 2 – Southeast - 529372,184019.3
- 3 – East - 529369.4,184028.8
- 4 – Amenity - 529347,184027.5
- 5 – Northeast - 529335.6,184048
- 6 – North - 529319.1, 184039.5
- 7 – West - 529322.1, 184019.8

Figure 6.1: Modelling Locations

6.10 Dispersion modelling using ADMS has been undertaken for all the above locations at 1.5, 4.5, 7.5, 10.5, 13.5, 16.5 and 19 metres from the ground, which are considered representative of each floor level, including roof top.

6.11 The transport assessment undertaken for the same development concluded that the development would be car free, therefore it was not required to undertake detailed traffic surveys.

6.12 As a result of this, the dispersion modelling has been undertaken using historical traffic survey data from 2014 sourced from both TFL and DfT. The following hourly traffic data has been used:

- Royal College Street (N) – 367(20)
- Royal College Street (S) – 477(19)
- Georgina Street (W) – 101(0)
- Georgina Street (E) – 235(1)
- St Pancras Way (E) – 202(6)

6.13 Please note that ADMS requires an average hourly flow. Due to the limitations in the traffic data available for these roads, peak hour data has been used instead. Therefore, the modelling results presented below should be regarded as an indication of the worst case scenario and not as an overall concentration expected on site.

6.14 The background concentrations used have been based on London Bloomsbury urban background monitoring station, located approximately 1.3miles south of the proposed development site and were as follows:

- 2014 NO_2 - 45 µg/m^3
- 2014 PM_{10} - 20 µg/m^3

6.15 For consistency, the local met office wind data file used within ADMS has also been for 2014.

6.16 The modelling results for both NO_2 and PM_{10} are presented below:

Receptor ID	Annual Mean NO_2 µg/m^3						
	Ground Floor (1.5m)	First Floor (4.5m)	Second Floor (7.5m)	Third Floor (10.5 m)	Fourth Floor (13.5m)	Fifth Floor (16.5m)	Roof Top (19m)
1	48.05	46.7	45.91	45.47	45.24	45.12	45.06
2	47.68	46.44	45.78	45.45	45.26	45.15	45.09
3	46.86	46.26	45.77	45.45	45.26	45.15	45.09
4	46.57	46.22	45.82	45.48	45.26	45.13	45.07
5	46.23	46.01	45.72	45.44	45.24	45.13	45.07
6	46.77	46.3	45.78	45.41	45.2	45.1	45.06
7	47.35	46.58	45.86	45.41	45.19	45.09	45.05

Table 6.4: NO_2 Results

Receptor ID	Annual Mean PM_{10} µg/m^3						
	Ground Floor (1.5m)	First Floor (4.5m)	Second Floor (7.5m)	Third Floor (10.5 m)	Fourth Floor (13.5m)	Fifth Floor (16.5m)	Roof Top (19m)
1	20.43	20.23	20.12	20.06	20.03	20.01	20.01
2	20.34	20.19	20.10	20.06	20.03	20.02	20.01
3	20.24	20.17	20.10	20.06	20.03	20.02	20.01
4	20.20	20.16	20.10	20.06	20.03	20.02	20.01
5	20.15	20.13	20.09	20.06	20.03	20.02	20.01
6	20.21	20.16	20.10	20.05	20.03	20.01	20.01
7	20.28	20.20	20.11	20.05	20.02	20.01	20.01

Table 6.5: PM_{10} Results

6.17 The above results, confirm that the NO_2 concentrations are >5% above objective level and therefore fall within APEC C, meaning that mitigation measures will be required in order to ensure that future residents are provided with suitable indoor air quality. Suitable mitigation measures are suggested within section 8 of this report.

Operational Emissions

6.18 Mayer Brown Ltd have been advised the following heating systems are being proposed as part of the Proposed Development:

- 2No Hoval ultragas 1150D boilers; and
- CHP SAV XRGI9

6.19 To note, the datasheet of the CHP unit and boilers are set out in **Appendix A**.

7 Air Quality Neutral Assessment

7.1 This assessment is in undertaken in accordance with the Air Quality Neutral Planning Support Update: GLA 80371 (Air Quality Consultants and Environ, 2014) and Mayor of London's Sustainable Design and Construction SPG (April 2014).

Transport Emission Benchmarks

7.2 At this time Transport Emission Benchmarks (TEB) are available for the Retail (A1), Office (B1a) and Residential (C3, C4) for CAZ, Inner and Outer London as per **Table 7.1**.

Land Use			
	CAZ	Inner	Outer
NOx (g/m²/annum)			
Retail (A1)	169	219	249
Office (B1)	1.27	11.4	68.5
NOx (g/dwelling/annum)			
Residential (C3)	234	558	1553
PM_{10} (g/m²/annum)			
Retail (A1)	29.3	39.3	42.9
Office (B1)	0.22	2.05	11.8
PM_{10} (g/dwelling/annum)			
Residential (C3)	40.7	100	267

Table 7.1: Transport Emissions Benchmarks

7.3 The traffic element of the Air Quality Neutral Assessment compares the road traffic related emissions against calculated benchmark values which are based upon land use, the number of anticipated trips per year, and the average distance travelled per trip, in accordance with the Air Quality Neutral Planning Support Update: GLA 80371 (Air Quality Consultants and Environ, 2014).

7.4 The Total Benchmarked Transport Emissions for the Proposed Development are calculated using default NO_x and PM_{10} emission factors per square metre, which have been determined for the different land use classes, and for each of the three areas within London, as defined in the guidance.

Transport Emission Assessment

7.5 Transport emissions are assessed by multiplying the number of residential units for the Proposed Development by emission factors in order to obtain the Transport Emissions Benchmarks for NO_x and PM_{10}, as presented in **Table 7.2**.

Land Use	GFAm²/No. of Dwellings	NO_X Transport Emissions Benchmark	Benchmarked Emissions (kgNOx/annum)
C3	46	558	25.67
B1	686	11.4	7.82
Total			**33.49**
Land Use	**GFAm²/No. of Dwellings**	**PM_{10} Transport Emissions Benchmarks**	**Benchmarked Emissions (kgPM_{10}/annum)**
C3	46	100	4.60
B1	686	2.05	1.41
Total			**6.01**

Table 7.2: Calculation of Benchmarked Transport Emissions

7.6 The Total Transport Emissions of NO_x and PM_{10} are then calculated for the Proposed Development. The predicted number of vehicle trips per m^2/ per dwelling is multiplied by the average distance travelled, as set out in Table 7 within Air Quality Neutral Planning Support Update: GLA 80371 (Air Quality Consultants and Environ, 2014). This process is shown in **Table 7.3**.

Land Use	GFAm²/No. of Dwellings	Number of vehicle trips per year*	Average distance travelled per trip (km/trip)**	Distance Travelled (km/year)
C3	46	18,722	3.7	69,271
B1	686	2,744	7.7	21,129
Total				**90,400**

*based on the TRAVL Benchmark Trip Rates as only Peak Hour flows have been predicted in the main assessment

**based on the London Travel Demand Survey for Outer London as shown in the supporting guidance

Table 7.3: Calculation of Total Average Distance Travelled Per Year

7.7 Emission factors for NO_x and PM_{10} for the three areas of London (the Central Area Zone (CAZ), Inner and Outer London) are presented in the guidance document. Emission factors for Inner London have been included in this assessment.

7.8 Emission factors sourced from the guidance for NO_x and PM_{10} are multiplied by the total distance travelled per year to the Total Transport Emissions, as set out in **Table 7.4**.

Land Use	Total distance travelled per year (km)	NOx Transport Emission factor (gNOx/Vehicle-km)	Total NO_x Transport (kg)
C3	90,400	0.370	33.45
B1			
Land Use	**Total distance travelled per year (km)**	**PM_{10} Transport Emission factor (gPM_{10}/Vehicle-km)**	**Total PM_{10} Transport (kg)**
C3	94,240	0.0665	6.01
B1			

Table 7.4: Calculation of Total Transport Emissions

7.9 The Total Benchmarked Transport Emissions are then subtracted from the Total Transport Emissions, as presented in **Table 7.5**, to assess whether the Total Transport Emissions for the Proposed Development are within the benchmark.

NO_x	
Total Transport Emissions (kg)	33.45
Total Benchmarked Transport Emissions (kg)	33.49
Difference (kg)	**-0.04**
PM_{10}	
Total Transport Emissions (kg)	6.01
Total Benchmarked Transport Emissions (kg)	6.01
Difference (kg)	**0.00**

Table 7.5: Comparison Between Total and Benchmarked Transport Emissions

7.10 As the total Transport Emissions (33.45kg NOx and 6.01kg PM_{10}) are equal to / below the Total Benchmarked Transport Emissions (33.45kg NOx and 6.01kg PM_{10}), it is considered that no further mitigation is required in respect of transport emissions.

Building Emissions

7.11 At this time Building Emission Benchmarks (BEB) are available for the building classifications set out in **Table 7.6**.

Land Use Class	NO_x (g/m^2)	PM_{10} (g/m^2)
A1	22.6	1.29
A3 – A5	75.2	4.32
A2 & B1	30.8	1.77
B2 – B7	36.6	2.95
B8	23.6	1.90
C1	70.9	4.07
C2	68.5	5.97
C3	26.2	2.28
D1 (a)	43.0	2.47
D1 (b)	75.0	4.30
D1 (c-h)	31.0	1.78
D2 (a-d)	90.3	5.18
D2 (e)	284	16.3

Table 7.6: Building Emissions Benchmarks

7.12 It is noted within the supporting guidance that the developer isn't required to demonstrate compliance with the PM_{10} benchmark where gas is the only fuel used. As this is the case it hasn't been considered as part of this assessment.

7.13 As mentioned earlier in these section only emissions of NOx are calculated as both the CHP plant and proposed boilers will be fuelled using natural gas rather than oil or solid fuel.

7.14 The emission factors are multiplied by the floor area (m^2) for the Proposed Development in order to obtain the Building Emissions Benchmarks for NOx, as presented in **Table 7.7**.

Land Use	GFAm^2	NO_X Transport Emissions Benchmark	Benchmarked Emissions (kgNOx/annum)
C3	3,608	26.2	94.53
B1	686	30.8	21.13
Total			**115.66**

Table 7.7: Calculation of Benchmarked Building Emissions

7.15 As previously stated, the following heating plant and associated emissions are being proposed:

- Boiler - Hoval Ultragas 1150D Model that consist of 2No 600. The NOx emissions from this model is 36 mg/kWh taken from manufacturer datasheet. Based on the total gas flow rate to the boiler 108,5 m^3/hour also taken from the manufacturer and assuming that boilers will work for 2500 hours/year, the annual emissions have been calculated as follows: 108,5x38.7/3.6 = 1160kW; 1160x36x2500 = **105 kg of Nitrogen oxides /Year,**

- CHP - SAV XRGI9 NOx emission is 52 mg/Nm^3 based on the manufacturer information. To convert it to mg/kWh a ratio of 0.857 is applied. 52x0.857 = 44.56mg/kWh, Gas flow rate to the CHP 3.1m3/hr. Assuming the unit will work for minimum 6570 hours/year the annual emissions have been calculated as follows: 3.1x38.7/3.6 = 33.33 kW; 33.33x44.56x6570 = **9.76 kg of Nitrogen oxides/Year**,

7.16 **Table 7.8** sets out the total annual mass of NOx emitted by the Proposed Development per annum.

Plsnt	Development Emissions (kg/Annum)
Gas Boilers	105
CHP	9.76
Total Development Building Emissions	**114.76**

Table 7.8: Total Development Building Emissions (kgNOx/annum)

7.17 The Total Benchmarked Building Emissions are then subtracted from the Total Development Building Emissions, as presented in **Table 7.9**, to assess whether the Total Building Emissions for the Proposed Development are within the benchmark.

NO_x	
Total Development Building Emissions (kg)	114.76
Total Benchmarked Building Emissions (kg)	115.66
Difference (kg)	**-0.9**

Table 7.9: Comparison Between Total and Benchmarked Building Emissions

7.18 As the Total Development Building Emissions (114.76 kg NOx/annum) are below the Total Benchmarked Emissions (115.66kg NOx/annum) it is therefore considered that no further mitigation is required in respect of building emissions.

8 Mitigation Measures and Residual Impacts

Construction

8.1 Potentially likely significant impacts are associated with air polluting activities in close proximity to potentially sensitive receptors. By employing appropriate site management practices, the potential for adverse air quality impacts from construction vehicles and plant during the works will be minimised. A range of measures are suggested, which will form part of a site specific Construction Environmental Management Plan (CEMP) within which all contractor activities will be undertaken.

8.2 The CEMP will also contain environmental risk assessments for all dust or pollution generating activities. Designers and contractors should liaise to identify the hazards and risks likely to occur for each activity taking place on the construction site and find ways of avoiding or reducing them within the design. A comprehensive method statement detailing the methods to be used should be drawn up and communicated to all relevant personnel.

8.3 The following measures may form part of CEMP to be agreed with London Borough of Camden:

- Routine monitoring of dust at the site boundary;
- Use of water spraying, especially on access roads, in order to reduce dust generation, as and when conditions dictate;
- Effective wheel/body washing facilities to be provided and used as necessary;
- A road sweeper to be readily available whenever the need for road cleaning arises;
- Dampening of exposed soil and material stockpiles, where necessary;
- Consider wind speed and direction prior to conducting dust generating activities to determine the potential for dust nuisance to occur and avoid such activities during periods of high or gusty winds.
- Ensure that all construction plant and equipment is maintained in good working order;
- Vehicles carrying waste material off-site to be sheeted; and
- Under no circumstances should fires be allowed on site.

Residual Effects

8.4 No significant residual effects are expected to occur as a consequence of construction activities assuming that appropriate mitigation measures to prevent and control dust emissions are maintained by the construction contractor.

Post Construction (Completed Development)

Traffic Impact

8.5 This assessment has demonstrated that as the development will be car free. Therefore, no impact on air quality is anticipated as a result of development traffic.

Operational Plant

8.6 It is not anticipated that there will be any operational air quality impacts related to the any operational plant.

Residential Receptor Impact

8.7 There is a wide variety of air quality mitigation options available to reduce the potential exposure of future residents to high pollution concentrations.

8.8 A review of the local air quality monitoring concentration levels has indicated that the future residential receptors may be exposed to annual mean concentrations which are within APEC C. Therefore, in line with the London Councils Air Quality Planning Policy, the inclusion of appropriate mitigation has been proposed as part of the planning application in order to offer protection against poor air quality.

8.9 It is suggested that ventilation to the proposed development should be achieved by the installation of mechanical ventilation with filtration and a high specification of air tightness on both windows and doors so that when they are closed, residents are adequately protected. This will provide the future residents with a high standard of indoor air quality.

8.10 Any ventilation system (including any air conditioning unit) should be fitted with appropriate NO_2 filters (subject to CIBSE & HVCA recommendations) and draw air in from a suitable location either at the roof or the back façade, where the pollution concentrations should be considerably reduced.

8.11 Additionally, the modelled baseline results within Section 6 of this report clearly demonstrate the road contributions for both NO_2 and PM_{10}, decreasing with height, having a negligible effect at roof top. Therefore, the location of the of any air inlet should be located, where possible at roof level.

8.12 The location of the air inlet(s) should be located away from any potential sources of pollution (chimney/flue/road). This location should be agreed with LBC prior to construction commencing (secured by condition) and be fully accessible for regular cleaning and maintenance.

8.13 Also one of the key factors for reducing exposure is to inform future residents of the potential impacts associated with prolonged exposure to elevated pollution levels. As such, it might be considered beneficial to provide future residents with a welcome pack containing air quality information which will allow them to follow appropriate advice on the protection against high concentration levels during peak periods.

8.14 Examples of free services which provide up to date information on the current air quality levels for residents in London are set out in **Table 8.1**.

Service	Website	Service Provided
Defra	www.twitter.com/defraukair	Official, automated feed for UK Air Quality from Defra. Latest info on Pollution, Forecasts & Health Advice.
airText	www.airtext.info	Free text message service providing air quality alerts for Greater London.
London Air	www.londonair.org.uk	Free downloadable air quality app providing real time air quality index across London, in addition LAQM data for London Boroughs is available.

Table 8.1: London Air Quality Services

9 Conclusions

Demolition and Construction

9.1 Subject to the implementation of good practice within a site specific Construction Environmental Management Plan, which incorporates all of the measures proposed within a construction statement, any residual construction impacts are anticipated to be, local, temporary but of a slight adverse significance.

Completed Development

9.2 The traffic data examined here has indicated that the additional traffic flows associated with the Proposed Development have the potential to have a negligible impact for all pollutants considered, over baseline levels at sensitive receptor locations. Therefore, it is concluded that no significant operational traffic air pollution impacts are anticipated as a result of this development.

9.3 The site is located in an area which consistently exceeds the annual mean objective for NO_2 and puts site within APEC C. Mitigation measures have been considered within Section 7 to help protect exposure to future residential receptors. It is considered that a high specification and air tight glazing will provide adequate protection for the worst-case facades.

9.4 The air quality neutral assessment has concluded that both transport and building emissions associated with the proposed development are lower than the benchmarked values. Therefore, no further mitigation measures have been necessary.

9.5 It is concluded that the proposed development does not raise any significant or other adverse air quality impacts on the health and/quality of life for future residential use of the site and has provided suitable mitigation measures to ensure future residents are provided with suitable indoor air quality. It is therefore concluded that the proposed development complies fully with air quality related national, regional and local planning policy and should not be refused on air quality grounds.

APPENDIX A: Boiler and CHP Specification

Technical Data

UltraGas® (800D-1300D)

Type			(800D)	(900D)	(1000D)	(1150D)	(1300D)
• Nominal output 80/ 60 °C with natural gas		kW	87 - 742	87 - 834	87 - 926	122 - 1066	122 - 1206
• Nominal output 40/ 30 °C with natural gas		kW	97 - 800	97 - 900	97 - 1000	136 - 1150	136 - 1300
• Nominal output 80/ 60 °C with liquid gas [1]		kW	139 - 728	139 - 820	139 - 910	169 - 1048	169 - 1184
• Nominal output 40/ 30 °C with liquid gas [1]		kW	154 - 800	154 - 900	154 - 1000	185 - 1150	185 - 1300
• Heat input net CV basis with natural gas		kW	89 - 754	89 - 848	89 - 942	125 - 1084	125 - 1226
• Heat input net CV basis with liquid gas [1]		kW	144 - 754	144 - 848	144 - 942	175 - 1084	175 - 1228
• Working pressure heating max./min. [2]		bar	6.0 / 1.2	6.0 / 1.2	6.0 / 1.2	6.0 / 1.2	6.0 / 1.2
• Working temperature max.		°C	90	90	90	90	90
• Boiler water content		l	822	774	751	1098	1058
• Minimum water flow rate [3]		l/h	0	0	0	0	0
• Boiler weight (without water content, incl. casing)		kg	1806	1910	1962	2566	2656
• Boiler efficiency Part load 30% at 50/30°C (gross)		%	97.4	97.4	97.3	97.4	97.3
• Boiler efficiency Full load 100% at 80/60°C (gross)		%	88.6	88.6	88.6	88.6	88.6
• Part L UK Seasonal efficiency		%	95.7	95.7	95.6	95.7	95.6
• Stand-by loss at 70 °C		Watt	1500	1500	1500	2000	2000
• Emission rate	Nitrogen oxides [4]	mg/kWh	37	37	37	36	39
	Carbon monoxide	mg/kWh	17	17	22	17	17
• Content of CO_2 in the exhaust gas maximum/minimum output		%	9.0 / 8.8	9.0 / 8.8	9.0 / 8.8	9.0 / 8.8	9.0 / 8.8
• Dimensions			See table of dimensions				
• Connections	Flow/return	DN	DN125/PN6	DN125/PN6	DN125/PN6	DN150/PN6	DN150/PN6
	Gas x2	Inches	2"	2"	2"	2"	2"
	Flue gas Ø inside	mm	356	356	356	356	356
• Gas flow pressure minimum/maximum							
Natural gas E		mbar	15-80	15-80	15-80	15-80	15-80
Propane gas		mbar	37-57	37-57	37-57	37-57	37-57
• Gas connection value at 0 °C / 1013 mbar:							
Natural gas E - (Wo = 15,0 kWh/m³) H_u = 9,97 kWh/m³		m³/h	75.4	84.9	94.3	108.5	122.7
Propane gas (H_u = 32,7 kWh/m³)		m³/h	29.1	32.7	36.4	41.9	47.3
• Operation voltage		V/Hz	230/50	230/50	230/50	230/50	230/50
• Control voltage		V/Hz	24/50	24/50	24/50	24/50	24/50
• Minimum/maximum electrical power consumption		Watt	60/890	60/1164	60/1490	62/1440	62/2060
• Stand-by		Watt	24	24	24	24	24
• IP rating (integral protection)		IP	20	20	20	20	20
• Acoustic power level max		dB(A)	74	76	78	75	78
• Acoustic pressure level at 1 metre		dB(A)	64	66	68	65	68
• Condensate quantity (natural gas) at 40/ 30 °C		l/h	70.9	79.7	88.5	101.9	115.2
• pH value of the condensate		pH	ca. 4.2	ca. 4.2	ca. 4.2	ca. 4.2	ca. 4.2
• Values for flue calculation:							
Temperature class			T120	T120	T120	T120	T120
Flue gas mass flow		kg/h	1252	1408	1564	1799	2035
Flue gas temperature with operating conditions 80/ 60 °C		°C	71	71	72	71	72
Flue gas temperature with operating conditions 40/ 30 °C		°C	48	47	49	47	49
Volume flow rate combustion air		Nm³/h	933	1050	1166	1342	1518
Usable overpressure for air duct/flue system		Pa	60	60	60	60	60

[1] UltraGas (800D-1300D) can also be operated with propane/butane (liquid gas) mixtures.
[2] Boiler test pressure is 1.5 times max. operating pressure.
[3] Although generally the UltraGas boilers do not require a minimum water flow, it does not mean that the pump and burner can be switched off together when the unit is operating at full output. There should be a pump overrun to dissipate any residual heat within the boiler to avoid nuisance high temperature lockouts.
[4] NOx emissions to EN676 are dry and at 0% excess oxygen.
• Boiler flow resistance see separate page.
• Note, from a controls point of view UltraGas D boilers are seen as two units. This means that each unit will require its own power supply and controls signals.

XRGI-9 NO_x Emissions Data Sheet

Summary

Heat Related NO_x	Assessment In- put Value
- 325 mg/kWh @ 0% O_2	**0 mg/kWh @ 0% O_2**

Calculation

Total NO_x emissions 100 mg/m^3 @ 5% O_2 (manufacturer data)

1. Conversion to mg/kWh factor = 0.857

100 mg/m^3 @ 5% O_2 x 0.857 = 86 mg/kWh @ 5% O_2

2. Excess Oxygen Correction Calculation = 20.9 / (20.9 - X)

% O_2 in air = 20.9

X = % Excess O_2 = 5

20.9 / (20.9 - 5) = 1.3144

86 mg/kWh @ 5% O_2 x 1.3144 = 113 mg/kWh @ 0% O_2

NO_x emission calculation; X = (A-B)/C

X = NO_x emission per unit of heat supplied

A = NO_x emission per unit of electricity generated by CHP = Total NO_x x Electrical Generation %

Electrical Generation % = Electrical output / Total output = 9 / (9 + 20) = 0.31

113 mg/kWh @ 0% O_2 x 0.31 = 35 mg/kWh @ 0% O_2

B = NO_x emission per unit of electricity generated by grid (mg/kWh) = 750 mg/kWh (national value)

C = Heat to electricity ratio = 20/9 = 2.2 (manufacturer data)

X = (35 – 750) / 2.2 = - 325 mg/kWh

X = - 325 mg/kWh

As the heat related dry NO_x value calculated here is negative, it can be assumed to be zero for assessments. Please see the calculation notes over leaf for further information.

NO_x Calculation Notes

When discussing NO_x emissions from CHP, it is only the heat related NO_x emissions that need to be considered. Manufacturers typically supply total NO_x values, which need to be allocated to heat and electricity in line with the respective power outputs. The following formula must be used to determine this:

$X = (A – B)/C$

Where:
X = NO_x emissions per unit of heat supplied (mg/kWh)

A = NO_x emissions per unit of electricity generated (mg/kWh) Note: This is the NO_x emitted by the CHP system per unit of electricity generated and should be obtained from the supplier. Where data is provided in different units or at a level of excess oxygen above zero it must be corrected using the factors above.

B = NO_x emissions per unit of electricity supplied from the grid (mg/kWh).
Note: this should be assumed to be 750mg/kWh supplied
C = Heat to Electricity Ratio of the CHP scheme

Calculations for The Code for Sustainable Homes and/or BREEAM ratings require dry NO_x values to be used. Dry NO_x is the NO_x emissions (mg/kWh) resulting from the combustion of a fuel at zero per cent excess oxygen levels.

Where the heat related dry NO_x value is calculated to be negative, it should be assumed to be zero for these assessments.