UCL

New Student Centre

Air Quality Assessment

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Air Quality CONSULTANTS

Document Control

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Executive Summary

The air quality impacts associated with the construction and operation of the proposed new Student Centre at UCL in Gordon Street have been assessed.

Existing air quality conditions have been described using the results of monitoring carried out by Camden Council, information published by Defra and the Environment Agency. The potential dust impacts arising during the construction phase have been assessed following guidance issued by the GLA, taking into account the sensitivity of the local area and the nature and duration of the works. The operational impacts have been assessed qualitatively. Concentrations have been compared with air quality objectives set by the Government to protect human health.

During construction it will be necessary to apply a package of mitigation measures to minimise dust emissions. IAQM guidance makes clear that, with the mitigation measures in place, the overall impacts during construction will not be significant.

Existing conditions within the study area show acceptable air quality, with concentrations all below the air quality objectives relevant for this scheme.

The proposed development will not generate any additional traffic or energy plant emissions and thus will not affect air quality at existing properties. The operational impacts are therefore negligible

The proposed development has also been shown to be better than air quality neutral.

Overall, the construction and operational air quality impacts of the proposed development are judged to be not significant.

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1 Introduction

1.1 This report describes the potential air quality impacts associated with the proposed development of a new Student Centre for UCL, Gordon Street, Camden. The assessment has been carried out by Air Quality Consultants Ltd on behalf of UCL.

1.2 The proposed development will consist of a 4/5 storey building on vacant land in Gordon Street. The sites lie within an Air Quality Management Area (AQMA) declared by the London Borough of Camden for exceedences of the nitrogen dioxide and PM_{10} objectives.

1.3 The air quality neutrality of the proposed development has been assessed following the methodology provided in the Greater London Authority's (GLA's) Supplementary Planning Guidance (SPG) on Sustainable Design and Construction (GLA, 2014a).

1.4 There is also the potential for the construction activities to impact upon both existing and new properties. The main pollutants of concern related to construction activities are dust and PM_{10}. The GLA has also released Supplementary Planning Guidance on the Control of Dust and Emissions from Construction and Demolition (GLA, 2014b). The SPG outlines a risk assessment approach for construction dust assessment and helps determine the mitigation measures that will need to be applied.

1.5 The development will not lead to an increase in traffic on the local roads and therefore traffic impacts have not been considered further. Heating will be provided from the existing UCL district heating scheme and thus there will be no additional combustion sources on site.

1.6 At the request of the London Borough of Camden, this report describes existing local air quality conditions (2014). The main air pollutants of concern, related to traffic emissions, are nitrogen dioxide and fine particulate matter (PM_{10} and $PM_{2.5}$). In addition, the London Borough of Camden Air Quality Planning Checklist has been completed.

1.7 This report has been prepared taking into account all relevant local and national guidance and regulations.

2 Policy Context and Assessment Criteria

Air Quality Strategy

2.1 The Air Quality Strategy published by the Department for Environment, Food, and Rural Affairs (Defra) provides the policy framework (Defra, 2007) for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

Planning Policy

National Policies

2.2 The National Planning Policy Framework (NPPF) (2012) sets out planning policy for England in one place. It places a general presumption in favour of sustainable development, stressing the importance of local development plans, and states that the planning system should perform an environmental role to minimise pollution. One of the twelve core planning principles notes that planning should *"contribute to…reducing pollution"*. To prevent unacceptable risks from air pollution, planning decisions should ensure that new development is appropriate for its location. The NPPF states that the effects of pollution on health and the sensitivity of the area and the development should be taken into account.

2.3 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"*.

2.4 The NPPF is now supported by Planning Practice Guidance (PPG) (DCLG, 2014), which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG 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". The role of the local authorities is covered by the LAQM regime, with the PPG stating that local authority Air Quality Action Plans "*identify measures that will be introduced in pursuit of the objectives*". In addition, the PPG makes clear that *"Odour and dust can also be a planning concern, for example, because of the effect on local amenity"*.

2.5 The PPG 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)".*

2.6 The PPG 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".*

The London Plan

2.7 The London Plan (GLA, 2015) sets out the spatial development strategy for London consolidated with alterations made to the original plan since 2011. It brings together all relevant strategies, including those relating to air quality.

2.8 Policy 7.14, 'Improving Air Quality', addresses the spatial implications of the Mayor's Air Quality Strategy and how development and land use can help achieve its objectives. It recognises that Boroughs should have policies in place to reduce pollutant concentrations, having regard to the Mayor's Air Quality Strategy.

2.9 Policy 7.14B(c), requires that development proposals should be "*at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as designated Air Quality Management Areas (AQMAs))*". Further details of the London Plan in relation to planning decisions are provided in Appendix A1.

The Mayor's Air Quality Strategy

2.10 The revised Mayor's Air Quality Strategy (MAQS) was published in December 2010 (GLA, 2010). The overarching aim of the Strategy is to reduce pollution concentrations in London to achieve compliance with the EU limit values as soon as possible. The Strategy commits to the continuation of measures identified in the 2002 MAQS, and sets out a series of additional measures. These additional measures and the role of the Low Emission Zone are described in Appendix A1.

2.11 The MAQS also addresses the issue of 'air quality neutral' and states that "*GLA will work with boroughs to assist in the development of methodologies that will allow an accurate assessment of the impacts of the emissions of new developments*" (Para 5.3.19).

GLA SPG: Sustainable Design and Construction

2.12 The GLA's SPG on Sustainable Design and Construction (GLA, 2014a) provides details on delivering some of the priorities in the London Plan. Section 4.3 covers Air Pollution. It defines when developers will be required to submit an air quality assessment, explains how location and transport measures can minimise emissions to air, and provides emission standards for gas-fired boilers, Combined Heat and Power (CHP) and biomass plant. It also sets out, for the first time, guidance on how Policy 7.14B(c) of the London Plan relating to 'air quality neutral' (see Paragraph 2.9, above) should be implemented.

GLA SPG: The Control of Dust and Emissions During Construction and Demolition

2.13 The GLA's SPG on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014b) outlines a risk assessment based approach to considering the potential for dust generation from a construction site, and sets out what mitigation measures should be implemented to minimise the risk of construction dust impacts, dependent on the outcomes of the risk assessment. This guidance is largely based on the Institute of Air Quality Management's (IAQM) 2014 guidance on the Assessment of dust from demolition and construction (Institute of Air Quality Management, 2014), and it states that "*the latest version of the IAQM Guidance should be used*".

Local Policies

2.14 The Local Development Framework (LDF) for Camden, which replaced the Unitary Development Plan (UDP) in November 2010, is a collection of planning documents that (in conjunction with national planning policy and the Mayor's London Plan) set out the strategy for managing growth and development in the borough, including where new homes, jobs and infrastructure will be located. Policy DP32 Air Quality and Camden's Clear Zone, in the Camden Development Policies Local Development Framework (London Borough of Camden, 2010) document, sets out how Camden will expect developments to reduce its impact on air quality. It 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.'*

2.15 The London Borough of Camden has also prepared a Supplementary Planning Document - Camden Planning Guidance (CPG) 6 Amenity (London Borough of Camden, 2011), which provides further guidance on air quality. It includes information on when an air quality assessment will be required, what an air quality assessment should cover and what measures can reduce air

quality emissions and protect public exposure. The Council's overarching aim is for new development to be 'air quality neutral' and not lead to further deterioration of existing poor air quality. Mitigation and offsetting measures to deal with any negative air quality impacts associated with the development proposals may be required, where a development is not air quality neutral. The development should be designed to minimise exposure of occupants to existing poor air quality. It states that the Council requires assessments for:

> *'development that could have a significant negative impact on air quality. This impact can arise during both the construction and operational stages of a development as a result of increased NOx and PM_{10} emissions.*'

Air Quality Action Plan

2.16 Camden Council has declared an AQMA for nitrogen dioxide and PM_{10} that covers the whole Borough. The Council has since developed an Air Quality Action Plan 2013 – 2015 (London Borough of Camden, 2014). This identifies actions and mitigating measures necessary to improve air quality in the borough. It sets out objectives to reduce transport emissions and any emissions associated with new development. Key objectives associated with new development include identifying the impact of new development on air quality and controlling emissions from construction sites.

Assessment Criteria

Health Criteria

2.17 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations, 2000, Statutory Instrument 928 (2000) and the Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043 (2002).

2.18 The objectives for nitrogen dioxide and PM_{10} were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The $PM_{2.5}$ objective is to be achieved by 2020. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded where the annual mean concentration is below 60 $\mu g/m^3$ (Defra, 2009). Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level. Measurements have also shown that the 24-hour PM_{10} objective could be exceeded where the annual mean concentration is above 32 $\mu g/m^3$ (Defra,

2009). The predicted annual mean PM_{10} concentrations are thus used as a proxy to determine the likelihood of an exceedence of the 24-hour mean PM_{10} objective. Where predicted annual mean concentrations are below 32 µg/m^3 it is unlikely that the 24-hour mean objective will be exceeded.

2.19 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2009). The annual mean objectives for nitrogen dioxide and PM_{10} are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels or non-residential academic institutions such as the New Student Centre. The 24-hour objective for PM_{10} is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The guidance also states that "*in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day*". On this basis, the New Student Centre can be considered relevant for the 24-hour PM_{10} objective, where a student may be present for eight hours or more. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

2.20 The European Union has also set limit values for nitrogen dioxide, PM_{10} and $PM_{2.5}$. The limit values for nitrogen dioxide are the same numerical concentrations as the UK objectives, but achievement of these values is a national obligation rather than a local one (Directive 2008/50/EC of the European Parliament and of the Council, 2008). In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded.

2.21 The relevant air quality criteria for this assessment are provided in Table 1.

Table 1: Air Quality Criteria for Nitrogen Dioxide, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
Fine Particles (PM_{10})	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3 [b]
Fine Particles ($PM_{2.5}$) [a]	Annual Mean	25 µg/m^3

[a] The $PM_{2.5}$ objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

[b] A proxy value of 32µg/m^3 as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM_{10} objective being exceeded. Measurements have shown that, above this concentration, exceedences of the 24-hour mean PM_{10} objective are possible (Defra, 2009).

Construction Dust Criteria

2.22 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management[1] (IAQM) (2014), on which the assessment methodology outlined in the GLA's SPG (GLA, 2014b) is based, has been used. Full details of this approach are provided in Appendix A2.

Descriptors for Air Quality Impacts and Assessment of Significance

Construction Dust Significance

2.23 Guidance from the IAQM (Institute of Air Quality Management, 2014) is that, with appropriate mitigation in place, the impacts of construction dust will not be significant. The assessment thus focuses on determining the appropriate level of mitigation so as to ensure that impacts will normally not be significant.

Operational Significance

Health

2.24 There is no official guidance in the UK on how to describe air quality impacts, nor how to assess their significance. The approach developed jointly by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)[2] (EPUK & IAQM, 2015) has therefore been used. This includes defining descriptors of the impacts at individual receptors, which take account of the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective. The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors. Full details of the EPUK/IAQM approach are provided in Appendix A3. The approach includes elements of professional judgement, and the professional experience of the consultants preparing the report is therefore set out in Appendix A4.

[1] The IAQM is the professional body for air quality practitioners in the UK.

[2] The IAQM is the professional body for air quality practitioners in the UK.

3 Assessment Approach

Consultation

3.1 The assessment follows an approach recommended by the London Borough of Camden at the pre-application meeting.

Air Quality Planning Checklist

3.2 London Borough of Camden's Air Quality Planning Checklist (November 2013) has been completed. This identifies any aspects of the planning application which may have an impact upon air quality.

Existing Conditions

3.3 Existing sources of emissions within the study area have been defined using a number of approaches. Industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register (Defra, 2015d) and the Environment Agency's website 'what's in your backyard' (Environment Agency, 2015). Local sources have also been identified through examination of the Council's Air Quality Review and Assessment reports.

3.4 Information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority. The background concentrations across the study area have been defined using the national pollution maps published by Defra (2015a). These cover the whole country on a 1x1 km grid. Current exceedences of the annual mean EU limit value for nitrogen dioxide have been identified using the maps of roadside concentrations published by Defra (2015e). These are the maps, currently based on 2012 data, used by the UK Government, together with the results from national AURN monitoring sites that operate to EU data quality standards, to report exceedences of the limit value to the EU.

Construction Impacts

3.5 The construction dust assessment considers the potential for impacts within 350 m of the site boundary; or within 50 m of roads used by construction vehicles. The assessment methodology follows the GLA's SPG on the Control of Dust and Emissions During Construction and Demolition (GLA, 2014b), which is based on that provided by the IAQM (Institute of Air Quality Management, 2014). This follows a sequence of steps. Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required. Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation. Step 3 uses

this information to determine the appropriate level of mitigation required to ensure that there should be no significant impacts. Appendix A2 explains the approach in more detail.

'Air Quality Neutral'

3.6 The guidance relating to air quality neutral follows a tiered approach, such that all developments are expected to comply with minimum standards for gas boilers, combined heat and power (CHP) and biomass (GLA, 2014a). Compliance with 'air quality neutral' is then founded on emissions benchmarks that have been derived for both building (energy) use and road transport in different areas of London. Developments that exceed the benchmarks are required to implement on-site or off-site mitigation to offset the excess emissions (GLA, 2014a).

3.7 Appendix A6 of this report sets out the emissions benchmarks. The approach has been to calculate the emissions from the development and to compare them with these benchmarks.

4 Site Description and Baseline Conditions

4.1 The proposed development site is located on vacant land adjacent to the Bloomsbury Theatre on Gordon Street. To the south-west of the site is the UCL Bernard Katz building and Japanese Garden; the terraced buildings of Gordon Square lie to the south-east.

Industrial sources

4.2 A search of the UK Pollutant Release and Transfer Register (Defra, 2015d) European Pollutant Release and Transfer Register (European Environment Agency, 2014) and Environment Agency's 'what's in your backyard' (Environment Agency, 2015) websites did not identify any significant industrial or waste management sources that are likely to affect the proposed development, in terms of air quality.

Air Quality Review and Assessment

4.3 Camden Council has investigated air quality within its area as part of its responsibilities under the LAQM regime. The Council has declared an AQMA covering the whole borough for exceedences of the nitrogen dioxide and PM_{10} objectives; the proposed development is thus located within the AQMA.

Local Air Quality Monitoring

Nitrogen Dioxide

4.4 In 2013, Camden Council operated four automatic monitoring stations within its area. Two of these, Bloomsbury (an urban background site) and Euston Road (a roadside site) are located less than 1 km from the proposed development site. A further automatic monitoring station, operated by the City of Westminster is located on Marylebone Road (a kerbside site) approximately 1.5 km from the site. Camden Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared by Gradko International (using the 50% Triethanolmine (TEA) in acetone method). There are urban background diffusion tube monitoring sites in Wakefield Gardens and Tavistock Gardens, previously there was also a background site in Russell Square Gardens. There are roadside/kerbside diffusion tube monitoring sites alongside Tottenham Court Road and Bloomsbury Street. Results for the years 2009 to 2014 are summarised in Table 2.

Table 2: Summary of Nitrogen Dioxide (NO_2) Monitoring (2009 – 2014) [a]

Site No.[b]	Site Type	Location	2009	2010	2011	2012	2013	2014
Automatic Monitors - Annual Mean (µg/m^3) [c]								
LB	Urban Background	London Bloomsbury	**54**	**55**	**50**	**55**	**51**	**45**
CD9	Roadside	Euston Road	**-**	**-**	**122**	**106**	n/a	**98**
-	Kerbside	Marylebone Road (Westminster)	**107**	**98**	**97**	**94**	**85**	**80**
Objective			**40**					
Automatic Monitors - No. of Hours > 200 µg/m^3 [c]								
LB	Urban Background	London Bloomsbury	2	1	0	1	0	0
CD9	Roadside	Euston Road	-	-	**712**	**293**	**398**	**170**
-	Kerbside	Marylebone Road (Westminster)	**469**	**524**	**217**	**122**	**59**	17
Objective			**40**					
Diffusion Tubes - Annual Mean (µg/m^3) [d]								
CA6	Urban Background	Wakefield Gardens	39.4	34	45.6	39.3	**40.3**	38.3
CA10	Urban Background	Tavistock Gardens	**50.1**	**52**	**47.6**	**40.1**	**49.4**	**48.9**
CA11	Kerbside	Tottenham Court Road	**107.7**	**92**	**91.7**	**83.3**	**88.1**	**91.2**
CA21	Roadside	Bloomsbury Street	**81.3**	**41**	**76.73**	**71.7**	**76.1**	**85.0**
CA14	Urban background	Russell Square Gardens [e]	**44.5**	**44**	**-**	**-**	**-**	**-**
Objective			**40**					

[a] Exceedences of the objectives are shown in bold

[b] The Site No. is a site identification code used by Camden Council.

[c] Data downloaded from the London Air website (King's College London, 2015).

[d] Data have been taken from the 2013 Progress Report (London Borough of Camden, 2013). 2014 diffusion tube data has been provided by Camden Council.

[e] Data have been taken from the 2010 Progress Report (London Borough of Camden, 2011).

4.5 Measured concentrations suggest air quality within the study area is poor. Concentrations at the roadside and kerbside monitoring locations alongside busy roads are well in excess of the annual

mean objective. Measured concentrations at these sites are more than double the annual mean nitrogen dioxide objective of 40 µg/m^3. These analysers are located on more heavily trafficked and congested roads than Gordon Street and are therefore unlikely to be representative of air quality at the proposed development site. Measured concentrations at the urban monitoring sites may be considered to be more closely representative of air quality conditions at the proposed development; concentrations of nitrogen dioxide at these locations also exceed the annual mean objective by up to 10 µg/m^3. However, these concentrations are 40-50 µg/m^3 lower than those measured at Euston Road and Marylebone Road.

4.6 The short-term nitrogen dioxide objective has been exceeded at the automatic analysers on Euston Road and Marylebone Road over a number of years. This objective is achieved at the urban background automatic analyser at Bloomsbury, and at the urban background diffusion tube monitoring sites, as annual mean concentrations are below 60 µg/m^3. It is considered likely, therefore, that the short-term objective will also be achieved at the proposed development site.

PM_{10} and $PM_{2.5}$

4.7 The automatic analysers at Bloomsbury and Marylebone Road[3] also record PM_{10} concentrations. Results for the period 2009 to 2014 are presented in Table 3. In recent years, measured annual mean concentrations have below the annual mean objective at both Marylebone Road and Bloomsbury. The 24-hour mean objective has been exceeded in a number of years at Marylebone Road, but not at Bloomsbury. Concentrations at the proposed development site are likely to be closer to those at the urban background site, where the objectives are achieved.

[3] There are two types of PM_{10} analyser at the Marylebone Road monitoring station, a tapered element oscillating microbalance (TEOM) and Filter Dynamics Measurement Systems (FDMS). Results for both are presented.

Table 3: Summary of PM_{10} Automatic Monitoring (2009 – 2014) [a]

Site No.	Site Type	Location	2009	2010	2011	2012	2013	2014
PM_{10} Annual Mean (µg/m^3)								
LB	Urban Background	London Bloomsbury	23	n/a	23	19	18	19
-	Kerbside	Marylebone Road (Westminster) TEOM	36	35	**41**	38	33	35
-		Marylebone Road (Westminster) FDMS	37	32	38	n/a	29	31
Objective			**40**					
PM_{10} No. Days >50 µg/m^3								
LB	Urban Background	London Bloomsbury	13	n/a	17	10	3	10
-	Kerbside	Marylebone Road (Westminster) TEOM	**36**	**40**	**73**	**48**	29	21
-		Marylebone Road (Westminster) FDMS	**43**	23	**57**	n/a	21	17
Objective			**35**					

[a] Exceedences of the objectives are shown in bold

[b] The Site No. is a site identification code used by Camden Council.

[c] Data downloaded from the London Air website (King's College London, 2015).

[d] Data have been taken from the 2013 Progress Report (London Borough of Camden, 2013). 2014 diffusion tube data has been provided by Camden Council. 2013 monitoring data for the Brill Place diffusion tube was not available at the time of writing this report.

4.8 There are no analysers in the study area which record $PM_{2.5}$.

Exceedences of EU Limit Value

4.9 There are several AURN monitoring sites within the Greater London Urban Area that have measured exceedences of the annual mean nitrogen dioxide limit value. Furthermore, the national map of roadside annual mean nitrogen dioxide concentrations (Defra, 2015e), used to report exceedences of the limit value to the EU, identifies exceedences of this limit value in 2012 along many roads in London, including Euston Road, Gower Street and Woburn Place but not for Gordon Street. The Greater London Urban Area has thus been reported to the EU as exceeding the limit value for annual mean nitrogen dioxide concentrations. The national maps of roadside PM_{10} and $PM_{2.5}$ concentrations show no exceedences of the limit values anywhere in London. These maps are for 2012 concentrations; detailed maps of predicted future year exceedences are not available (Defra, 2015e).

Background Concentrations

4.10 In addition to these locally measured concentrations, estimated background concentrations in the study area have been determined for 2015 and the opening year 2017 (Table 4). In the case of nitrogen dioxide, two sets of future-year backgrounds are presented to take into account uncertainty in future year vehicle emission factors. The derivation of background concentrations is described in Appendix A5. The background annual mean nitrogen dioxide concentrations are above the objective. This is consistent with measured concentrations in the area (see Table 2). The background PM_{10} and $PM_{2.5}$ concentrations are all well below the objectives.

Table 4: Estimated Annual Mean Background Pollutant Concentrations in 2015 and 2017 (µg/m^3)

Year	NO_2	PM_{10}	$PM_{2.5}$
2015 [a]	46.4	24.9	16.8
2017 – Without Reductions in Traffic Emissions [b]	45.5	n/a	n/a
2017 – With Reductions in Traffic Emissions [c]	42.8	24.4	16.4
Objectives	**40**	**40**	**25**

n/a = not applicable

[a] This assumes that road vehicle emission factors in 2015 remain the same as in 2011 (See Appendix A5).

[b] This assumes that road vehicle emission factors in 2017 remain the same as in 2011.

[c] This assumes that road vehicle emission factors reduce between 2015 and 2017 at the current 'official' rates.

5 Construction Phase Impact Assessment

5.1 The construction works will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Initially, a large external brick and concrete staircase will need to be demolished. This will then be followed by piling and excavation of the basement, prior to construction of the new building. Overall, the construction period is expected to last approximately two and a half years.

Potential Dust Emission Magnitude

Demolition

5.2 There will be a requirement to demolish the large external brick and concrete staircase to the rear of the Bloomsbury Theatre, which is programmed to take around 6 months. The total volume of buildings to be demolished is approximately 100 m^3. Although the volume of building to be demolished is fairly small, the staircase is 22m high and a mobile crusher will be used on site which will increase the risk of dust impacts. Based on the example definitions set out in Table A2.1, the dust emission class for demolition is considered to be *medium.*

Earthworks

5.3 The characteristics of the soil at the development site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2015), as set out in Table 5.

Table 5: Summary of Soil Characteristics

Category	Record
Soil layer thickness	Deep
Soil Parent Material Grain Size	Arenaceous[a] – Rudaceous[b]
European Soil Bureau Description	River terrace sand/gravel
Soil Group	Light (Sandy) to Medium (Sandy)
Soil Texture	Sandy to Sandy Loam[c]

[a] grain size 0.06 – 2.0 mm.

[b] grain size > 2.0 mm.

[c] a loam is composed mostly of sand and silt.

5.4 Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

5.5 The site covers some 900 m^2 which will be subject to earthworks, involving breaking up of a paved area and excavation of the basement, which will require approximately 8,000 m^3 of material to be removed. The earthworks will last around 4 months and dust will arise mainly from the handling of dusty materials. Based on the example definitions set out in Table A2.1, the dust emission class for earthworks is considered to be *medium*.

Construction

5.6 Construction will involve erection of a reinforced concrete frame insitu, with brickwork and precast concrete cladding. Dust will arise from the handling and storage of dusty materials, and from the cutting of concrete. The construction will take place over a 15-month period. Based on the example definitions set out in Table A2.1, the dust emission class for construction is considered to be *medium*.

Trackout

5.7 The number of vehicles accessing the site, which may track-out dust and dirt is currently unknown. A high volume of vehicle movements off site may be generated during the demolition, piling and excavation phases. However, given the size and nature of the site it is unlikely that many will travel over unpaved ground. Based on the example definitions set out in Table A2.1, the dust emission class for trackout is considered to be *small*.

5.8 Table 6 summarises the dust emission magnitude for the proposed development.

Table 6: Summary of Dust Emission Magnitude

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

Sensitivity of the Area

5.9 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM_{10} concentrations.

Sensitivity of the Area to Effects from Dust Soiling

5.10 The IAQM guidance, upon which the GLA's guidance is based, explains that residential properties are 'high' sensitivity receptors to dust soiling (Table A2.2). The university buildings are also

considered to be of 'high' sensitivity to dust soiling. There are a number of university buildings within 20 m of the site, including the Bloomsbury Theatre, Wilkins and Bernard Katz buildings and offices in Gordon Square. The chemistry and nanotechnology buildings are approximately 20m and 40m respectively from the site (see Figure 1). Using the matrix set out in Table A2.3, the area surrounding the onsite works is of 'high' sensitivity to dust soiling. Table 6 shows that dust emission magnitude for trackout is 'small' and Table A2.3 thus explains that there is a risk of material being tracked 50 m from the site exit. Since it is not known which roads construction vehicles will use, it has been assumed that vehicles could turn either left or right onto Gordon Street. The Bloomsbury Theatre, the chemistry and nanotechnology buildings, Gordon House, and offices on Gordon Square, as well as part of Gordon Square itself are within 20 m of the roads along which material could be tracked (see Figure 2), and Table A2.3 thus indicates that the area is of 'high' sensitivity to dust soiling due to trackout. Taking these points into account, it is judged that the areas surrounding the onsite works and surrounding roads along which material may be tracked from the site are of 'high' sensitivity to dust soiling (Table 7).

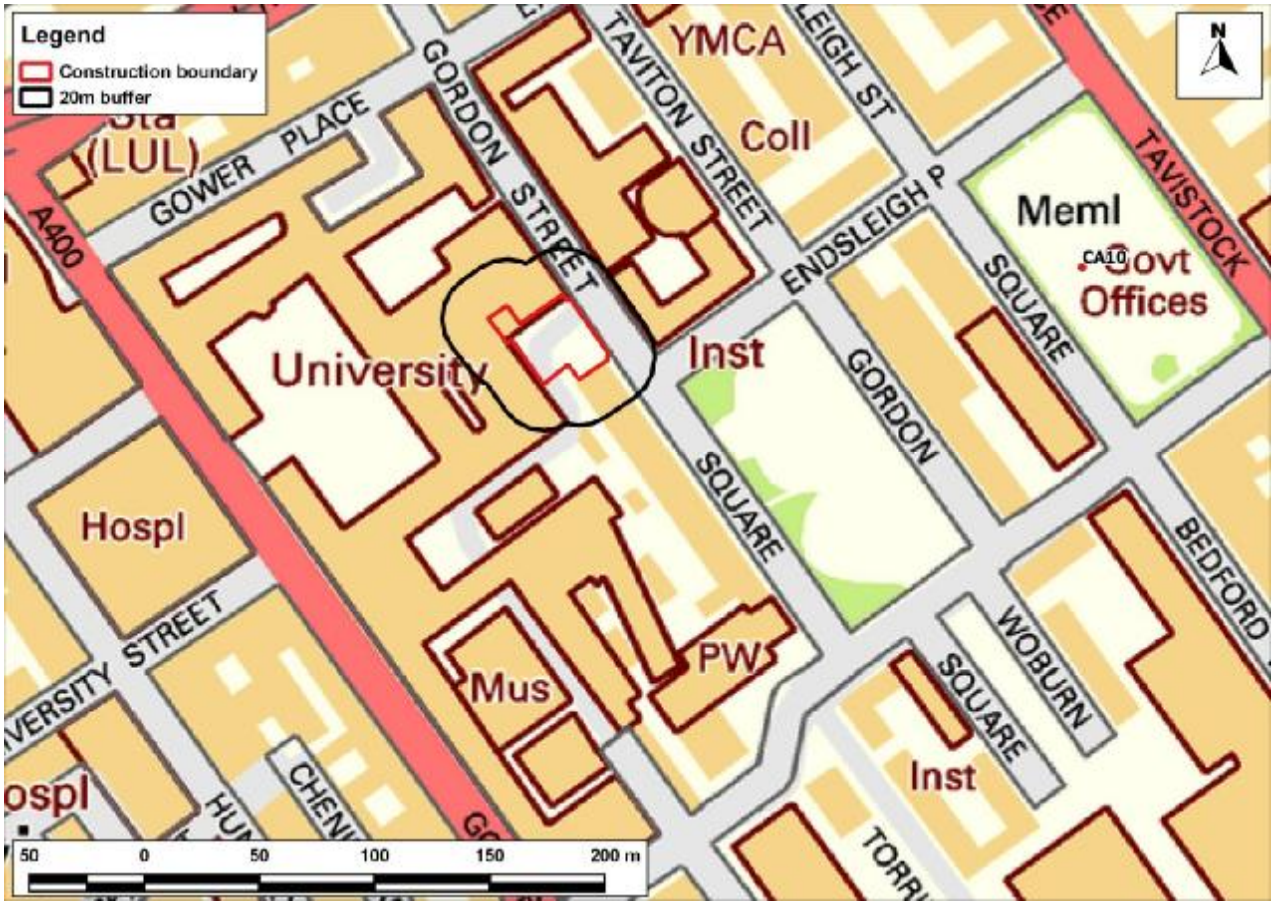

Figure 1: 20 m Distance Band around Construction Area

Contains Ordnance Survey data © Crown copyright and database right 2015

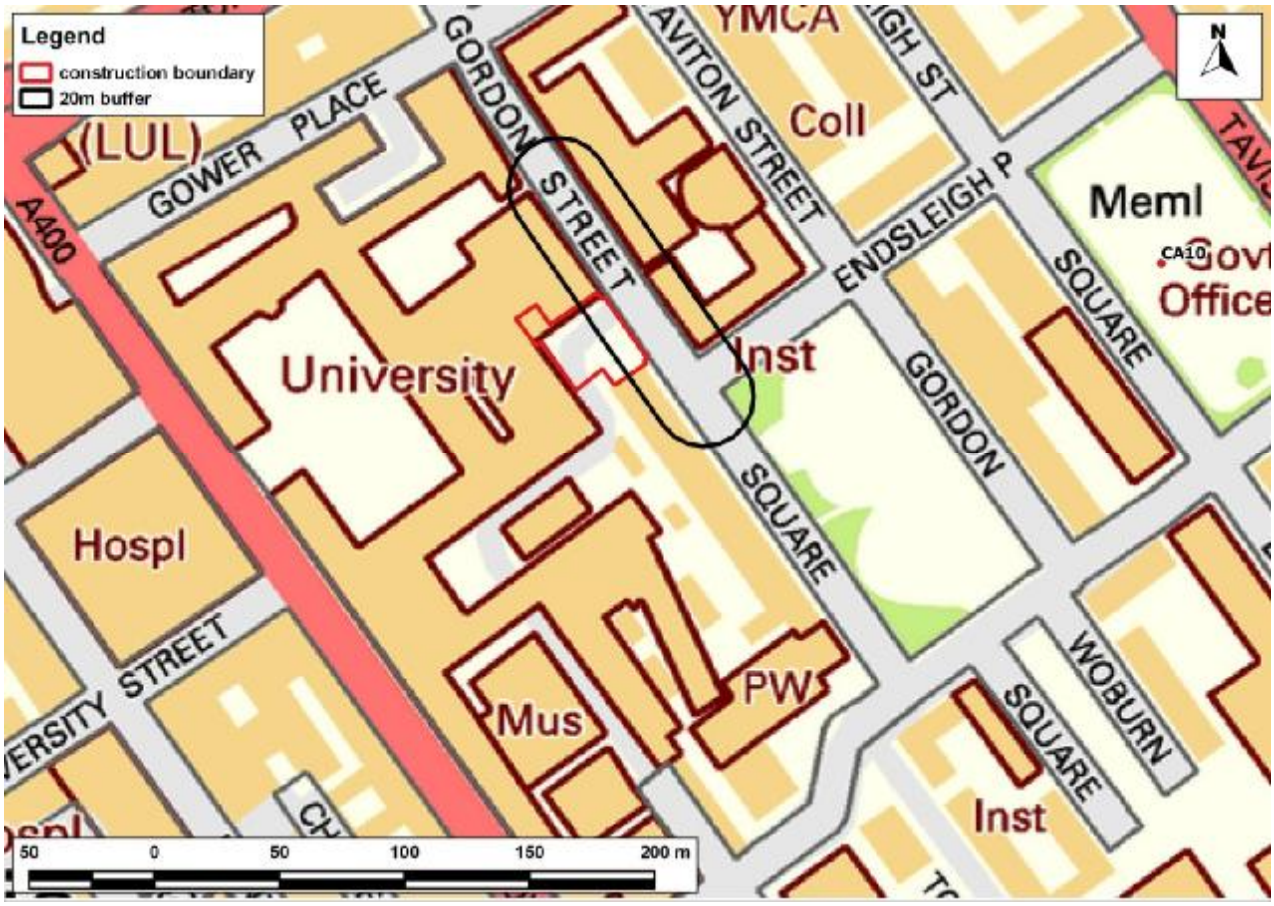

Figure 2: 20 m Distance Band around Roads Used by Construction Traffic Within 50m of the Site Exit

Sensitivity of the Area to any Human Health Effects

5.11 The university buildings are also classified as being of 'high' sensitivity to human health effects. The matrix in Table A2.4 requires information on the baseline annual mean PM_{10} concentration in the area. It is considered that the measured PM_{10} concentration at the Bloomsbury urban background monitoring site in Table 3 will best represent conditions near to the site. Using the matrix in Table A2.4, the area surrounding the onsite works and surrounding roads along which material may be tracked from the site are of 'medium' sensitivity to human health effects (Table 7).

Sensitivity of the Area to any Ecological Effects

5.12 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. There are no designated ecological sites within 50 m of the site boundary or those roads along which material may be tracked, thus ecological impacts will not be considered further.

Table 7: Summary of the Area Sensitivity

Effects Associated With:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	High Sensitivity	High Sensitivity
Human Health	Medium Sensitivity	Medium Sensitivity

Risk and Significance

5.13 The dust emission magnitudes in Table 6 have been combined with the sensitivities of the area in Table 7 using the matrix in Table A2.6 in Appendix A2, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 8. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 7.

Table 8: Summary of Risk of Impacts Without Mitigation

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

5.14 The IAQM does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally not be significant (Institute of Air Quality Management, 2014).

6 Operational Phase Impact Assessment

Energy Plant Impacts

6.1 The existing UCL district heating scheme would provide heat to the proposed development. This would make use of existing excess heat and therefore there would be no additional emissions to air as a result of heating the proposed development. Heating the proposed development would therefore have no impact on local air quality.

6.2 The existing CHP and boiler plant that power the district heating scheme are located around the campus. None of the plant are immediately adjacent to the proposed development. In addition, the New Student Centre would be a similar height to the surrounding buildings. On this basis, the impact of existing CHP/boiler plant upon the proposed development is unlikely to be any greater than the impact on any existing buildings in the area.

Road Traffic Impacts

6.3 There would not be any additional car parking associated with the New Student Centre, and therefore no increase in local traffic. On this basis, the proposed development would not have any traffic related air quality impacts.

Impacts on the Development

6.4 Information presented in the Baseline Conditions section indicates that the annual mean nitrogen dioxide objective will be exceeded at the New Student Centre. Although, the 1-hour nitrogen dioxide and PM_{10} objectives are expected to be achieved. As discussed in paragraph 2.19 the New Student Centre would represent relevant exposure for the 1-hour nitrogen dioxide and 24-hour mean PM_{10} objectives but not the annual mean objectives. As the 1-hour and 24-hour objectives will be achieved at the proposed development, the impacts of existing emission sources on air quality for the new occupants of the development is considered to be 'not significant'.

'Air Quality Neutral'

Building Emissions

6.5 Building Emission Benchmarks in terms of emissions of NOx and PM_{10} per m^2 of floor area for various land uses have been set. The benchmarks for Class D1(c) non-residential institutions for education use are 31 g/m^2 for NOx, and 1.78 g/m^2 for PM_{10}. There would be no increase in NOx or PM_{10} emissions due to proposed development and it will thus be better than air quality neutral in terms of building emissions.

Road Transport Emissions

6.6 The Transport Emissions Benchmarks (TEBs) are based on the number of trips generated by different land-use classes, together with the associated trip lengths and vehicle emission rates.

6.7 The New Student Centre would not lead to any increase in emissions of NOX and PM_{10} in the local area. The proposed development will be thus better than air quality neutral in terms of transport emissions.

Air Quality Planning and Checklist

6.8 LB of Camden's Air Quality and Planning Checklist has been completed. The completed checklist is included in Appendix A7.

Significance of Operational Air Quality Impacts

6.9 The operational air quality impacts without mitigation are judged to be *not significant*. This professional judgement is made in accordance with the methodology set out in Appendix A3. It is made on the basis that the development will not lead to an increase in traffic or energy plant emissions in the local area, and the occupants of the building will not be exposed to unacceptable air quality.

7 Mitigation

Construction Impacts

7.1 Measures to mitigate dust emissions will be required during the construction phase of the development in order to reduce impacts upon nearby sensitive receptors.

7.2 The site has been identified as a *Medium* Risk site during demolition, earthworks and construction, and *Low* Risk for trackout, as set out in Table 8. The GLA's SPG on *The Control of Dust and Emissions During Construction and Demolition* (GLA, 2014b) describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on what monitoring that should be undertaken during the construction phase. This reflects best practice experience and has been used, together with the professional experience of the consultant and the findings of the dust impact assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix A8.

7.3 The mitigation measures should be written into a dust management plan (DMP). The GLA's guidance suggests that, for a Medium Risk site, automatic monitoring of particulate matter (as PM_{10}) will be required. It also states that, on certain sites, it may be appropriate to determine the existing (baseline) pollution levels before work begins. However, the guidance is clear that the Local Authority should advise as to the appropriate air quality monitoring procedure and timescale on a case-by-case basis.

7.4 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

Road Traffic Impacts

7.5 The assessment has demonstrated that the scheme will not lead to any increase in traffic emissions. It is not considered appropriate to propose further mitigation measures for this scheme.

7.6 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation. The Mayor's Air Quality Strategy and Council's Air Quality Action Plan will also be helping to deliver improved air quality.

Good Design and Best Practice Measures

7.7 The proposed development incorporates the following good design and best practice measures, which the EPUK/IAQM guidance advises should be considered whether or not more specific mitigation is required:

- no car parking spaces provided, to discourage the use of private vehicles to access the proposed development;
- provision of cycle parking;
- provision of pedestrian and cycle access through the new development;
- siting of the intake of the mechanical ventilation system at the rear of the building away from any local sources; and
- use of the existing district heating scheme to avoid the need for on-site combustion.

8 Residual Impacts

Construction

8.1 The IAQM guidance is clear that, with appropriate mitigation in place, the residual effect will normally be 'not significant'. The mitigation measures set out in Section 7 and Appendix A7 are based on the IAQM guidance. With these measures in place and effectively implemented the residual effects are judged to be *insignificant*.

8.2 The IAQM guidance does, however, recognise that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. During these events, short-term dust annoyance may occur, however, the scale of this would not normally be considered sufficient to change the conclusion that overall the effects will be *insignificant*.

Energy Plant Impacts

8.3 The residual impacts will be the same as those identified in Section 6 (paragraphs 6.1 to 6.2). The impacts of the proposed development will be *negligible*.

Road Traffic Impacts

8.4 The residual impacts will be the same as those identified in Section 6 (paragraphs 6.3). The impacts of the proposed development will be *negligible*.

9 Conclusions

9.1 The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emission. With these measures in place, it is expected that any residual effects will be 'not significant'. However, the guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will not be significant.

9.2 Air quality is considered to be acceptable in relation to the air quality objectives that are relevant to the proposed use of the site (24-hour and 1-hour means). Annual mean nitrogen dioxide concentrations at the development site are likely to exceed the air quality objective, this is not significant, however, as the proposed use of the building does not represent relevant exposure in terms of the annual mean.

9.3 The proposed development would not increase traffic on local roads and thus the impacts of the development on air quality would be not significant. Heating would be provided by using excess heat from the existing district heating scheme and thus would not have any impact on local air quality.

9.4 The building and transport related emissions associated with the proposed development are both below the relevant benchmarks. The proposed development is (better than air quality neutral) and is thus compliant with Policy 7.14 of the London Plan.

9.5 The LB Camden Air Quality Planning Checklist has been completed and is provided in Appendix A7.

9.6 The overall operational air quality impacts of the development are judged to be not significant. No additional mitigation has been proposed for the operational impacts.

10 References

AQC. (2014). *Air Quality Neutral Planning Support Update: GLA 80371.*

British Geological Survey. (2015). *UK Soil Observatory Map Viewer*. Retrieved from http://mapapps2.bgs.ac.uk/ukso/home.html

DCLG. (2014). *Planning Practice Guidance*. Retrieved from http://planningguidance.planningportal.gov.uk/blog/guidance/

Defra. (2007). *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.* Defra.

Defra. (2009). *Review & Assessment: Technical Guidance LAQM.TG(09).* Defra.

Defra. (2015a). *Defra Air Quality Website*. Retrieved from http://laqm.defra.gov.uk/

Defra. (2015b). *UK Pollutant Release and Transfer Register*. Retrieved from prtr.defra.gov.uk

Defra. (2015c). *UK Ambient Air Quality Interactive Map*. Retrieved from http://uk-air.defra.gov.uk/data/gis-mapping

Directive 2008/50/EC of the European Parliament and of the Council. (2008).

Directive 2009/147/EC of the European Parliament and of the Council. (2009).

Directive 97/68/EC of the European Parliament and of the Council. (1997).

Environment Act. (1995). HMSO.

EPUK & IAQM. (2015, November). *Land-Use Planning & Development Control: Planning For Air Quality.* IAQM.

GLA. (2010). *Mayor's Air Quality Strategy: Cleaning the Air.*

GLA. (2013). *London Atmospheric Emissions Inventory (LAEI) 2010.*

GLA. (2014a). *Sustainable Design and Construction Supplementary Planning Guidance*. Retrieved from https://www.london.gov.uk/sites/default/files/Revised%20SD%26C%20SPG_0.pdf

GLA. (2014b). *The Control of Dust and Emissions from Construction and Demolition SPG*. Retrieved from https://www.london.gov.uk/sites/default/files/Dust%20and%20Emissions%20SPG%208%20July%202014_0.pdf

GLA. (2015). *The London Plan: The Spatial Development Strategy for London Consolidated with Alterations Since 2011*. Retrieved from http://www.london.gov.uk/sites/default/files/London%20Plan%20March%202015%20%28FALP%29.pdf

HMSO. (1990). *Environmental Protection Act 1990.*

Institute of Air Quality Management. (2012). *Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites*. Retrieved from www.iaqm.co.uk/guidance.html

Institute of Air Quality Management. (2014). *Guidance on the Assessment of Dust from Demolition and Construction.*

King's College London. (2015). *London Air.*

London Borough of Camden. (2010). *Camden Development Policies 2010 - 2025, Local Development Framework.*

London Borough of Camden. (2011). *2010 Air Quality Progress Report.*

London Borough of Camden. (2011). *Camden Planning guidance - Amenity.*

London Borough of Camden. (2013). *2013 Air Quality Progress Report.*

London Borough of Camden. (2014). *Air Quality Action Plan 2013 - 2015*. Retrieved from http://www.camden.gov.uk/ccm/content/environment/air-quality-and-pollution/air-quality/filestorage/air-quality-action-plan-2009-2012.en

National Planning Policy Framework. (2012). DCLG.

The Air Quality (England) (Amendment) Regulations, 2002, Statutory Instrument 3043. (2002). HMSO.

The Air Quality (England) Regulations, 2000, Statutory Instrument 928. (2000). HMSO.

The Air Quality Standards Regulations (No. 1001). (2010). Stationery Office.

WHO. (2000). *Air Quality Guidelines for Europe; 2nd Edition. http://www.euro.who.int/__data/assets/pdf_file/0005/74732/E71922.pdf.*

11 Glossary

AADT	Annual Average Daily Traffic
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
DCLG	Department for Communities and Local Government
Defra	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
EPUK	Environmental Protection UK
Exceedence	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LB	London Borough
LDF	Local Development Framework
LDV	Light Duty Vehicles (<3.5 tonnes)
LEZ	Low Emission Zone
µg/m^3	Microgrammes per cubic metre
MAQS	Mayor's Air Quality Strategy
NAEI	National Atmospheric Emissions Inventory
NRMM	Non-road Mobile Machinery
NO	Nitric oxide
NO_2	Nitrogen dioxide
NOx	Nitrogen oxides (taken to be NO_2 + NO)
NPPF	National Planning Policy Framework

Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
PHV	Private Hire Vehicle
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG	Planning Practice Guidance
SPG	Supplementary Planning Guidance
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TEA	Triethanolamine – used to absorb nitrogen dioxide

12 Appendices

A1 Extracts from the London Plan and Mayor's Air Quality Strategy, and Description of the Low Emission Zone (LEZ)

London Plan

A1.1 The London Plan sets out the following points in relation to planning decisions:

"Development proposals should:

a) minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within AQMAs or 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 by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3);

b) promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils "The control, of dust and emissions form 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 made to reduce emissions from a development, these usually are made on site. Where it can be demonstrated that on-sire 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

A1.2 The Mayor's Air Quality Strategy commits to the continuation of measures identified in the 2002 MAQS, and sets out a series of additional measures, including:

Policy 1 – Encouraging smarter choices and sustainable travel;

Measures to reduce emissions from idling vehicles focusing on buses, taxis, coaches, taxis, PHVs and delivery vehicles;

Using spatial planning powers to support a shift to public transport;

Supporting car free developments.

Policy 2 – Promoting technological change and cleaner vehicles:

Supporting the uptake of cleaner vehicles.

Policy 4 – Reducing emissions from public transport:

Introducing age limits for taxis and PHVs.

Policy 5 – Schemes that control emissions to air:

Implementing Phases 3 and 4 of the LEZ from January 2012

Introducing a NOx emissions standard (Euro IV) into the LEZ for Heavy Goods Vehicles (HGVs), buses and coaches, from 2015.

Policy 7 – Using the planning process to improve air quality:

Minimising increased exposure to poor air quality, particularly within AQMAs or where a development is likely to be used by a large number of people who are particularly vulnerable to air quality;

Ensuring air quality benefits are realised through planning conditions and section 106 agreements and Community Infrastructure Levy.

Policy 8 – Creating opportunities between low to zero carbon energy supply for London and air quality impacts:

Applying emissions limits for biomass boilers across London;

Requiring an emissions assessment to be included at the planning application stage.

Low Emission Zone (LEZ)

A1.3 A key measure to improve air quality in Greater London is the Low Emission Zone (LEZ). This entails charges for vehicles entering Greater London not meeting certain emissions criteria, and affects older, diesel-engined lorries, buses, coaches, large vans, minibuses and other specialist vehicles derived from lorries and vans. The LEZ was introduced on 4th February 2008, and was phased in through to January 2012. From January 2012 a standard of Euro IV was implemented for lorries and other specialist diesel vehicles over 3.5 tonnes, and buses and coaches over 5 tonnes. Cars and lighter Light Goods Vehicles (LGVs) are excluded. The third phase of the LEZ, which applies to larger vans, minibuses and other specialist diesel vehicles, was also implemented in January 2012. As set out in the 2010 MAQS, a NOx emissions standard (Euro IV) is included in the LEZ for HGVs, buses and coaches, from 2015.

A2 Construction Dust Assessment Procedure

A2.1 The criteria developed by IAQM, upon which the GLA's guidance is based, divide the activities on construction sites into four types to reflect their different potential impacts. These are:

- demolition;
- earthworks;
- construction; and
- trackout.

A2.2 The assessment procedure includes the four steps summarised below:

STEP 1: Screen the Need for a Detailed Assessment

A2.3 An assessment is required where there is a human receptor within 350 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), or where there is an ecological receptor within 50 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

A2.4 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is *negligible* and that any effects will not be significant. No mitigation measures beyond those required by legislation will be required.

STEP 2: Assess the Risk of Dust Impacts

A2.5 A site is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emission magnitude (Step 2A); and
- the sensitivity of the area to dust effects (Step 2B).

A2.6 These two factors are combined in Step 2C, which is to determine the risk of dust impacts with no mitigation applied. The risk categories assigned to the site may be different for each of the four potential sources of dust (demolition, earthworks, construction and trackout).

Step 2A – Define the Potential Dust Emission Magnitude

A2.7 Dust emission magnitude is defined as either 'Small', 'Medium', or 'Large'. The IAQM explains that this classification should be based on professional judgement, but provides the examples in Table Table A2.1.

Table A2.1: Examples of How the Dust Emission Magnitude Class May be Defined

Class	Examples
Demolition	
Large	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >20 m above ground level
Medium	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level
Small	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months
Earthworks	
Large	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes
Medium	Total site area 2,500 m^2 – 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 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes
Small	Total site area <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 wetter months
Construction	
Large	Total building volume >100,000 m^3, piling, on site concrete batching; sandblasting
Medium	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching
Small	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout [a]	
Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m
Medium	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m
Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

[a] These numbers are for vehicles that leave the site after moving over unpaved ground.

Step 2B – Define the Sensitivity of the Area

A2.8 The sensitivity of the area is defined taking account of a number of factors:

- the specific sensitivities of 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 to reduce the risk of wind-blown dust.

A2.9 The first requirement is to determine the specific sensitivities of local receptors. The IAQM recommends that this should be based on professional judgment, taking account of the principles in Table A2.2. Table A2.2. These receptor sensitivities are then used in the matrices set out in Table A2.3, Table A2.4**Error! Reference source not found.** and Table A2.5 to determine the sensitivity of the area. Finally, the sensitivity of the area is considered in relation to any other site-specific factors, such as the presence of natural shelters etc., and any required adjustments to the defined sensitivities are made.

Step 2C – Define the Risk of Impacts

A2.10 The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the *risk* of impacts with no mitigation applied. The IAQM provides the matrix in Table A2.6 as a method of assigning the level of risk for each activity.

STEP 3: Determine Site-specific Mitigation Requirements

A2.11 The IAQM provides a suite of recommended and desirable mitigation measures which are organised according to whether the outcome of Step 2 indicates a low, medium, or high risk. The list provided by the IAQM has been used as the basis for the requirements set out in Appendix A7.

STEP 4: Determine Significant Effects

A2.12 The IAQM does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally not be significant (Institute of Air Quality Management, 2014).

A2.13 The IAQM guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will not be significant.

Table A2.2: Principles to be Used When Defining Receptor Sensitivities

Class	Principles	Examples
Sensitivities of People to Dust Soiling Effects		
High	users can reasonably expect enjoyment of a high level of amenity; or the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected a to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land	dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms
Medium	users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or the appearance, aesthetics or value of their property could be diminished by soiling; or the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land	parks and places of work
Low	the enjoyment of amenity would not reasonably be expected; or there is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land	playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads
Sensitivities of People to the Health Effects of PM_{10}		
High	locations where members of the public may be exposed for eight hours or more in a day	residential properties, hospitals, schools and residential care homes
Medium	locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day.	may include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}
Low	locations where human exposure is transient	public footpaths, playing fields, parks and shopping streets
Sensitivities of Receptors to Ecological Effects		
High	locations with an international or national designation and the designated features may be affected by dust soiling; or locations where there is a community of a particularly dust sensitive species	Special Areas of Conservation with dust sensitive features
Medium	locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or locations with a national designation where the features may be affected by dust deposition	Sites of Special Scientific Interest with dust sensitive features
Low	locations with a local designation where the features may be affected by dust deposition	Local Nature Reserves with dust sensitive features

Table A2.3: Sensitivity of the Area to Effects on People and Property from Dust Soiling [4]

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	Low	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table A2.4: Sensitivity of the Area to Human Health Effects [4]

Receptor Sensitivity	Annual Mean PM_{10}	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m^3	>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

[4] For demolition, earthworks and construction, distances are taken either from the dust source or from the boundary of the site. For trackout, distances are measured from the sides of roads used by construction traffic. Without mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

Table A2.5: Sensitivity of the Area to Ecological Effects [4]

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

Table A2.6: Defining the Risk of Dust Impacts

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

A3 EPUK & IAQM Planning for Air Quality Guidance

A3.1 The guidance issued by EPUK and IAQM[5] (EPUK & IAQM, 2015) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air quality as a material consideration

"Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- *the positive benefits provided through other material considerations".*

Recommended Best Practice

A3.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

"The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions".

A3.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m^2 of commercial floorspace;
- are carried out on land of 1ha or more.

A3.4 The good practice principles are that:

[5] The IAQM is the professional body for air quality practitioners in the UK.

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new "street canyon", as this inhibits pollution dispersion;
- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;
- The provision of at least 1 Electric Vehicle (EV) "rapid charge" point per 10 residential dwellings and/or 1000m^2 of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
- All gas-fired boilers to meet a minimum standard of <40 mgNOx/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
    - Spark ignition engine: 250 mgNOx/Nm^3;
    - Compression ignition engine: 400 mgNOx/Nm^3;
    - Gas turbine: 50 mgNOx/Nm^3.
- A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNOx/Nm^3 and 25 mgPM/Nm^3.

A3.5 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

"It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the "damage cost approach" used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential".

A3.6 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

- Support and promotion of car clubs;
- Contributions to low emission vehicle refuelling infrastructure;
- Provision of incentives for the uptake of low emission vehicles;
- Financial support to low emission public transport options; and
- Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

"There may be a requirement to carry out an air quality assessment for the impacts of the local area's emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

- *the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- *the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- *the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular nitrogen dioxide), that would cause unacceptably high exposure for users of the new development; and*
- *the presence of a source of odour and/or dust that may affect amenity for future occupants of the development".*

Impacts of the Development on the Local Area

A3.7 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the follow apply:

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

A3.8 Coupled with any of the following:

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

A3.9 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, the criteria for which are set out below. The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria is likely to be more appropriate.

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights, or roundabouts;
- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor;
- the development will have one or more substantial combustion processes where the combustion unit is:
    - any centralised plant using bio fuel;
    - any combustion plant with thermal input >400kW; or
    - a standby emergency generator associated with a centralised energy centre (if likely to be tested/used >18 hours a year).

A3.10 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area.

A3.11 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

A3.12 There is no official guidance in the UK on how to assess the significance of air quality impacts. The approach developed by EPUK and IAQM[6] (EPUK & IAQM, 2015) has therefore been used. The guidance is that the assessment of significance should be based on professional judgement, with the overall air quality impact of the scheme described as either significant or not significant. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts. In such circumstances, several impacts that are described as 'slight' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a 'moderate' or 'substantial' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

A3.13 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant.

A3.14 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A4.

[6] The IAQM is the professional body for air quality practitioners in the UK.

A4 Professional Experience

Prof. Duncan Laxen, BSc (Hons) MSc PhD MIEnvSc FIAQM

Prof Laxen is the Managing Director of Air Quality Consultants, a company which he founded in 1993. He has over forty years' experience in environmental sciences and has been a member of Defra's Air Quality Expert Group and the Department of Health's Committee on the Medical Effects of Air Pollution. He has been involved in major studies of air quality, including nitrogen dioxide, lead, dust, acid rain, PM_{10}, $PM_{2.5}$ and ozone and was responsible for setting up the UK's urban air quality monitoring network. Prof Laxen has been responsible for appraisals of all local authorities' air quality Review & Assessment reports and for providing guidance and support to local authorities carrying out their local air quality management duties. He has carried out air quality assessments for power stations; road schemes; ports; airports; railways; mineral and landfill sites; and residential/commercial developments. He has also been involved in numerous investigations into industrial emissions; ambient air quality; indoor air quality; nuisance dust and transport emissions. Prof Laxen has prepared specialist reviews on air quality topics and contributed to the development of air quality management in the UK. He has been an expert witness at numerous Public Inquiries, published over 70 scientific papers and given numerous presentations at conferences. He is a Fellow of the Institute of Air Quality Management.

Penny Wilson, BSc (Hons) CSci MIEnvSc MIAQM

Ms Wilson is a Principal Consultant with AQC, with more than fifteen years' relevant experience in the field of air quality. She has been responsible for air quality assessments of a wide range of development projects, covering retail, housing, roads, ports, railways and airports. She has also prepared air quality review and assessment reports and air quality action plans for local authorities and appraised local authority assessments and air quality grant applications on behalf of the UK governments. Ms Wilson has arranged air quality and dust monitoring programmes and carried out dust and odour assessments. She has provided expert witness services for planning appeals and is a Chartered Scientist and Member of the Institute of Air Quality Management.

Full CVs are available at www.aqconsultants.co.uk.

A5 Background Concentrations

A5.1 The background concentrations across the study area have been defined using the national pollution maps published by Defra (2015a). These cover the whole country on a 1x1 km grid and are published for each year from 2011 until 2030. The maps include the influence of emissions from a range of different sources; one of which is road traffic. There is evidence that the current 'official' emissions factors published by Defra may over-predicted the rate at which road traffic emissions of nitrogen oxides will fall in the future. The maps currently in use were verified against measurements made during 2011 at a large number of automatic monitoring stations and so there can be reasonable confidence that the maps are representative of conditions during 2011. Similarly, there is reasonable confidence that the reductions which Defra predicts from other sectors (e.g. rail) will be achieved.

A5.2 In order to calculate background nitrogen dioxide and nitrogen oxides concentrations in 2015, it is assumed that there was no reduction in the road traffic component of backgrounds between 2011[7] and 2015. This has been done using the source-specific background nitrogen oxides maps provided by Defra (2015a). For each grid square, the road traffic component has been held constant at 2011 levels, while 2015 values have been taken for the other components. Nitrogen dioxide concentrations have then been calculated using the background nitrogen dioxide calculator which Defra (2015a) publishes to accompany the maps. The result is a set of 'adjusted 2015 background' concentrations.

A5.3 Two separate sets of 2017 background nitrogen dioxide and nitrogen oxides concentrations have been used for the future-year assessment. The 2017 background 'without emissions reduction' has been calculated using the same approach as described for the 2015 data: the road traffic component of background nitrogen oxides has been held constant at 2011 values, while 2017 data are taken for the other components. Nitrogen dioxide has then been calculated using Defra's background nitrogen dioxide calculator. The 2017 background 'with emissions reduction' assumes that Defra's revised predicted reductions occur from 2015 onward. This dataset has been derived first by calculating the ratio of the unadjusted mapped value for 2015 to the unadjusted mapped value for 2017. This ratio has then been applied to the adjusted 2017 value (as derived in Paragraph A5.2).

A5.4 For PM_{10} and $PM_{2.5}$, there is no strong evidence that Defra's predictions are unrealistic and so the year-specific mapped concentrations have been used in this assessment.

[7] This approach assumes that there has been no reduction in emissions per vehicle, but that traffic volumes have remained constant. This is not the same as the assumption made for dispersion modelling, in which emissions per vehicle are held constant while traffic volumes are assumed to change year on year. This discrepancy is unlikely to influence the overall conclusions of the assessment.

A6 'Air Quality Neutral'

A6.1 The GLA's SPG on Sustainable Design and Construction (GLA, 2014a), and its accompanying Air Quality Neutral methodology report (AQC, 2014), provide an approach to assessing whether a development is air quality neutral. The approach is to compare the expected emissions from the building energy use and the car use associated with the proposed development against defined emissions benchmarks for buildings and transport in London.

A6.2 The benchmarks for heating and energy plant (termed 'Building Emissions Benchmarks' or 'BEBs') are set out in Table A6.1, while the 'Transport Emissions Benchmarks' ('TEBs') are set out in Table A6.2. In order to assess against the TEBs, it is necessary to combine the expected trip generation from the development with estimates of average trip length and average emission per vehicle. So as to ensure a consistent methodology, the report which accompanies the SPG (AQC, 2014) recommends that the information in Table A6.3 and Table A6.4 (upon which the TEBs are based) is used. Similarly, the information in Table A6.5 may be used if site-specific information are not available (AQC, 2014).

Table A6.1: Building Emissions Benchmarks (g/m^2 of Gross Internal Floor Area)

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

Table A6.2: Transport Emissions Benchmarks

Land use	CAZ [a]	Inner [b]	Outer [b]
NOx (g/m^2/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/m^2/annum)			
Retail (A1)	29.3	39.3	42.9
Office (B1)	0.22	2.05	11.8
PM_{10} (g/dwelling/annum)			
Residential (C3,C4)	40.7	100	267

[a] Central Activity Zone

[b] Inner London and Outer London (as defined in the LAEI) (GLA, 2013)

Table A6.3: Average Distance Travelled by Car per Trip

Land use	Distance (km)		
	CAZ	Inner	Outer
Retail (A1)	9.3	5.9	5.4
Office (B1)	3.0	7.7	10.8
Residential (C3)	4.3	3.7	11.4

Table A6.4: Average Road Traffic Emission Factors in London in 2010 (AQC, 2014)

Pollutant	g/vehicle-km		
	CAZ	Inner	Outer
NOx	0.4224	0.370	0.353
PM_{10}	0.0733	0.0665	0.0606

Table A6.5: Average Emissions from Heating and Cooling Buildings in London in 2010 (AQC, 2014)

	Gas (kg/kWh)		Oil (kg/kWh)	
	NOx	PM_{10}	NOx	PM_{10}
Domestic	0.0000785	0.00000181	0.000369	0.000080
Industrial/Commercial	0.000194	0.00000314	0.000369	0.000080

A7 Air Quality and Planning Checklist

A7.1 The following sets outs the contents of the LB Camden Air Quality and Planning Checklist, and relevant responses (in bold) for this development:

Travel and Transport

1) If there will be parking in the development, will electric vehicle charging points be included?

N/A – No parking spaces included in the development

2) Will secure cycle storage be provided for users of the building?

Y – 54 cycle parking spaces will be provided

Energy

3) If a CHP is to be included, did you ensure that this technology is suitable for the energy requirements of the building? Please see Camden's Boiler Guidance Manual B for more information.

N/A – heating supplied from existing district heating scheme

4) If CHP is to be included, was this included within the air quality modelling in the AQA?

N/A – no CHP

Please note that if CHP modelling was not included due to the fact that the final CHP specification has not been decided, this will need to be clearly stated in the draft AQA, and the potential impact of the CHP will still need to be considered when assessing the exposure of occupants and/or locations of any ventilation inlets, if applicable. If full details of the CHP have not been included at Planning Application stage, Camden will impose a stringent Planning Condition for the CHP, which will include a requirement for modelling of the impact at all sensitive receptors. Please note that the report will also need to evidence that the CHP will conform to the latest (stringent) emissions limits outlined in the GLA's Draft Sustainable Design and Construction SPG.

5) If CHP will be included and the final technology agreed, have you ensured that it is the best in class in terms of NOx emissions?

N/A – no CHP

Please note that in addition to adhering to the Emission Limits outlined in the GLA Draft Sustainable Design and Construction SPG, Camden's aim is that all new CHPs will have a

"Negligible" impact at all identified receptors, as defined by the EPUK Best Practice Guidance. In your AQA, please outline how you have adhered to this.

Exposure

6) If located in an area of poor air quality and/or next to a busy road or diesel railway line, does the AQA include details of the way in which the building has been designed to reduce the exposure of occupants (e.g. through orientation, greening, placement of residential properties, or, only for developments in areas of very poor air quality, mechanical ventilation?)

Y – Pollutant concentrations are below relevant air quality objectives. Air intakes for mechanical ventilation are located away from Gordon Street.

If not, the AQA must be revised to include this information.

Construction Dust

7) Does the project have a Construction Management Plan written in accordance with the recommendations in the Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance, including an assessment of the risk? And, if the risk is High, a real time monitoring proposal?

Y - Risk assessment included in this assessment. The project is Medium Risk. Specific mitigation measures are recommended in Appendix A8.

If not, this must be provided.

Please return this form with your AQA with your Planning Application

A8 Construction Mitigation

A8.1 The following is a set of measures that should be incorporated into the specification for the works:

Site Management

- develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- develop a Dust Management Plan (DMP);
- display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary;
- display the head or regional office contact information;
- record and respond to all dust and air quality pollutant emissions complaints;
- make a complaints log available to the local authority when asked;
- carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the Local Authority when asked;
- increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions are being carried out and during prolonged dry or windy conditions; and
- record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and ensure that the action taken to resolve the situation is recorded in the log book.

Preparing and Maintaining the Site

- Plan the site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible;
- erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- avoid site runoff of water or mud;
- keep site fencing, barriers and scaffolding clean using wet methods;
- remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below;

- cover, seed, or fence stockpiles to prevent wind whipping;
- carry out regular dust soiling checks of buildings within 100 m of site boundary and cleaning to be provided if necessary;
- put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly;
- agree monitoring locations with the Local Authority; and
- where possible, commence baseline monitoring at least three months before phase begins.

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 the GLA's Control of Dust and Emissions During Construction and Demolition SPG. This outlines that, from 1st September 2015, all NRMM of net power 37 kW to 560 kW used on the site of a major development in Greater London must meet Stage IIIA of EU Directive 97/68/EC (Directive 97/68/EC of the European Parliament and of the Council, 1997) and its subsequent amendments as a minimum. NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IIIB of the Directive as a minimum. From 1st September 2020 NRMM used on any site within Greater London will be required to meet Stage IIIB of the Directive as a minimum, while NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IV of the Directive as a minimum;
- 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; and
- implement a Travel Plan that supports and encourages sustainable staff 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 recycled water where possible and appropriate;

- use enclosed chutes, 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; and
- 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; and
- avoid bonfires and burning of waste materials.

Measures Specific to 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);
- ensure water suppression is used during demolition operations;
- avoid explosive blasting, using appropriate manual or mechanical alternatives; and
- bag and remove any biological debris or damp down such material before demolition.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces), if possible;
- 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;
- 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; and
- for smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures Specific to Trackout

- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.