Air Quality Assessment:
Fortess Grove, London Borough of Camden

July 2015

Experts in air quality management & assessment

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Executive Summary

The air quality impacts associated with the construction and operation of the proposed mixed-use development at Fortess Grove in the London Borough of Camden have been assessed.

Existing air quality conditions have been described using the results of monitoring carried out by Camden Council and information published by Defra. 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 qualitatively assessed against criteria defined within the guidance developed jointly by Environmental Protection UK and the Institute of Air Quality Management. The expected 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 poor air quality, with concentrations of nitrogen dioxide exceeding the annual mean objective at the three roadside monitoring sites closest to the proposed development. The site lies within the borough-wide Air Quality Management Area.

The proposed development will be car-free and thus will not significantly increase traffic volumes on local roads. It is concluded that the impacts of the proposed development on local air quality will be insignificant.

Air quality conditions for residents within the proposed development have also been considered. Due to the location of the development site behind existing buildings, and as it is set back more than 30 m from the main road, pollutant concentrations across the site are expected to be below the air quality objectives, and air quality conditions for new residents will be acceptable.

Providing any new boilers meet the requirement of the Greater London Authority's Supplementary Planning Guidance on Sustainable Design and Construction, and emit <40 mg/kWh of nitrogen oxides, the proposed development will 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 mixed use development at Fortess Grove in the London Borough of Camden. The assessment has been carried out by Air Quality Consultants Ltd on behalf of The Estate Charity of Eleanor Palmer.

1.2 The proposed development will consist of part demolition and part retention of existing warehouse structures to create 1,131 m^2 of residential accommodation (9 properties in total) and 1,138 m^2 of commercial floor space (over 3 levels), together with associated landscaping. It lies within an Air Quality Management Area (AQMA) declared by the London Borough (LB) of Camden for exceedences of the annual mean nitrogen dioxide and daily mean PM_{10} objectives.

1.3 The development has the potential to give rise to dust emissions during the construction phase, and to increase traffic emissions once it is open. Both of these impacts have been considered, as have the air quality conditions that will be experienced by future residents of the development.

1.4 The air quality neutrality of the proposed development has also 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).

1.5 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.

1.6 This report has been prepared taking into account all relevant local and national guidance and regulations, and follows a methodology agreed with the London Borough of Camden.

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), 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. 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 in 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. 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 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

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. 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.

3 Assessment Approach

Consultation

3.1 The assessment follows a methodology agreed with the London Borough of Camden via a telephone discussion and subsequent email correspondence between Amy Farthing (Air Quality Officer at the London Borough of Camden) and Dr Ben Marner (Air Quality Consultants) held on 15th June 2015.

Existing Conditions

3.2 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.

3.3 Information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority. This covers both the study area and nearby sites, the latter being used to provide context for the assessment. 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, Measurements made during 2013 have been used to predict concentrations in 2016 following the methodology provided by (Defra, 2009). 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

3.4 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.

Road Traffic Impacts

3.5 The assessment compares the level of traffic expected to be generated by the proposal against criteria defined by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)[3] (EPUK & IAQM, 2015). This states that an air quality assessment of the impacts of the development on the local area, is likely to be necessary if any of the following apply:

"A change of LDV flows of:

- *more than 100 AADT within or adjacent to an AQMA*
- *more than 500 AADT elsewhere*

A change of HDV flows of:

- *more than 25 AADT within or adjacent to an AQMA*
- *more than 100 AADT elsewhere."*

3.6 Where these criteria are not breached, the potential for significant adverse impacts can be discounted without needing a more detailed quantitative assessment. Using the values defined by EPUK and IAQM (as set out above), it can be calculated that an increase in traffic of fewer than 100 LDV and 25 HDV vehicles per day, can be discounted as insignificant.

'Air Quality Neutral'

3.7 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).

3.8 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.

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

4 Site Description and Baseline Conditions

4.1 The proposed development site is located approximately 230 m to the north of Kentish Town train station, in the London Borough of Camden. The site is set back approximately 30 m from the A400 Fortess Road. The site is predominantly bounded by residential properties, with access via Railey Mews to the east and Fortess Grove (cul-de-sac) to the south west. It currently consists of a coach-works and old industrial/warehouse buildings in the northern portion of the site. There are existing residential properties on Fortess Grove which adjoin the on-site buildings. The Eleanor House residential block is within 5 m of the site boundary and there are further residential dwellings along Fortess Road and Railey Mews.

Industrial sources

4.2 A search of the UK Pollutant Release and Transfer Register (Defra, 2015d) 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 a borough wide AQMA for exceedences of the nitrogen dioxide and PM_{10} objectives and the proposed development is thus located within the AQMA.

Local Air Quality Monitoring

4.4 In 2013, Camden Council operated four automatic monitoring stations within its area. None of these are in close proximity to the proposed development site. The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Gradko International (using the 50% TEA in acetone method). These include one deployed on the A400 Kentish Town Road (CA16), and a tube on Chetwynd Road (CA24). Data for these sites have been provided by Camden Council.

4.5 Islington Council also operates a network of nitrogen dioxide monitoring using diffusion tubes prepared and analysed by Lambeth Scientific Services (using the 50% TEA in acetone method). Two of their sites (Junction Road and Lady Margaret Road) are located within one kilometre of the proposed development and thus the data is provided in this report for information.

4.6 Monitoring results for sites within one kilometre of the proposed development are summarised in Table 2, for the years 2009 to 2013. The monitoring locations are shown in Figure 1.

Table 2: Summary of Nitrogen Dioxide (NO_2) Monitoring (2009-2013) [a, b]

Site No.	Site Type	Location	2009	2010	2011	2012	2013
Diffusion Tubes - Annual Mean (µg/m^3)							
CA16	Roadside	Kentish Town Road	**68**	**74**	**57**	**59**	**65**
CA24	Roadside	Chetwynd Road	**50**	**68**	**44**	**44**	**48**
-	Roadside	Junction Road	**50**	**50**	**52**	**45**	**41**
-	Urban Background	Lady Margaret Road	39	37	35	34	33
Objective			**40**				

[a] Exceedences of the objectives are shown in bold

[b] All data relating to Camden have been taken from Camden Council's 2014 Progress Report (London Borough of Camden, 2014) and all data relating to Islington have been taken from Islington Council's 2014 Progress Report (London borough of Islington, 2014).

4.7 The results presented in Table 2 show that the annual mean nitrogen dioxide objective is exceeded at all roadside monitoring sites within one kilometre of the proposed development. In particular, concentrations at the Kentish Town Road monitoring site (CA16) are high enough to warrant concern of exceedences of the short-term nitrogen dioxide objective.

4.8 The proposed development is located approximately 300 m north of CA16, along the A400. However, the road appears to be less congested near the proposed development. Furthermore, the development site is situated approximately 30 m back from the roadside (with the nearest proposed residential property being approximately 35 m from the road) and behind existing buildings. Therefore, the concentrations measured at the roadside monitoring sites presented in Table 2 are not considered representative of conditions at the development site.

4.9 There are no clear trends in monitoring results from Camden Council for the past five years. This contrasts with the expected decline due to the progressive introduction of new vehicles operating to more stringent standards.

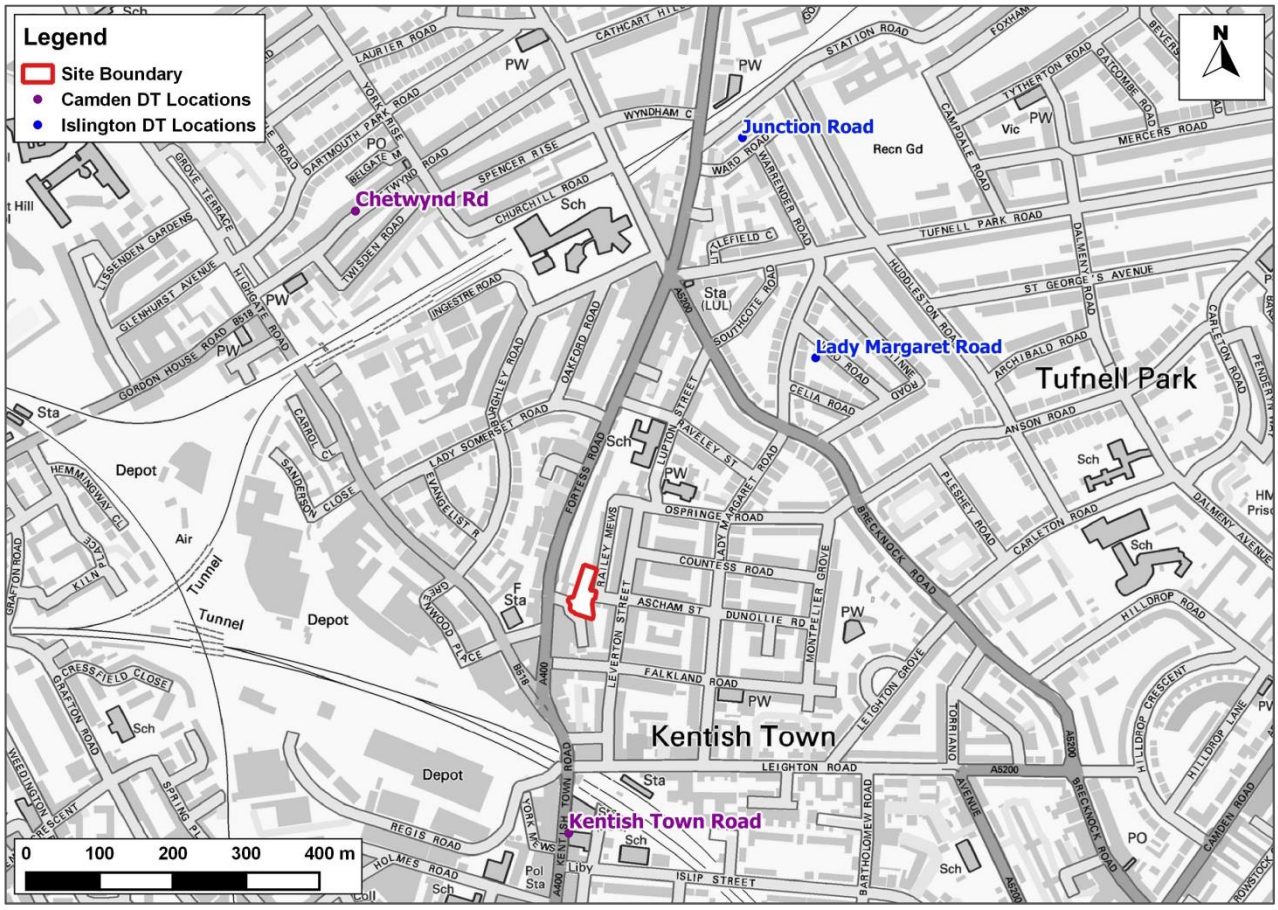

Figure 1: Monitoring Locations

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4.10 The Swiss Cottage kerbside automatic monitoring station, located adjacent to the A41/B511 junction in South Hampstead, approximately 2.5 km south west of the proposed development site, is the closest station which measured PM_{10} concentrations in 2013. Data capture was high (at 94%) and concentrations were consistently well below the objectives over the past five years. The annual mean PM_{10} concentration measured at Swiss Cottage in 2013 was 18 µg/m^3.

Exceedences of EU Limit Value

4.11 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. 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

4.12 In addition to these locally measured concentrations, estimated background concentrations in the study area have been determined for 2013 and the opening year 2016 (Table 3). 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 concentrations are all well below the objectives. Furthermore, the predicted background nitrogen dioxide concentration in 2013 compares well with the concurrent measurement at the Lady Margaret Road urban background monitoring site (as shown in Figure 1 and Table 2).

Table 3: Estimated Annual Mean Background Pollutant Concentrations in 2013 and 2016 (µg/m^3)

Year	NO_2	PM_{10}	$PM_{2.5}$
2013 [a]	33.8	23.2	15.9
2016 – Without Reductions in Traffic Emissions [b]	32.4	n/a	n/a
2016 – With Reductions in Traffic Emissions [c]	31.0	22.2	15.0
Objectives	**40**	**40**	**25**

n/a = not applicable

[a] This assumes that road vehicle emission factors in 2013 remain the same as in 2011 (See AppendixA5).

[b] This assumes that road vehicle emission factors in 2016 remain the same as in 2011.

[c] This assumes that road vehicle emission factors reduce between 2013 and 2016 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.

Potential Dust Emission Magnitude

Demolition

5.2 There will be a requirement to demolish some existing brick buildings with an approximate total volume of less than 20,000 m^3. The method of demolition has not yet been decided. Based on the example definitions set out in Table A2.1, the dust emission class for demolition is considered to be *small.*

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

Table 4: Summary of Soil Characteristics

Category	Record
Soil layer thickness	Deep
Soil Parent Material Grain Size	Argillaceous (0.06 – 2.0 mm)
European Soil Bureau Description	Prequaternary Marine/Estuarine Sand and Silt
Soil Group	Medium to Light (Silty) to Heavy
Soil Texture	Clay to Silt

5.4 The site covers some 1,700 m^2 and most of this will be subject to earthworks. The earthworks will involve some excavation and landscaping, and dust will arise mainly from vehicles travelling over unpaved ground. Based on the example definitions set out in Table A2.1, the dust emission class for earthworks is considered to be *small*.

Construction

5.5 Construction will involve 1,131.14 m^2 of residential accommodation (9 units) and 1,137.38 m^2 of commercial floor space. The total building volume is expected to be less than 25,000 m^3. Dust will arise from vehicles travelling over unpaved ground and the handling and storage of dusty materials. Based on the example definitions set out in Table A2.1, the dust emission class for construction is considered to be *small*.

Trackout

5.6 The number of vehicles accessing the site, which may track out dust and dirt is currently unknown, but given the small size of the site it is likely that there will be a maximum of under 10 outward heavy vehicle movements per day. Based on the example definitions set out in Table A2.1, the dust emission class for trackout is considered to be *small*.

5.7 Table 5 summarises the dust emission magnitude for the proposed development.

Table 5: Summary of Dust Emission

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

Sensitivity of the Area

5.8 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

5.9 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). There are approximately 45 residential properties within 20 m of the site (see Figure 2). Using the matrix set out in Table A2.3, the area surrounding the onsite works is of 'high' sensitivity to dust soiling. Table 5 shows that dust emission magnitude for trackout is 'low' 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 all possible routes could be affected. There are over 100 residential properties within 50 m of the roads along which material could be tracked (see Figure 3), and Table A2.3 thus indicates that the area is of 'high' sensitivity to dust soiling due to trackout. In summary, it is judged that the area surrounding the onsite works is of 'high' sensitivity to dust soiling, and the area surrounding roads along which material may be tracked from the site is also of 'high' sensitivity (Table 6).

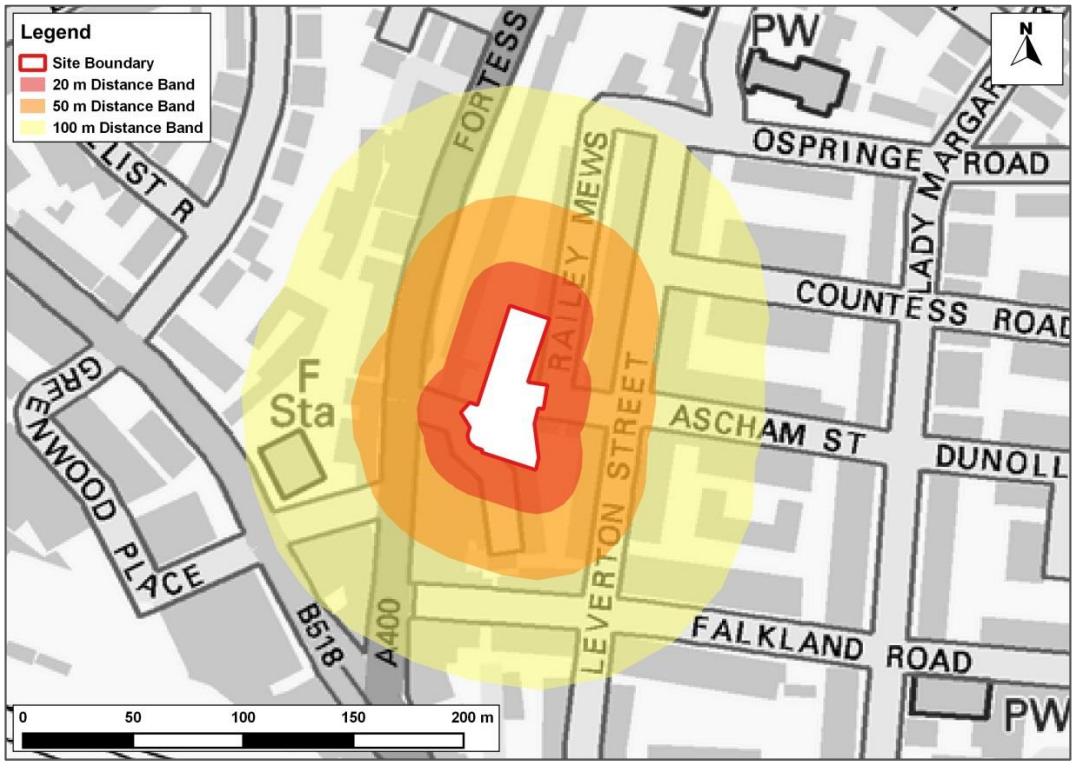

Figure 2: 20 m, 50 m and 100 m Distance Bands around Site Boundary

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Figure 3: 50 m Distance Bands around Roads Used by Construction Traffic Within 50 m of the Site Boundary

Contains Ordnance Survey data © Crown copyright and database right 2015

Sensitivity of the Area to any Human Health Effects

5.10 Residential properties 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. The existing annual mean PM_{10} concentration is best described by the background concentration from Table 3 and is less than 24 µg/m^3. Using the matrix in Table A2.4, the area surrounding the onsite works is of 'low' sensitivity to human health effects and the area surrounding roads along which material may be tracked from the site is also of 'low' sensitivity (Table 6).

Sensitivity of the Area to any Ecological Effects

5.11 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 6: 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	Low Sensitivity	Low Sensitivity
Ecological	None	None

Risk and Significance

5.12 The dust emission magnitudes in Table 5 have been combined with the sensitivities of the area in Table 6 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 7. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 7.

Table 7: Summary of Risk of Impacts Without Mitigation

Source	Dust Soiling	Human Health	Ecology
Demolition	Medium Risk	Negligible	None
Earthworks	Low Risk	Negligible	None
Construction	Low Risk	Negligible	None
Trackout	Low Risk	Negligible	None

5.13 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

Road Traffic Impacts

6.1 Cooley Architects has advised that the proposed development will not add to local traffic flows, as the development includes no provision for parking. There may be a small number of deliveries to the commercial unit, but these are unlikely to represent new trips that would not otherwise occur. Because the level of traffic generation is expected to be less than the 100 LDV and 25 HDV vehicles per day referred to in Paragraph 3.6, the local impacts are considered to be insignificant.

Impacts on the Development

6.2 As noted in Paragraph 4.2, there are no significant industrial emission sources in the vicinity that are likely to affect air quality for future occupants. The development will be set back more than 30 m from the main road and shielded by existing buildings (see Figure 1), thus concentrations are likely to be similar to the local background levels set out in Table 3. Concentrations for future residents will therefore be below the relevant objectives and air quality will be acceptable.

'Air Quality Neutral'

Building Emissions

6.3 The precise specifications of the energy plant for the development are unknown at this stage. However, it is anticipated that the residential (C3) dwellings will use mains gas combi boilers with radiators, and the commercial (A1/A2) unit will use Air Source Heat Pumps (ASHPs).

6.4 The ASHPs run on electricity and therefore have no associated on-site emissions of NO_X or PM_{10}. NRG consulting has advised that the residential units will be fitted with mains gas combi boilers and has provided the annual combustion energy use of the residential portion of the development. Paragraph 4.3.21 of the Sustainable Design and Construction SPG (GLA, 2014a) sets emission standards for gas-fired boilers:

"Where individual and/or commercial gas boilers are installed in commercial and domestic buildings, they should achieve a NOx rating of <40 mgNOx/kWh."

6.5 The boilers that will be installed within the development will thus have to meet this requirement. Based on the assumption that this emission standard is matched, but not improved upon, Table 8 sets out the calculated emissions for the development.

Table 8: Calculation of Building Emissions for the Development

	Description	Value	Reference
	Residential (C3)		
A	**Annual On-Site Combustion Energy Use of Residential Units (kWh/annum)**	76,760	NRG Consulting
B	**Maximum NOx Emissions from Boilers (mg/kWh)**	40	(GLA, 2014a)
	Commercial (A1/A2)		
C	**Annual On-Site Combustion Energy Use of Commercial Units (kWh)**	0	NRG Consulting
D	**Maximum NOx Emissions from Boilers (mg/kWh)**	40	(GLA, 2014a)
	Entire Development		
Total NOx Emissions (kg/annum)		**3.1**	(A x B + C x D) / 1,000,000

6.6 Appendix 6 shows the Building Emissions Benchmarks (BEBs) for each land use category. Table 9 shows the calculation of the BEBs for this development.

Table 9: Calculation of Building Emissions Benchmark (BEB) for the Development

	Description	Value	Reference
	Residential (C3)		
A	**Gross Internal Floor Area of Residential Units (m^2)**	1147	Cooley Architects
B	**NOx BEB for Residential Units (g/m^2/annum)**	26.2	Table A6.1
	Commercial (A1/A2)		
C	**Gross Internal Floor Area of Commercial Unit (m^2)**	1140	Cooley Architects
D	**NOx BEB for A1 Commercial Use (g/m^2/annum)**	22.6	Table A6.1
	Entire Development		
Total BEB NOx Emissions (kg/annum)		**55.8**	(A x B + C x D) / 1000

6.7 The Total Building NOx Emission of **3.1 kg/annum** is less than Total BEB NOx Emission of **55.8 kg/annum**. The proposed development is thus better than air quality neutral in terms of building emissions.

Road Transport Emissions

6.8 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.

6.9 Cooley Architects has advised that the proposed development is not expected to generate any car trips from either the residential apartments or commercial units. There will be some generation of traffic in the form of larger vehicles making deliveries to the commercial unit, however these are unlikely to represent new trips that would not otherwise occur and, in any event, the road transport emissions calculations are based on car trips only. As a result, the proposed development will meet the TEBs and is thus better than air quality neutral in terms of transport emissions.

Significance of Operational Air Quality Impacts

6.10 The operational air quality impacts are judged to be *insignificant*. This professional judgement is made in accordance with the methodology set out in Appendix A3, taking into account the factors set out in Table 10. More specifically, the judgement that the air quality impacts will be *insignificant* takes account of the assessment that the traffic-related impacts of the scheme will be insignificant, that air quality within the site will be below the objectives, and that the development will be better than air quality neutral.

Table 10: Factors Taken into Account in Determining the Overall Significance of the Scheme on Local Air Quality

Factors	Outcome of Assessment
The magnitude of the changes and the descriptions of the impacts at the receptors.	The impact of the scheme on offsite receptors will be insignificant.
Number of people affected by increases and/or decreases in concentrations and a judgement on the overall balance.	
The number of people exposed to levels above the objective, where new exposure is being introduced.	No people will be introduced to levels above the objectives.
Whether or not an exceedence of an objective is predicted to arise in the study area where none existed before or an exceedence area is substantially increased.	No new areas of exceedence of the objective are predicted.

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 and *Low* Risk during earthworks, construction and for trackout, as set out in Table 7. 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 A7.

7.3 The mitigation measures should be written into a dust management plan (DMP).

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 not identified any specific requirement to mitigate the operational traffic impacts of the development.

Good Design and Best Practice Measures

7.6 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:

- scheme design such that the most sensitive uses (residential) are the furthest from source of pollution (roads);
- setting back of the development buildings from roads by at least 5 m;
- setting back of the development buildings from the railway lines by at least 5 m;
- provision of pedestrian and cycle access to the new development, including cycle parking;

Air Quality Neutral

7.1 The air quality neutral policy is intended to minimise the cumulative impacts of many schemes throughout London. In terms of the building emissions from the operational development, it will be necessary for all new boilers to meet the requirement of the SPG on Sustainable Design and Construction and thus emit <40 mg/kWh of nitrogen oxides. It has been shown that, with such a boiler, the development will be better than air quality neutral in terms of building emissions.

7.2 The development has no adverse impact on local air quality, and the road traffic movements predicted for the scheme are not expected to cause the development to exceed the benchmark derived for an average development of this nature in inner London. As a result, no specific mitigation measures relating to the developments transport emissions have been identified.

8 Conclusions

8.1 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. These measures are described in Appendix A7. 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.

8.2 The proposed scheme will be car free and thus will not significantly increase traffic volumes on local roads and it is concluded that the impacts on local air quality will be insignificant.

8.3 The building and transport related emissions associated with the proposed development are both expected to below the relevant benchmarks. Providing appropriate boilers are installed in the residential units, the proposed development complies with the requirement that all new developments in London should be at least air quality neutral.

8.4 The overall operational air quality impacts of the development are thus judged to be *insignificant*.

8.5 The proposed development is consistent with the NPPF, with Policy 7.14 of the London Plan.

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10 Glossary

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System model for Roads
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
BEB	Building Emissions Benchmark
CHP	Combined Heat and Power
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
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LB	London Borough
LDF	Local Development Framework
LDV	Light Duty Vehicles (<3.5 tonnes)
LEZ	Low Emission Zone
$\mu g/m^3$	Microgrammes per cubic metre
MAQS	Mayor's Air Quality Strategy
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
TEB	Transport Emissions Benchmark

11 Appendices

A1 Extracts from the London Plan and Mayor's Air Quality Strategy, and Description of the Low Emission Zone (LEZ) 33
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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. These receptor sensitivities are then used in the matrices set out in Table A2.3, Table A2.4 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

Stephen Moorcroft, BSc (Hons) MSc DIC MIEnvSc MIAQM CEnv

Mr Moorcroft is a Director of Air Quality Consultants, and has worked for the company since 2004. He has over thirty-five years' postgraduate experience in environmental sciences. Prior to joining Air Quality Consultants, he was the Managing Director of Casella Stanger, with responsibility for a business employing over 100 staff and a turnover of £12 million. He also acted as the Business Director for Air Quality services, with direct responsibility for a number of major Government projects. He has considerable project management experience associated with Environmental Assessments in relation to a variety of development projects, including power stations, incinerators, road developments and airports, with particular experience related to air quality assessment, monitoring and analysis. He has contributed to the development of air quality management in the UK, and has been closely involved with the LAQM process since its inception. He has given expert evidence to numerous public inquiries, and is frequently invited to present to conferences and seminars. He is a Member of the Institute of Air Quality Management.

Dr Ben Marner, BSc (Hons) PhD CSci MIEnvSc MIAQM

Dr Marner is a Technical Director with AQC, and has over fifteen years' experience in the field of air quality. He has been responsible for air quality and greenhouse gas assessments of road schemes, rail schemes, airports, power stations, waste incinerators, commercial developments and residential developments in the UK and abroad. He has been an expert witness at several public inquiries, where he has presented evidence on health-related air quality impacts, the impacts of air quality on sensitive ecosystems, and greenhouse gas impacts. He has extensive experience of using detailed dispersion models, as well as contributing to the development of modelling best practices. Dr Marner has arranged and overseen air quality monitoring surveys, as well as contributing to Defra guidance on harmonising monitoring methods. He has been responsible for air quality review and assessments on behalf of numerous local authorities. He has also developed methods to predict nitrogen deposition fluxes on behalf of the Environment Agency, provided support and advice to the UK Government's air quality review and assessment helpdesk, Transport Scotland, Transport for London, and numerous local authorities. He is a Member of the Institute of Air Quality Management and a Chartered Scientist.

Dr Ann McDonagh, BSc (Hons) PhD MIOP

Dr McDonagh is a Consultant with AQC. Prior to joining AQC in 2014, she spent eight years in academia where she conducted experimental research investigating the source, dispersion and fate of airborne hazardous particles. Her research encompassed a range of hazardous particles (such as radioactive or biological) in an array of different environments. She has designed and

performed numerous indoor air quality assessments, often within buildings with particularly sensitive occupants. She now conducts air quality and construction dust assessments of new developments, involving the analysis and interpretation of air quality data, as well as the preparation of review and assessment reports. Dr McDonagh is an active member of the Institute of Physics (IOP), the UK Indoor Environments Group (UKIEG), and the Aerosol Society (AS).

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 2013, it is assumed that there was no reduction in the road traffic component of backgrounds between 2011[7] and 2013. 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 2013 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 2016 background' concentrations.

[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 Construction Mitigation

A7.1 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;
- 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; and

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;
- install green walls, screens or other green infrastructure to minimise the impact of dust and pollution;
- 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;
- impose and signpost a maximum-speed-limit of 10 mph on surfaced haul routes and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the Local Authority, where appropriate);
- 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 Earthworks

- N/A

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;

Measures Specific to Trackout

- Regularly use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site;
- avoid dry sweeping of large areas;
- ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;