156-164 GRAY'S INN ROAD/PANTHER HOUSE, LONDON
Air Quality Assessment

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Date: November 2015

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APPENDICES

REGISTRATION OF AMENDMENTS

Revision	Date	Amendment Details	Revision Prepared By	Revision Approved By

1.0 INTRODUCTION

1.1 Create Consulting Engineers Ltd has been commissioned by Panther House Developments Ltd to provide an Air Quality Assessment (AQA) in support of a full planning application at 156-164 Gray's Inn Road and Panther House.

1.2 The site is located within the administrative boundary of the London Borough of Camden, between Gray's Inn Road and Mount Pleasant. The proposed site location is illustrated in Figure 1.1 below.

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Figures 1: Site Location Plan

1.3 The proposed development is for the partial retention of the existing buildings with an addition of a new, mixed use and high quality contemporary building.

1.4 156 Gray's Inn Road is the only part of the overall site that is proposed for full removal; all other elements – Panther House, the Brain Yard shed and 160-164 Gray's Inn Road are retained, albeit altered and extended. It is proposed to retain the north and south end walls of the Brain Yard shed, but remove the east and west flank walls. Excavation will be undertaken to increase the height of existing basement. The western flank wall will be removed and reinstated, using salvaged material and replicating existing details in the wall. The Design & Access Statement explains the complex structural, constructional, cost, programme and safety reasons why it is necessary to do this.

1.5 The façade of 160-164 Gray's Inn Road will retrained while the building behind will be removed. The façade will be fully investigated when the building is vacant, by means of opening up its fabric in order to better understand its condition and the extent of repair required.

1.6 The space between 156 and 160-164 Gray's Inn Road is also retained, and what is at present a dead-end will be transformed into a new route from west to east through the site, creating new permeability and connection between Mount Pleasant and Gray's Inn Road and beyond. This is a central objective of the proposed scheme. Connected with this is the creation of a distinctive 'place' in this part of the borough, and the connection of a series of spaces within the urban block is part of achieving this. There is considerable opportunity for east-west pedestrian traffic to pass through the site by this means, thus helping to reinforce links between the emerging quarter around Mount Pleasant (and Exmouth Market beyond) with Bloomsbury and Holborn.

1.7 A new two-storey addition building will sit above the reinstated Brain Yard shed, visibly contained with in the masonry volume of the shed and thus allowing the original structure to read beneath the new intervention.

1.8 38 Mount Pleasant (Panther House) will be reconfigured internally, and additional floors will be added. As with Brain Yard, the additions will be in a contemporary style, contrasting with the retained buildings. The Design & Access Statement illustrates the careful selection of materials for the new elements of the scheme: on Gray's Inn Road, the primary structure of the new building above 156 and 160-164 Gray's Inn Road will be in precast concrete, and the new 'building' to replace 156 Gray's Inn Road will be in a similar material. In Brain Yard and Panther House, metal and glass will be used for the new floors above the brickwork mass of the existing building.

1.9 The following AQA has been undertaken in accordance with guidance set out by the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) to assess any likely air quality impacts associated with the proposed development upon the surrounding area and whether the site location can be considered as suitable for the proposed use.

1.10 In the event that potential impacts are identified, specific mitigation measures will be recommended in order to help safeguard the health and well being of existing and future occupiers of the site and surrounding area.

1.11 The assessment has been based on drawings prepared by Alfford Hall Monaghan Morris in 2015.

2.0 LEGISLATION AND POLICY CONTEXT

National Legislation

The Air Quality Strategy

2.1 European Union (EU) legislation forms the basis for UK air quality policy, the legislation has been developed in response to the identification of the relationship between air pollution and adverse effects upon human health and ecosystems. The EU Framework Directive 96/62/EC[1] on ambient air quality assessment and management came into force in November 1996 and had to be implemented by Member States by May 1998. The Directive aims to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

2.2 Directive 96/62/EC and the three daughter Directives that followed were combined to form Council Directive 2008/50/EC[2] on Ambient Air Quality and Cleaner Air for Europe, that came into force in June 2008.

2.3 The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales & Northern Ireland[3], originally adopted in 1997[4], reissued in 2000[5], and amended in 2003[6]. It has been set out in accordance with the requirements of Part IV of the Environment Act (1995)[7]. The AQS sets standards and objectives for pollutants to protect human health, vegetation and ecosystems. The AQS sets out a framework for Local Authorities to reduce adverse health effects from air pollution and ensures that international commitments are met (the Local Air Quality Management system).

2.4 Air quality objectives and limit values that currently apply in the United Kingdom can be divided into four groups:

- United Kingdom air quality objectives set down in regulations for the purpose of Local Air Quality Management (LAQM);
- United Kingdom national air quality objectives not included in regulations;
- European Union (EU) Limit Values transcribed into United Kingdom legislation; and
- Guidelines: e.g. World Health Organization (WHO) guidelines.

[1] European Parliament (1996). Council Directive 96/62/EC on ambient air quality assessment and management.

[2] European Parliament (2008). Council Directive 2008/50/EC on ambient air quality and cleaner air for Europe.

[3] Department for Environment, Food and Rural Affairs (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Island. HMSO, London.

[4] Department of the Environment (1997). The UK National Air Quality Strategy. HMSO, London.

[5] Department of the Environment, Transport and the Regions (2000). The Air Quality Strategy for England, Scotland, Wales and Northern Island. HMSO, London.

[6] Department of the Environment, Transport and the Regions (2003). The Air Quality Strategy for England, Scotland, Wales and Northern Island: Addendum. HMSO, London.

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

2.5 The current air quality standards and objectives are presented in Table 2.1. The standards and objectives relevant to the LAQM framework have been developed through the Air Quality (England) Regulations (2000)[8] and the Air Quality (England) (Amendment) Regulations 2002[9]; with the Air Quality Standards Regulations 2010[10] implementing the EU Directive 2008/50/EC.

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	5 µg m^{-3}	Annual mean	31/12/2010
1, 3 Butadiene	2.25 µg m^{-3}	Running annual mean	31/12/2003
Carbon Monoxide	10 mg m^{-3}	Maximum daily running 8-hour mean	31/12/2003
Lead	0.25 µg m^{-3}	Annual mean	31/12/2008
Nitrogen Dioxide (NO_2)	200 µg m^{-3}	1-hour mean not to be exceeded more than 18 times per year	31/12/2005
	40 µg m^{-3}	Annual mean	31/12/2005
Particles (PM_{10})	50 µg m^{-3}	24-hour mean not to be exceeded more than 35 times per year	31/12/2004
	40 µg m^{-3}	Annual mean	31/12/2004
Particles ($PM_{2.5}$)	25 µg m^{-3}	Annual mean (target)	2020
	15% cut in annual mean (urban background exposure)		2010 - 2020
Sulphur Dioxide (SO_2)	350 µg m^{-3}	1-hour mean not to be exceeded more than 24 times a year	31/12/2004
	125 µg m^{-3}	24-hour mean not to be exceeded more than 3 times a year	31/12/2004
	266 µg m^{-3}	15-minute mean not to be exceeded more than 35 times a year	31/12/2005

Table 2.1: Air Quality Strategy Objectives (England)

2.6 The LAQM Technical Guidance (2009)[11] outlines the review and assessment process to be followed by Local Authorities in relation to air quality. If following a detailed assessment, a Local Authority considers that one or more of the air quality objectives is not being met, an Air Quality Management Area (AQMA) must be declared.

2.7 In response to the issuing of an AQMA, an Air Quality Action Plan (AQAP) must be submitted within 12 - 18 months by the Local Authority setting out the measures intended to reach the exceeded air quality objectives.

[8] UK Parliament (2000). Air Quality (England) Regulations 2000, SI 2000/928. HMSO, London

[9] UK Parliament (2002) The Air Quality (England) (Amendment) Regulations 2002, SI 2002/3043. HMSO, London.

[10] UK Parliament (2010). The Air Quality Standards Regulations 2010, SI 2010/1001. HMSO, London.

[11] Department of Environment, Food and Rural Affairs (2009). Local Air Quality Management Technical Guidance, TG (09). HMSO, London.

The National Planning Policy Framework (2012)

2.8 In March 2012 the Department of Communities and Local Government published the National Planning Policy Framework (NPPF)[12]. The purpose of the framework is to help achieve sustainable development within the planning sector. Section 11 of the policy refers to the conservation and enhancement of the natural environment, and identifies air pollution as a development risk.

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

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

2.10 The NPPF states that planning policies should take into account the presence of any AQMAs and the cumulative impact of individual sites whilst maintaining compliance with the LAQM procedure, and states that *'Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan'.*

Planning Policy Guidance (2014)

2.11 The National Planning Policy Guidance (NPPG)[13] details the instances when air quality would be relevant to a planning application. Considerations could include whether a development would:

- *'Generate or increase traffic volumes or congestion, changing vehicle speeds;*
- *Introduce new sources of air pollution;*
- *Expose people to existing sources of air pollution;*
- *Give rise to unacceptable impacts during construction for sensitive receptors; and*
- *Affect biodiversity by deposition or concentration of pollutants.'*

2.12 The NPPG provides guidance for the completion of air quality assessments, stating the importance of an assessment to be location specific, and being *'proportionate to the nature and scale of development proposed and the level of concern about air quality.'*

2.13 The mitigation measures necessary for a development are stated to be *'location specific, depend on the proposed development and should be proportionate to the likely impact.'*

[12] Department of Communities and Local Government (2012). National Planning Policy Framework. HMSO, London.

[13] Department for Communities and Local Government (2014). National Planning Policy Guidance. HMSO, http://planningguidance.planningportal.ov.uk/

Regional Planning Policy

The London Plan (2015)

2.14 The London Plan, Further Alterations London Plan (FALP)[14] was adopted in March 2015 and contains updated guidance for air quality and planning decisions under Policy 7.14.

2.15 Policy 7.14 Improving Air Quality states that:

> *'The Mayor recognises the importance of tackling air pollution and improving air quality to London's development and the health and well-being of its people. He will work with strategic partners to ensure that the spatial, climate change, transport and design policies of this plan support implementation of his Air Quality and Transport strategies to achieve reductions in pollutant emissions and minimize public exposure to pollution.'*
>
> *'Development proposals should:*
>
> - *minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plan;*
> - *promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition';*
> - *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));*
> - *ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches; and*

[14] Greater London Authority FALP (2015). The London Plan: Spatial Development Strategy for Greater London FALP. GLA, London.

- *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'.*

2.16 Poor air quality is a public health issue that is linked to the development of chronic diseases and can increase the risk of respiratory illness. Action is needed to improve air quality in London and the Mayor is committed to working towards meeting the EU limit values of fine particulate matter (PM_{10}) by 2011 and nitrogen dioxide (NO_2) by 2015.

2.17 Increased exposure to existing poor air quality should be minimised by avoiding the introduction of potentially new sensitive receptors in locations where they will be affected by existing sources of air pollution (such as road traffic and industrial processes). Particular attention should be paid to development proposals such as housing, homes for elderly people, schools and nurseries. Where additional negative air quality impacts from a new development are identified, mitigation measures will be required to ameliorate them.

The Mayors Air Quality Strategy (2010)

2.18 Cleaning the Air: The Mayor's Air Quality Strategy[15] within Chapter 4 outlines a number of policies relating to new developments and pollutant emissions.

2.19 Policy 6 Reducing emissions from construction and demolition sites:

'The Mayor will work with London Boroughs, the GLA group and the construction industry to encourage implementation of the Best Practice Guidance for construction and demolition sites across London.'

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

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

[15] Greater London Authority (2010). Clearing the Air: The Mayor's Air Quality Strategy. GLA, London.

Local Planning Policy

Camden Core Strategy 2010-2025

2.21 Section 3 - A sustainable and attractive Camden – Tackling climate change and improving and protecting Camden's environment and quality of life. Policy CS16 – Improving Camden's health and well-being, states the following:

"The Council will seek to improve health and well-being in Camden. We will:
(...) e) recognise the impact of poor air quality on health and implement Camden's Air Quality Action Plan which aims to reduce air pollution levels."

Camden Development Policies 2010 – 2025 – Local Development Framework

2.22 Policy DP32 – Air quality and Camden's Clear Zone, states the following:

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

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

Camden Planning Guidance 6: Amenity Supplementary Document

2.23 Camden Planning Guidance has been prepared to support the policies in the Local Development Framework (LDF). Section 2 - Air Quality states the following:

"*The Council's overarching aim is for new development is to be 'air quality neutral' and not lead to further deterioration of existing poor air quality.*

You will be required to include mitigation and offsetting measures to deal with any negative air quality impacts associated with your development proposals. At the same time your development should be designed to minimise exposure of occupants to existing poor air quality. To manage and prevent further deterioration of air quality in Camden, we will require an air quality assessment with planning applications 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 PM10 emissions.

An air quality assessment will also be required for a proposal if it introduces uses that are susceptible to poor air quality, such as housing or a school, into areas of particularly poor air quality.

The Council will not grant planning permission for developments that could significantly harm air quality or introduce people into areas of elevated pollution concentrations, unless mitigation measures are adopted to reduce the impact to acceptable levels and protect public exposure (see paragraph 32.4 of policy DP32 of the Camden Development Policies).

Although all of Camden is covered by an AQMA we will only require an air quality assessment where development could potentially cause significant harm to air quality as set out in the table below."

An Air Quality Assessment is required in developments:

- with potential to significantly change road traffic on any road exceeding 10,000 vehicles per day. Significant changes include:
  - increase in traffic volumes > 5% (Annual Average Daily Traffic (AADT) – or peak);
  - lower average vehicle speed or significant increase in congestion;
  - significant increase in the percentage of HGVs;
- that introduce, or increase car parking facilities by, 100 spaces or more;
- with commercial floorspace of more than 1,000sq m;
- with more than 75 homes;
- where people will be exposed to poor air quality for significant periods of the day, in particular developments located on busy roads;
- involving the following - biomass boilers, biomass or gas combined heat and power (CHP);
- involving industrial or commercial floorspace regulation under the Environmental Permitting (England and Wales) Regulations (EPR) which will be subject to Environmental Assessment under the Town and Country Planning (Environmental Impact Assessment) Regulations 1999.

Draft Camden Local Plan 2015

2.24 Camden Council is reviewing its main planning policies and has consulted on a draft Local Plan. This took into account feedback from initial engagement, a series of evidence studies and national policy and legislation. When finalised, the Local Plan will replace the current Core Strategy and Camden Development Policies documents as the basis for planning decisions and future development in the borough.

2.25 Section 8 – Sustainability and Climate Change, Policy CC$ - Air Quality states the following:

"The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of a development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan.

Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution. Where the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless mitigation measures are adopted to reduce the impact to acceptable levels. Similarly, developments in locations of poor air quality will not be acceptable unless designed to mitigate the impact to within acceptable limits.

Development which involves significant demolition, construction or earthworks will also be required to assess the risk of impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan.

The Council will only grant planning permission for development in Camden's Clear Zone region that significantly increases travel demand where it considers that appropriate measures to minimise the transport impact of development are incorporated."

2.26 Under same section it adds the following important information that needs to be considered:

"Any development which involves significant demolition, construction or earthworks will be required to assess the risk of impacts according to Institute of Air Quality Management Dust Guidance. Mitigation measures appropriate to the risk should be included in the Construction Management Plan. All high risk sites must include real time construction dust monitoring and all medium risk sites to include monitoring where considered necessary.

In order to help reduce air pollution and adhere to regional planning policy, developments must demonstrate that they comply with the 'Air Quality Neutral' policy outlined in the GLA Sustainable Design and Construction SPG.

In Central London, one of the most significant sources of air pollution is domestic and commercial boilers, which are a key source of NO2 (around 40%) and a small source of PM10. This can be reduced through energy efficiency and by ensuring new boilers are Ultra Low Nitrogen Oxide (NOx) (<40 mg/kWh). There are serious air quality implications for the use of Combined Heat and Power (CHP) Plants and Biomass Boilers. Consequently the use of biomass as a renewable energy source will be the Council's least preferred option for the provision of renewable energy. We will expect developments to focus on energy

efficiency and an efficient energy supply. CHP will only be accepted if it shown to be the most appropriate choice, it must also be of the highest standard in terms of NOx emissions and it must adhere to the latest emissions standards contained in the Mayor's Supplementary Planning Guidance 'Sustainable Design and Construction'. An AQA with full dispersion modelling is required for all proposed Biomass and CHP boilers and this must demonstrate that its impact on nearby receptors is minimal.

3.0 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

3.1 This section outlines the assessment methodology and the criteria that have been used to assess the significance of risk associated with the proposed development.

Data Sources

3.2 The key data sources reviewed as part of this study are listed in Table 3.1 below.

Data Source	Reference
Department for Environment, Food and Rural Affairs (Defra)	Defra (2009). LAQM Technical Guidance, TG (09)
	Defra (2011). LAQM Background Maps - 1 x 1 km grid background maps for NO_x, NO_2, PM_{10} and $PM_{2.5}$ (2011-2030)
Environmental Protection UK (EPUK)	EPUK (2010). Development Control: Planning For Air Quality (2010 Update)
Institute of Air Quality Management (IAQM)	IAQM (2014). Guidance on the assessment of dust from demolition and construction
Greater London Authority (GLA)	GLA (2006) The control of dust and emissions from construction and demolition: Best Practice Guidance
	GLA (2013). The Control of Dust and Emissions during Construction and Demolition (Draft published for consultation)
	GLA (2015). The London Plan FALP: Spatial Development Strategy for Greater London
	GLA (2010). Clearing the Air: The Mayor's Air Quality Strategy
Department for Transport (DfT) Highways Agency	Highways Agency (2007). Design Manual for Roads and Bridges (DMRB), Volume 11: Environmental Assessment, Section 3: Environmental Assessment Techniques, Part 1, HA 207/07
	Highways Agency (2013). Interim Advice Note 170/12 v3: Updating air quality advice of the future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality'
The London Borough of Camden	Camden Core Strategy 2010-2025 Camden Development Policies 2010 – 2025 – Local Development Framework Camden Planning Guidance 6: Amenity Supplementary Document Draft Camden Local Plan 2015
	Air Quality Progress Report for London Borough of Camden 2014 Camden's Clean Air Action Plan 2013 - 2015

Table 3.1: Key Information Sources

Scope of Air Quality Assessment

3.3 The following document assesses the suitability of the site for the proposed development and whether any significant air quality impacts are expected as a result of the construction and operation of the proposed development.

3.4 A staged assessment approach has been adopted. This ensures that the approach taken for the assessment of risk is proportional to the risk of an unacceptable impact being caused. Where a simple review of the impacts associated with the proposed development shows that the risk of a health/annoyance impact is negligible, this will be sufficient and no further assessment will be undertaken.

3.5 In cases where the risk involved cannot be regarded as insignificant, a more detailed and quantitative assessment will be undertaken.

3.6 The methodology used in this assessment is presented in the following sections.

Dust Assessment

3.7 Potential dust impacts associated with construction activities have been assessed in accordance with guidance from the Institute of Air Quality Management (IAQM)[16] and the Greater London Authority (GLA)[17] best practice documents. The IAQM provides guidance on a five step process to assess the potential impacts of construction dust pre-mitigation, provide mitigation measures specific to the risk and assess the post-mitigation impacts.

3.8 The assessment procedure follows the following framework:

- Screen the requirement for a more detailed assessment;
- Assess the risk of dust impacts of the four phases of construction (demolition, earthworks, construction and trackout), taking into account:
  - the scale and nature of the works, which determines the potential Dust Emission Magnitude; and
  - the sensitivity of the area.
- Determine the site-specific mitigation for the potential activities;
- Examine the residual effects and determine whether or not these are significant; and
- Prepare the Construction Dust Assessment.

3.9 In the process for defining the sensitivity of an area/receptor, the following guidance has been used.

[16] Institute of Air Quality Management (2014). Guidance on the assessment of dust from demolition and construction. IAQM, London.

[17] Greater London Authority and London Councils (2006). The Control of dust and emissions from construction and demolition: Best Guidance Practice. GLA, London.

Sensitivity of Area	Human Receptors	Ecological Receptors
High	Very densely populated area, 10-100 dwellings within 20m of site. Annual mean concentrations of PM_{10} close to/in exceedence of the national objective (40 µg m^{-3}). Very sensitive receptors (e.g. residential properties, hospitals, schools, care homes).	Internationally or nationally designated site, the designated features may be affected by dust soiling. A location where there is dust sensitive species present.
Medium	Densely populated area, 1-10 dwellings within 20m of site. Annual mean concentrations of PM_{10} below the national objective (> 28 µg m^{-3}). Medium sensitivity receptors (e.g. office and shop workers).	Nationally designated site where the features may be affected by dust deposition. A location with a particularly important plant species where its dust sensitivity is unknown.
Low	Sparsely populated area, 1 dwelling within 20m of site. Annual mean concentrations well below the national objectives (< 28 µg m^{-3}). Low sensitivity receptors (e.g. public footpaths, playing fields, shopping streets).	Locally designated site where the features may be affected by dust deposition.

Table 3.2: IAQM Factors for Defining the Sensitivity of an Area

Traffic Exhaust Emissions

3.10 The assessment of traffic impacts has been carried out in accordance with the UK Design Manual for Roads and Bridges (DMRB)[18] and Highways Agency Interim Advisory Note 170/12[19] which specify the following road assessment criteria:

'Affected roads are those that meet any of the following criteria:

- *road alignment will change by 5m of more; or*
- *daily traffic flows will change by 1,000 AADT or more; or*
- *Heavy Duty Vehicles (HDV) flows will change by 200 AADT or more; or*
- *daily average speed will change by 10 kph or more; or*
- *peak hour speed will change by 20 kph or more.*

If none of the roads in the network meet any of the traffic/alignment criteria or there are no properties or relevant Designated Sites near the affected roads, then the impact of the

[18] Department for Transport (2007).Design Manual for Roads and Bridges (DMRB), Volume 11: Environmental Assessment, Section 3: Environmental Assessment Techniques. HMSO, London.

[19] Highways Agency (2013). Interim Advice Note 170/12 v3 Updated air quality advice on the assessment of future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1 Air Quality. HMSO, London.

scheme can be considered to be neutral in terms of local air quality and no further work is needed.'

3.11 In addition to the above DMRB guidance, the EPUK and IAQM have produced the following criteria to also help establish indicative criteria when to trigger the requirement for an air quality assessment.

The Development will:	Indicative Criteria to Proceed to an Air Quality Assessment
1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on roads with relevant receptors.	A change of LDV flows of: • more than 100 vehicles per day (vpd) within or adjacent to an AQMA or within 100m of an internationally or nationally designated habitat; and • more than 500 vpd elsewhere. Coupled with relevant receptors within: • 10m of roads with AADT flows 5,000 to 10,000 vpd; • 20m of roads with AADT flows 10,000 to 30,000 vpd; and • 30m of roads with AADT flows > 30,000 vpd.
2. Cause a significant change in Heavy Duty Vehicles (HDV) flows on local roads with relevant receptors.	A change of HDV flows of: • more than 25 vpd within or adjacent to an AQMA or within 100m of an internationally or nationally designated habitat; and • more than 100 vpd elsewhere. Coupled with relevant receptors within: • 10m of roads with AADT flows 5,000 to 10,000 vpd; • 20m of roads with AADT flows 10,000 to 30,000 vpd; and • 30m of roads with AADT flows > 30,000 vpd.
3. Cause a significant change in road alignment bringing roads closer to relevant receptors.	Where relevant receptors will be within: • 10m of roads with AADT flows 5,000 to 10,000 vpd; • 20m of roads with AADT flows 10,000 to 30,000 vpd; and • 30m of roads with AADT flows > 30,000 vpd.
4. Introduce a new junction near to relevant receptors.	The junction will cause vehicles to slow down and accelerate, e.g. traffic lights. Coupled with relevant receptors within 50m of the junction.
5. Introduce or change a bus station.	Where bus flows will be: • more than 25 vpd within or adjacent to an AQMA; and • more than 100 vpd elsewhere. Coupled with relevant receptors within: • 50m of the buses within the bus station.
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).
7. Have one or more substantial combustion processes.	Where the combustion unit is: • any centralised plant using biomass fuel; • a CHP unit > 15kWe; • any other combustion plant with thermal input > 400kW_{th}; and • a standby emergency generator associated with a centralised energy centre.

The Development will:	Indicative Criteria to Proceed to an Air Quality Assessment
Note – Where distances from the road are presented, they are from the edge of the nearest carriageway to the nearest relevant receptor, taking account of vertical and horizontal dimensions. Where traffic flows are presented they are Annual Average Daily Traffic (AADT) in vehicles per day (vpd). Wher HDV flows are specified, they include lorries and buses. Where LDV's are specified they include cars and vans (with a gross vehicle weight ≤ 3.5 tonnes).	

Table 3.3: EPUK & IAQM Indicative Criteria for Proceeding to an Air Quality Assessment

3.12 If any of the above criteria is met then the significance of air pollution impacts are to be quantified and the following procedure will be implemented.

3.13 The likely impact of changing traffic volumes upon air pollutant concentrations will be modelled, where required, using the DMRB Screening Method v1.03c with additional input from the Defra NO_x/NO_2 calculator and the Gap Analysis Methodology developed by the Highways Agency as part of IAN 170/12.

3.14 The transport inputs required for the use of DMRB are the existing Average Annual Daily Trip (AADT) data for the road link(s) being modelled, AADT data for the proposed opening year for scenarios of without the proposed development and with the proposed development, the average speed and the % of Heavy Duty Vehicles (HDVs) within the vehicular mix.

Operational Activities

3.15 A qualitative assessment of any likely impacts associated with any operational plant, will be completed based on the finding of the Energy Assessment produced for the same proposals. If necessary, mitigation measures will be recommended in order to minimise any detrimental impacts.

3.16 At this early stage, it is not usually possible to undertake a quantitative assessment of operational plant due to the detailed technical specifications required in order to undertake this work not being available yet.

Significance Criteria

3.17 In the event that the risk is assessed as significant, guidance is provided by the IAQM[20] and EPUK on how to determine any likely changes in air pollutant concentrations and/or exposure as a result of a proposed development.

[20] Institute of Air Quality Management (2009). Significance in air quality. IAQM, London.

3.18 The methodology provided by the EPUK guidance document has been followed to determine the significance of the impacts. This process takes the following into account:

- the magnitude of the change (% change of annual mean concentration);
- the concentration relative to the AQS objective (above or below the objective); and
- the direction of change (adverse or beneficial).

3.19 The magnitude of an impact should be described by using the EPUK criteria set out in Table 3.3 below, the criteria are based on the change in concentration resulting by the proposed development as a percentage of the assessment level.

Magnitude of Change	Annual Mean NO_2/PM_{10}	Days PM_{10} > 50 µg m^{-3}
Large	Increase/decrease >10% (>4 µg m^{-3})	Increase/decrease >4 days
Medium	Increase/decrease 5-10% (2-4 µg m^{-3})	Increase/decrease 2-4 days
Small	Increase/decrease 1-5% (0.4-2 µg m^{-3})	Increase/decrease 1-2 days
Imperceptible	Increase/decrease <1% (<0.4 µg m^{-3})	Increase/decrease <1 day

Table 3.3: Impact Magnitude for Changes in Relation to Concentration of NO_2 and PM_{10}

3.20 The descriptors of impact significance for the annual mean concentration for both NO_2 and PM_{10} that take account of the magnitude of changes for the proposed development based on guidance from EPUK are shown in Table 3.4 below.

Total Concentration Related to Objective/Limit Value	Change in Concentration		
	Small	Medium	Large
Increase With Scheme			
Above Objective/Limit Value with Scheme (>40 µg m^{-3})	Minor Adverse	Moderate Adverse	Major Adverse
Just Below Objective/Limit Value with Scheme (36-40 µg m^{-3})	Minor Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with Scheme (30-36 µg m^{-3})	Negligible	Minor Adverse	Minor Adverse
Well Below Objective/Limit Value with Scheme (<30 µg m^{-3})	Negligible	Negligible	Minor Adverse
Decrease With Scheme			
Above Objective/Limit Value with Scheme (> 40 µg m^{-3})	Minor Beneficial	Moderate Beneficial	Major Beneficial
Just Below Objective/Limit Value with Scheme (36-40 µg m^{-3})	Minor Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value with Scheme (30-36 µg m^{-3})	Negligible	Minor Beneficial	Minor Beneficial
Well Below Objective/Limit Value with Scheme (< 30 µg m^{-3})	Negligible	Negligible	Minor Beneficial

Table 3.4: Impact Descriptors for Changes to Annual Mean Concentration of NO_2 and PM_{10}

3.21 Once the magnitude of the change has been established, the impact at each relevant receptor needs to be described. The impact magnitude at each receptor location can be described using the changes stated above as Negligible, Minor, Moderate or Major, as either Adverse or Beneficial, and either Temporary or Permanent.

3.22 The overall significance should be described separately for both the impact of emissions related to the proposed development on existing receptors, and for the impacts of emissions from existing source(s) on new exposure being introduced from the proposed development.

3.23 Air quality is not well suited to the rigid application of generic significance matrix to determine the overall significance of a development. Professional judgement should be employed throughout, and the assessment should take into account site specific considerations.

4.0 BASELINE CONDITIONS

Local Air Quality Management

4.1 London Borough of Camden (LBC) has declared one Air Quality Management Area (AQMA) which encompasses the whole borough. This was declared as a result of exceedences of Nitrogen dioxide NO_2 - Annual Mean and Particulate Matter PM_{10} - 24-Hour Mean.

4.2 Camden AQMA is illustrated in figure 4.1 below.

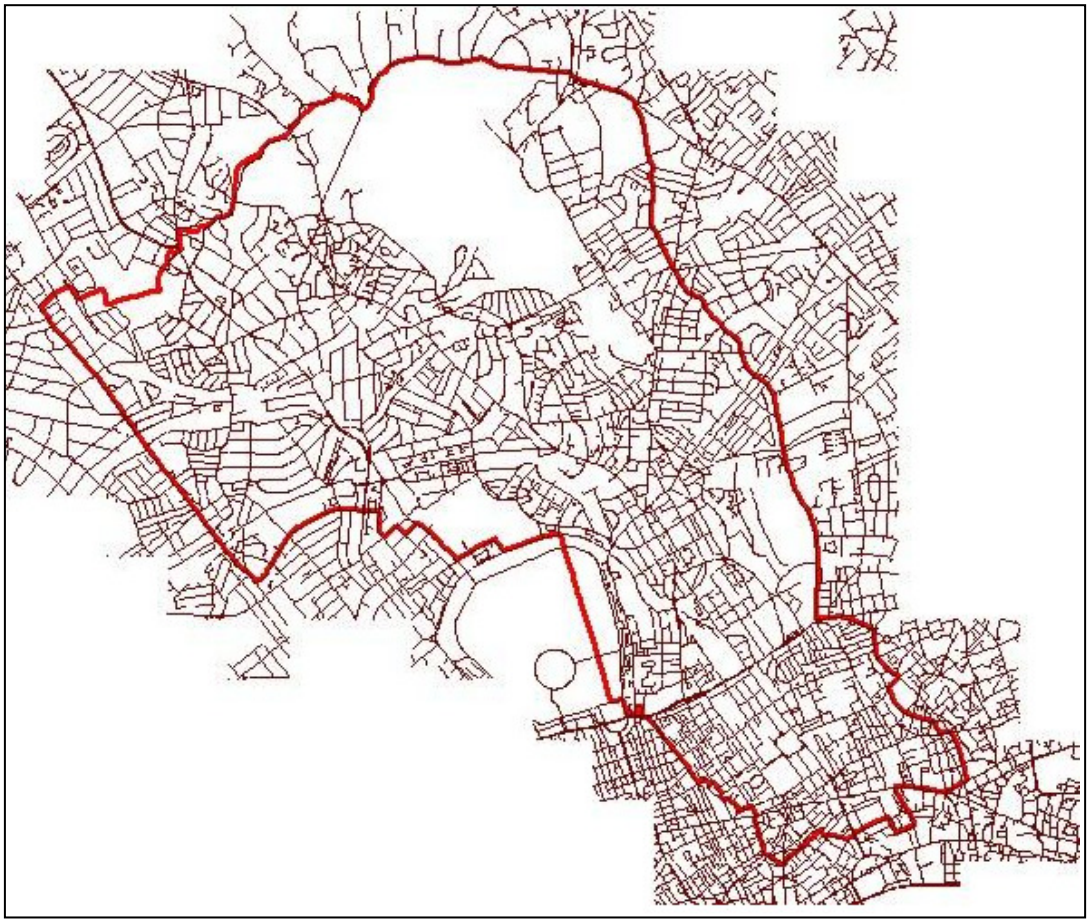

Figure 4.1: Camden AQMA

Modelled/ Monitored Concentrations

4.3 Modelled annual mean concentrations for NO_2 which have been based on 2010 measured data have been taken from The London Air website[21] and are presented in Figures 4.2 below.

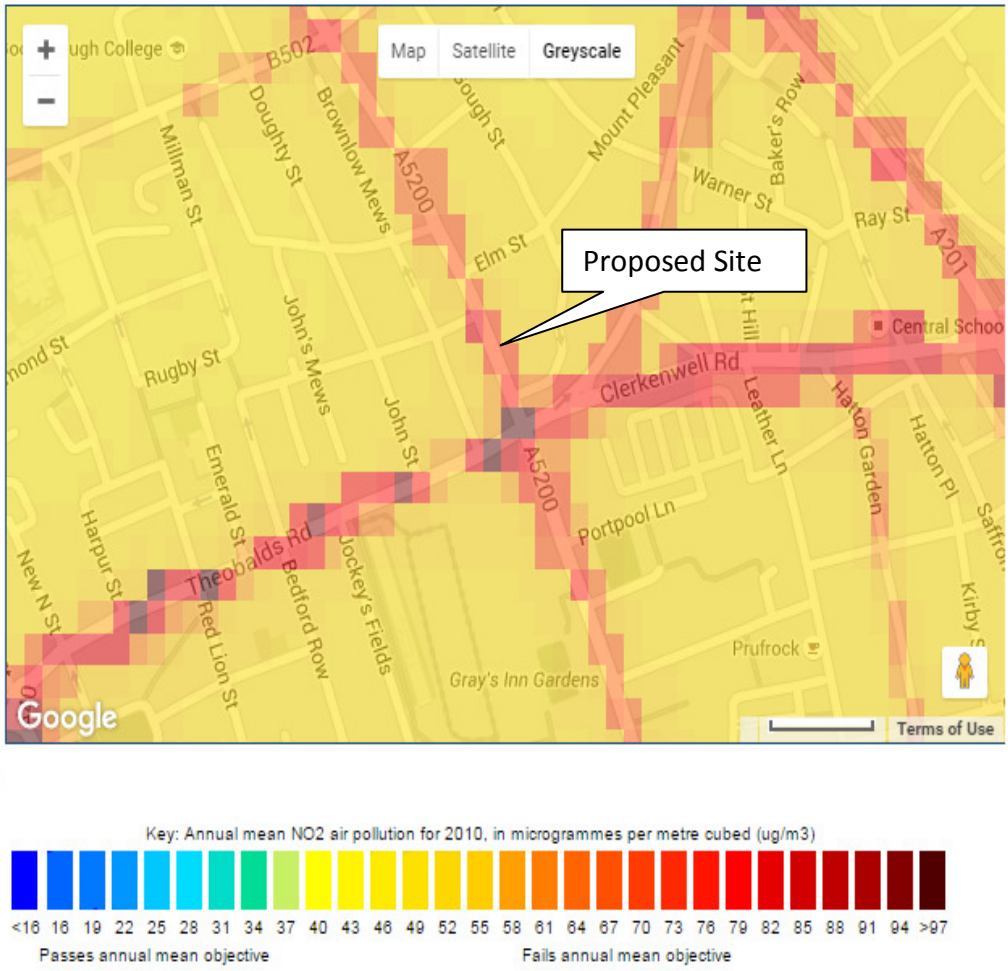

Figure 4.2: Modelled Annual Mean NO_2 Based on 2010 Measured Data

Source: http://www.londonair.org.uk/LondonAir/Default.aspx

4.4 It can be seen from the 2010 monitored data above that the proposed site is located in an area that is above the annual mean NO_2 objective (40 µg /m^3). Therefore, suitable mitigation measures will be required in order to ensure that acceptable indoor air quality is achieved.

4.5 Modelled annual mean concentrations for PM_{10} which have been based on 2010 measured data have been taken from The London Air website and are presented in Figure 4.3 below.

[21] www.londonair.org.uk

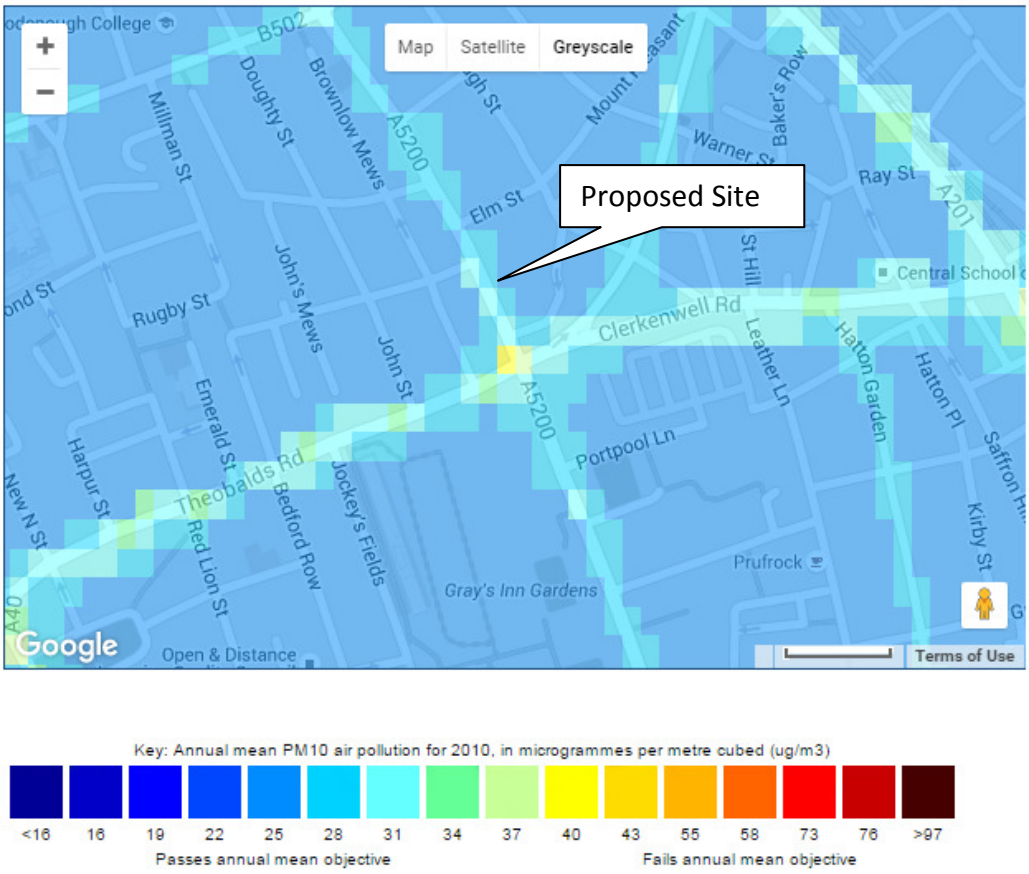

Figure 4.3: Modelled Annual Mean PM_{10} Based on 2010 Measured Data

Source: http://www.londonair.org.uk/LondonAir/Default.aspx

4.6 It can be seen from the above map based on 2010 monitored data that the proposed site is within the annual mean PM_{10} objective (40 µg m^{-3}). Therefore, PM_{10} levels are still within annual mean objectives, therefore PM_{10} specific mitigation measures are unlikely to be required.

Monitoring Locations

4.7 LBC operates continuous automatic monitoring at four locations across the Borough. The closest location to the proposed site is London Bloomsbury which is a background location located off Southampton Row, approximately 0.5miles west of the proposed site. The closest Roadside location is Shaftesbury Avenue, located approximately 1km southwest of the proposed site and then Euston Avenue, approximately 1.5km to the Northwest.

4.8 Shaftesbury Avenue measures both NO_2 and PM_{10} concentrations. This monitoring location is the closest roadside location for the proposed development site. Therefore, this location will be used in this assessment as the best representation of the pollution levels at the proposed site location.

4.9 The closest automatic monitoring location in relation to the proposed site is illustrated in Figure 4.4 below.

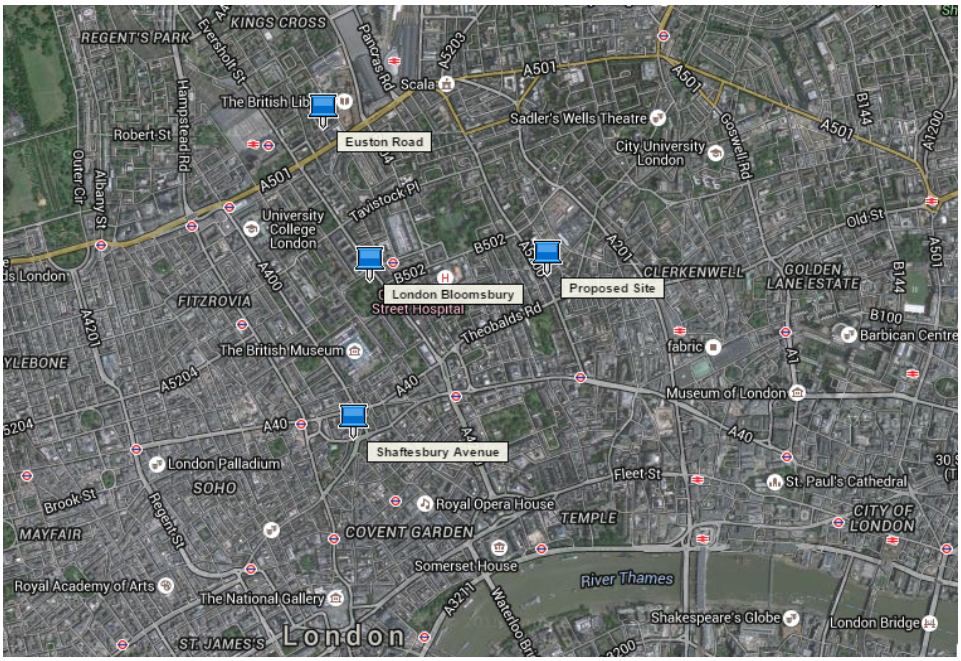

Figure 4.4: Automatic Monitoring Locations Closest to the Proposed Site

Source: http://www.gridreferencefinder.com/

4.10 A summary of the latest monitored data for Shaftesbury Avenue is presented below.

NO_2

Monitoring Position	Site Coordinates (X, Y)	Location	Annual Mean Concentration ($\mu g\ m^{-3}$)	
			2012	2013
Shaftesbury Avenue	530060, 181290	Roadside, <1m from kerb	**71**	**74**

Note – Exceedences of the AQS National Objectives shown in bold.

Table 4.1: 2012 and 2013 NO_2 concentrations for closest Automatic Monitoring Station

4.11 The above table demonstrates that the closest automatic monitoring location recorded monitored NO_2 annual mean concentrations for 2012 and 2013, which are above the annual mean objective levels.

4.12 It is therefore demonstrated that the monitored NO_2 results for Shaftesbury Avenue, are in line with the 2010 roadside modelling results for the proposed site illustrated in figure 4.2 previously.

PM_{10}

Monitoring Position	Site Coordinates (X, Y)	Location	Annual Mean Concentration (µg m^{-3})	
			2012	2013
Shaftesbury Avenue	530060, 181290	Roadside, <1m from kerb	29	29

Table 4.2: 2012 and 2013 PM_{10} Concentrations for Closest Automatic Monitoring Station

4.13 The above table demonstrates that the closest automatic monitoring location has monitored PM_{10} annual mean concentrations which are below the annual mean objective levels.

4.14 It is therefore demonstrated that the monitored PM_{10} results for Shaftesbury Avenue, are in line with the 2010 roadside modelling results for the proposed site illustrated in figure 4.3 previously.

Background Concentrations

4.15 Background concentrations of NO_x, NO_2, PM_{10} and $PM_{2..5}$ for the site have been obtained from the Defra Background Map tool[22]. Data is available for years 2011 – 2030 and is calibrated against monitoring data collected in 2011.

4.16 The Defra background mapping tool has been used to establish the pollutant background concentration within the two 1 x 1km grid square closest to the proposed site (x:530500, y:182500 - x:531500, y:182500). The pollutant background concentrations have been collated for the current year (2015) and the proposed opening year (2018) when the proposed development has been estimated to be completed. These are given in Table 4.3 below.

Pollutant	Current Year (2015) (µg m^{-3})	Opening Year (2018) (µg m^{-3})
NO_x	76.5	66.7
NO_2	43.9	39.3
PM_{10}	24.8	24.1
$PM_{2.5}$	16.8	16.1

Table 4.3: Annual Mean Background Concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$

4.17 It is shown that the background concentrations for NO_2, PM_{10} and $PM_{2.5}$ are well within their annual mean objective levels.

[22] Department for Environment, Food and Rural Affairs (2011). Background Concentration Maps. Defra, http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2011

5.0 IDENTIFICATION AND EVALUATION OF POTENTIAL EFFECTS

5.1 Table 5.1 sets out the potential sources of air quality impacts that have been identified with the proposed development.

Stage	Source of Impact
Construction	Demolition and Construction Activities
	Construction Traffic and Plant
Completed Development	Operational Activities

Table 5.1: Sources of Air Quality Impacts

Construction

Construction Dust

5.2 During the demolition, site clearance and construction phases, there is the potential for emissions of dust to cause annoyance/nuisance for sensitive receptors, both human and ecological located close to the site.

5.3 The construction activities associated with the proposed development can be separated into four stages:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

5.4 There are numerous sensitive receptors within close proximity to the site that could potentially be affected by construction dust emissions in relation to any of the above stages.

5.5 However, no sensitive ecological receptors have been identified in close proximity to the site. Therefore, the risk has been assessed as negligible.

5.6 In February 2014, the IAQM published guidance on how to assess and mitigate the impacts the dust emissions from demolition and construction sites. The guidance superseded the 2012 IAQM guidance on the assessment of the impacts of construction on air quality and the determination of their significance. This approach is broadly replicated within the GLA draft construction dust document (2013) and provides detail for a clear and concise dust assessment.

5.7 This guidance has been followed for the production of a construction dust assessment included in Appendix A. The dust assessment has been completed to satisfy the requirements of Policy 7.14 of the London Plan and Policy 6 of the Mayor's Air Quality Strategy relating to the reduction of emissions from construction and demolition.

5.8 There are a number of human receptors that, due to their location, could potentially suffer a degree of nuisance or annoyance from the emission of construction dust from the site. It has been predicted that construction will take place between June 2016 and August 2018. Due to there being human receptors located closer than 350m from the site, a dust assessment is required and specific mitigation measures adopted, where appropriate.

5.9 A summary of the dust assessment can be seen below. Further details can be found in Appendix A of this report.

5.10 The background PM_{10} concentration for the site in 2015 derived from Defra background pollutant maps shown in Table 4.3 is 24.8 µg m^{-3}. However, the monitored concentration for Shaftesbury Avenue (Table 4.2 above) was 29.0 µg m^{-3} in 2013. For the completion of the dust assessment, the monitored PM_{10} concentration of 29 µg m^{-3} will be used as a worst case scenario value.

5.11 Each activity has been assessed individually to determine a Dust Emissions Magnitude in terms of the scale and nature of the works. The level of magnitude is assessed against the sensitivity of the site in order to determine the risk of dust impacts from each activity with no mitigation applied. This is shown in Table 5.2 below:

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	High	High	High	High
Ecological	Negligible	Negligible	Negligible	Negligible

Table 5.2: Summary of Dust Risk (pre-mitigation)

5.12 The above summary demonstrates that the proposed development, pre-mitigation, has the potential to have a high adverse effect upon sensitive receptors from dust soiling.

5.13 In addition, it has been estimated that although dust will not be generated at the same level throughout the construction period, the risk of impacts will continue throughout the duration of the construction and have the potential to lower the amenity of receptors close to the site.

5.14 As a result of this, specific mitigation measures should be employed to lower the significance of any potential impacts.

5.15 The mitigation measures detailed in section 6 have been recommended to ensure that the residual effect of construction dust on the receptors and surrounding area will be temporary and where possible, negligible.

Construction Traffic and Plant

5.16 It is anticipated that, throughout the construction phase of the development, there will be a number of construction vehicles, stationary plant and vehicles used by the construction workforce. These additional units may potentially present an additional source of air pollutants in the vicinity of the site during the construction phase of the proposed development.

5.17 The number of deliveries and materials collections vehicles required has not been confirmed at this stage. Therefore, any likely pollutant impacts should be addressed through Best Available Techniques (BAT) mitigation measures. Likely BAT are provided in section 6.

Completed Development

Development Traffic

5.18 The proposed development is proposed to be car free. However, a certain number of deliveries is expected to arrive on site in order to service the proposed units. The transport assessment estimates that proposed deliveries will be in the region of 40 daily. The exiting flooorspace at the moment would attract approximately 20 deliveries per day, therefore the traffic related impact as a result of the proposed development will be approximately 20 vehicles for day.

5.19 This level of traffic impact does meet neither the DMRB nor EPUK criteria for requiring further assessment as specified in section 3 of this report. Therefore, it has not been considered necessary to quantify traffic exhaust emissions as a result of the operation of the proposed development.

Operational Activities

5.20 The Sustainability and Energy Report produced for the proposed development site[23] outlines how the proposed development will exceed the energy requirements specified by the London Plan.

5.21 The services strategy at the baseline stage for the proposed development consists of the following:

[23] mTTLtd. (2015). Panther House, Sustainability and Energy Report. mTT, London.

5.22 The measures at each stage of the energy hierarchy described below are applicable to the new-build extension.

Energy Hierarchy Step 1 - 'Be Lean' - Reduce Energy Demand

5.23 The first step in pursuing an energy efficient and low-carbon design under the Energy Hierarchy is to minimise the development's energy demand. This is achieved both by passive measures and the introduction of more energy efficient plant and services.

5.24 The services strategy at 'Be Lean' stage for the dwellings consists of: high efficiency gas boilers, mechanical ventilation with heat recovery (MVHR), a VRF system to provide cooling for the flats to satisfy market expectations and energy efficient lighting throughout the development.

5.25 For the commercial areas the services strategy will consist of: high efficiency VRF system with heat recovery and high efficiency lighting with PIR throughout the development.

5.26 An evaluation of the cooling loads and how they are reduced, following the London Plan cooling hierarchy, has been undertaken to demonstrate how solar gains and general overheating can be mitigated. This reduces the level of mechanical cooling required for the development.

5.27 Further details of the SAP/SBEM calculation parameters are given in appendix b of Energy Assessment.

5.28 The proposed 'Be Lean' measures contribute an 18.7% reduction in CO_2 emissions of the site's 'regulated' emissions.

Energy Hierarchy Step 2 - 'Be Clean' - Supply Energy Efficiently

5.29 In line with the London Plan requirements for Decentralised Energy: Heating, Cooling and Power, the opportunity to connect the scheme beyond the site boundary to adjacent areas has been considered. However, it was found that there are no viable distribution networks near to the site.

5.30 From the results of the thermal modelling a very low domestic hot water load is required at Panther House and heating is only necessary for a proportion of the year. As discussed previously CHP systems only work efficiently when operated constantly for the majority of the year and therefore Panther House with its changing loads would not provide a year round requirement for heat.

Energy Hierarchy Step 3 - 'Be Green' - Renewable Energy

5.31 The Renewables Toolkit published by the London Energy Partnership has been used to provide a robust methodology for the selection and sizing of renewable energy technologies, as shown in appendix c of the Sustainability and Energy report.

5.32 From the analysis set out in appendix c of the Sustainability and Energy Report, it is clear that the most appropriate renewable energy technology for integration on the site is photovoltaic (PV) panels.

5.33 It is proposed to allocate all suitable roof space on the site to PV, of an approximate effective area of 26 m2 for the residential development approximately and 35 m2 for the non-domestic development. The panels will be positioned facing south, to provide an approximate 4 kWp output for the residential and 5.5 kWp for the non-domestic development.

5.34 The inclusion of PV contributes a further 1.2% CO_2 emissions reduction; resulting in a total 19.5% reduction in the entire site's 'regulated' CO_2 emissions.

5.35 Further information on sustainability and the proposed energy strategy can be seen within the sustainability and energy report.

5.36 Having regard to the operational activities associated with the proposed development, the proposed energy strategy is unlikely to result in any significant impacts upon local air quality. However, at this early stage of the proposed development, the specific boilers/plant being used have not been identified.

5.37 As a result of this, it is not possible to assess potential operational plant impacts at this stage.

6.0 MITIGATION MEASURES

Construction

Construction Dust

6.1 A construction dust assessment has been completed for the proposed development in accordance with IAQM guidance and is presented in Appendix A. Within the assessment, site specific mitigation measures have been identified that ensure compliance with both the London Plan and the Mayor's Air Quality Strategy.

6.2 The mitigation measures have been recommended because although the construction magnitude is considered small, the potential for dust soiling and human health effects was considered to be high.

6.3 The mitigation measures outlined below should make up part of a Construction Environment Management Plan (CEMP) that should be implemented to minimise the potential of adverse construction dust impacts throughout all the relevant construction stages.

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);
- Wherever reasonably practicable, retain walls and windows while the rest of the building is demolished to provide a screen against dust;
- Bag and remove any biological debris or damp down such material before demolition; and
- Ensure effective water suppression is used during demolition operations, hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is required.

Earthworks:

- Avoid scabbling (roughening of concrete surfaces) if possible;
- Avoid carrying out any earthworks during dry weather if reasonably practicable having regard to programme and contracting arrangements for the relevant works or provide and ensure appropriate use of water to control dust.
- Re-vegetate any earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.

Construction:

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out unless required for a particular process;
- Mix large quantities of cement, grouts and other similar materials in enclosed areas remote from site boundaries and potential receptors;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery; and
- For small supplies of fine powder ensure bags are sealed after use and are stored appropriately to prevent dust.

Trackout:

- Ensure any vehicles arriving and leaving site are securely covered to prevent escape of materials during transport;
- Ensure all vehicles switch off engines when stationary, so that there are no idling vehicles;
- Routinely clean public roads and any access routes using wet sweeping methods; and
- Avoid dry sweeping.

General Mitigation Measures:

- Ensure regular cleaning of hardstanding surfaces using wet sweeping methods;
- Display the head or regional office contact information, and the name and contact details of person(s) accountable for air quality on the site boundary;
- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- Log all air quality complaints, identify the cause(s), take appropriate measures to reduce emissions in a timely manner, and record all measures taken. Make the complaints log available to the Local Authority when requested;
- Carry out regular on-site and off-site inspections to monitor dust soiling effects, with cleaning to be provided if necessary. Increase the frequency of inspections when activities with a high potential to produce dust are being carried out;
- Erect barriers around the site, any dusty activities and stockpiles (the last of which should be covered);
- Screen areas of the building, where dust producing activities are taking place, with debris screens or sheeting;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Remove materials that have a potential to produce dust as soon as possible, unless they are being re-used. If they are to be re-used, on site covers should be used;

- Ensure all vehicles switch off engines when stationary, so that there are no idling vehicles;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine sprays on such equipment wherever possible;
- Avoid bonfires and the burning of waste materials; and
- Special provisions will apply for any materials containing asbestos. The safety method statement should outline the control measures necessary to minimise the risks to an acceptable level and all statutory notices will be placed with the Health and Safety Executive (HSE).

6.4 It is important that attention is paid to any construction activity that takes place in close proximity to the site boundary, potentially at the closest location to sensitive receptors.

6.5 The implementation of the specific mitigation measures given above within a CEMP will ensure that any potential adverse impacts from construction dust during all construction stages are avoided. It is noted by the IAQM that, through the use of effective mitigation, the effects of dust from construction activity will normally not be considered significant.

Construction Traffic and Plant

6.6 As previously stated, there is potential for air pollutant impacts to arise from construction plant and vehicles associated with the scheme. Currently the number of construction vehicles has not yet been confirmed. The construction plant has not been confirmed at this stage either. However, the following BAT should still be implemented during the demolition and construction phases.

6.7 The construction traffic and plant mitigation measures recommended are as follows:

- All vehicles should switch off engines when stationary, no idling vehicles;
- On-road vehicles to comply with the requirements of the Low Emission Zone and the London NRMM standards, where applicable;
- All non-road mobile machinery (NRMM) to use ultra low sulphur diesel (ULSD) where available;
- Minimise the movement of construction traffic around the site;
- Maximising efficiency (this may include alternative modes of transport, maximising vehicle utilisation by ensuring full loading and efficient routing);
- Vehicles should be well maintained and kept in a high standard of working order;
- Avoid the use of diesel or petrol powered generators by using mains electricity or battery powered equipment where possible; and
- Locate plant away from boundaries close to residential areas.

Operational

Operational Traffic

6.8 The assessment has demonstrated that air quality impacts associated with the proposed development traffic are unlikely due to the development being car free and the delivery traffic not being of a scale that would be considered significant or require further assessment. Therefore, it is not anticipated that mitigation measures will be required.

Operational Plant

6.9 The assessment has demonstrated that air quality impacts associated with the proposed operational plant as described in the sustainability and Energy Report produced by mTT Ltd are unlikely.

6.10 At this stage, it is not known the exact type of boilers/plant which will be selected for the site. Therefore it is not possible to estimate emissions and decide whether any mitigation measures will be required. Any operational plant effects should be assessed, if required, at the appropriate stage, when all the required plant technical information is available, and compliance to relevant regulations and standards should be secured through planning conditions, where required.

6.11 However, it is suggested that, at the appropriate stage, any boilers being used on site should be highly efficient low NOx boilers, and emissions of NOx should be ≤ 40 mg kwh-1 dry NOx. This will ensure that any additional NOx contributions associated with proposed heating boilers are kept as low as possible. Where possible, these should be combined with Photovoltaic (PV) panels.

6.12 Due to the site being located within an AQMA with NO_2 concentrations considerably above objective levels, it is suggested that ventilation to the proposed development should ideally be achieved by the installation of mechanical ventilation with filtration which will provide future residents with a high standard of indoor air quality.

6.13 Any ventilation system (including air conditioning) should be fitted with appropriate NO_2 filters (subject to CIBSE & HVCA recommendations) and draw air in from a suitable location on the roof top where the pollution concentrations are slightly reduced.

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

7.0 RESIDUAL EFFECTS AND CONCLUSIONS

Baseline

7.1 This assessment demonstrates that the proposed development is situated within an AQMA designated by LBC on the basis that the levels of NO_2 and PM_{10} would not meet the AQS national objectives.

7.2 Automatic and non-automatic NO_2 monitoring is undertaken at several locations within the Borough. Shaftesbury Avenue has been identified as the closest monitoring locations to the proposed site and their monitoring results have been used as the best representation of the air quality environment at the proposed site.

7.3 The latest published monitoring results for Shaftesbury Avenue automatic monitoring location demonstrates that the annual average concentration for nitrogen dioxide (NO_2) exceed the annual objectives, 74 µg m^3 , in 2013. However, the annual average concentration for Particulate Matter PM_{10} meets the annual objectives, 29 µg m^3 , also in 2013

Construction Phase

7.4 A construction dust assessment has been undertaken for the demolition and construction phase associated with the proposed development in accordance with IAQM and GLA guidance on the assessment of dust from demolition and construction (Appendix A).

Operational Phase (Built and Occupied)

7.5 The proposed development is proposed to be car free and the delivery traffic not being of a scale that would be considered significant or require further assessment. Therefore, it has not been considered necessary to quantify traffic exhaust emissions as a result of the operation of the proposed development.

7.6 A complete Sustainability and Energy Report has been completed for the proposed development, which demonstrates that the proposed building services strategy exceeds the London Plan guidelines using a combination of individual gas boilers, centralised CHP, PV panels and centralised mechanical ventilation.

7.7 At this early stage of the proposed development, the specific boilers/plant being used have not been identified. As a result of this, it has not been possible to assess potential operational plant impacts at this stage. Therefore, any operational plant effects should be assessed, if required, at the appropriate stage when all the required plant technical information is available and compliance to relevant regulations and standards should be secured through planning conditions, where required.

7.8 To ensure suitable indoor air quality within the proposed development, a mechanical ventilation system has been proposed to be incorporated within the proposed development to provide suitable indoor air quality conditions, reducing the need for opening windows. The location of the ventilation air inlets should be agreed upon with LBC prior to construction to ensure that pollutants are not re-circulated.

7.9 In accordance with London Plan Policy 7.14 and The Mayor's Air Quality Strategy Policy 7, based on the above assessment, it is considered unlikely, at this stage, that the proposed development will result in further deterioration of the existing air quality environment and on that basis can be classed as 'air quality neutral'. However, these conclusions are based upon details available at the time of writing and should be reviewed as soon as the specific technical data for the operational plant is available.

8.0 DISCLAIMER

8.1 Create Consulting disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report.

8.2 The copyright of this report is vested in Create Consulting Engineers Ltd and Panther House Developments Ltd. The Client, or his appointed representatives, may copy the report for purposes in connection with the development described herein. It shall not be copied by any other party or used for any other purposes without the written consent of Create Consulting Engineers Ltd or Panther House Developments Ltd.

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APPENDICES

APPENDIX A

CONSTRUCTION DUST ASSESSMENT

CONSTRUCTION DUST ASSESSMENT

A.1 The construction dust assessment has been completed in accordance with 2014 IAQM guidance and follows the procedure as outlined in Section 3 of this report.

Screen the Need for a Detailed Assessment

A.2 The following screening criterion has been applied to the assessment: An assessment will normally be required where there is:

- a 'human receptor' within:
  - 350m of the boundary of the site; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- an 'ecological receptor' within:
  - 50m of the boundary of the site; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

A.3 There are a number of human receptors within 350m of the site boundary but no ecological receptors within 50m of the site. However a dust assessment is still required due to the proposed development location meeting some of the above criteria.

Assess the Risk of Dust Impacts

A.4 The construction activities associated with the proposed development can be separated into four stages:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

A.5 The assessment of the risk of dust impacts was completed in two stages:

- Determine the potential dust emission magnitude; and
- Determine the sensitivity of the area to dust impacts.

A.6 The potential dust emission magnitude for all four of the construction activities were determined to be Small, according to the criteria presented in Table A.1.

Construction Activity	Dust Emission Magnitude Scale		
	Small	Medium	Large
Demolition	Total building volume <20,000m^3, construction	Total building volume 20,000-50,000m^3,	Total building volume >50,000m^3, potentially

Construction Activity	Dust Emission Magnitude Scale		
	Small	Medium	Large
	material with low potential for dust release, demolition activities <10m above ground, works during wetter months.	potentially dusty construction material, demolition activities 10-20m above ground level.	dusty material, on-site crushing and screening, activities >20m above ground level.
Earthworks	Total site area <2,500m^2, soil type with large grain size, <5 heavy earth moving vehicles active at one time, bunds <4m high, total material moved <20,000t, works during wetter months.	Total site area 2,500-10,000m^2, moderately dusty soil type, 5-10 heavy earth moving vehicles active at one time, bunds 4-8m high, total material moved 20,000-100,000t.	Total site area >10,000m^2, potentially dusty soil type, >10 heavy earth moving vehicles active at one time, bunds >8m high, total material moved >100,000t.
Construction	Total building volume <25,000m^3, construction material with low potential for dust release.	Total building volume 25,000-100,000m^3, potentially dusty construction material, on site concrete batching.	Total building volume >100,000m^3, on site concrete batching, sandblasting.
Trackout	<10 HDV* outwards movements in any one day, surface material with low potential for dust release, unpaved road length <50m.	10-50 HDV outward movements in any one day, moderately dusty surface material, unpaved road length 50-100m.	>50 HDV outward movements in any one day, potentially dusty surface material, unpaved road length >100m.
* HDV – Heavy Duty Vehicle (>3.5t), Note – In each case, not all the criteria need to be met, and that other criteria may be used if justified.			

Table A.1: Dust Emission Magnitude Criteria

A.7 The completed assessment of Dust Emission Magnitude is shown in Table A.2 below.

Construction Activity	Dust Emission Magnitude	Justification
Demolition	small	Existing building to be demolished has been estimated to have a total volume of <20,000m^3
Earthworks	small	Total site area has been estimated to be <2,500m^2 and there will be <5 heavy earth moving vehicles active at one time.
Construction	small	The proposed building volume has been estimated to be <25,000m^3, construction material with low potential for dust release.
Trackout	small	Estimated <10 HDV* outwards movements in any one day .

Table A.2: Dust Emission Magnitude Assessment

A.8 The sensitivity of the area has been assessed in relation to a number of factors such as; the specific sensitivities of receptors in the area, the proximity and number of those receptors and in the case of PM_{10}, the local background concentration and also following the significance criteria in Tables A3, A4 and A5 below.

Receptor Sensitivity	Number of Receptors	Distance from the source (m)			
		<20	<50	<100	<350
High	**>100**	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	**>1**	Medium	Low	Low	Low
Low	**>1**	Low	Low	Low	Low

Table 3: Sensitivity of the Area to Dust Soiling Effects of People and Property

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the source (m)				
			<20	<50	<100	<200	<350
High	>32 µg 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

Table A4: Sensitivity of the Area to Human Health Impacts

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

Table A5: Sensitivity of the Area to Ecological Impacts

A.9 In addition to Tables A3, A4 and A5 any site specific factors have been taken into account when defining the sensitivity of the area:

- any history of dust generating activities in the area;
- the likelihood of concurrent dust generating activity on nearby sites;
- any pre-existing screening between the source and the receptors; and
- the duration of the potential impact, as a receptor may become more sensitive over time.

A.10 The completed pre-mitigation impact risk assessment incorporating the sensitivity of the area and the dust emissions magnitude for the four construction activities is shown below.

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	High	High	High	High
Ecological	Negligible	Negligible	Negligible	Negligible

Table A6: Summary of Dust Risk (pre-mitigation)

Site-specific Mitigation

A.11 From the identification of the of the risk of impacts with no mitigation applied in Table A7, it is possible to determine the specific mitigation measures that can be applied in relation to the level of risk associated with the construction activity. The mitigation measures described below are suggested as measures that should be included in a site specific Construction Environmental Management Plan (CEMP).

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);
- Wherever reasonably practicable, retain walls and windows while the rest of the building is demolished to provide a screen against dust;
- Bag and remove any biological debris or damp down such material before demolition; and
- Ensure effective water suppression is used during demolition operations, hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is required.

Earthworks:

- Avoid scabbling (roughening of concrete surfaces) if possible;
- Avoid carrying out any earthworks during dry weather if reasonably practicable having regard to programme and contracting arrangements for the relevant works or provide and ensure appropriate use of water to control dust.
- Re-vegetate any earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.

Construction:

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out unless required for a particular process;
- Mix large quantities of cement, grouts and other similar materials in enclosed areas remote from site boundaries and potential receptors;

- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery; and
- For small supplies of fine powder ensure bags are sealed after use and are stored appropriately to prevent dust.

Trackout:

- Ensure any vehicles arriving and leaving site are securely covered to prevent escape of materials during transport;
- Ensure all vehicles switch off engines when stationary, so that there are no idling vehicles;
- Routinely clean public roads and any access routes using wet sweeping methods; and
- Avoid dry sweeping.

General Mitigation Measures:

- Ensure regular cleaning of hardstanding surfaces using wet sweeping methods;
- Display the head or regional office contact information, and the name and contact details of person(s) accountable for air quality on the site boundary;
- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- Log all air quality complaints, identify the cause(s), take appropriate measures to reduce emissions in a timely manner, and record all measures taken. Make the complaints log available to the Local Authority when requested;
- Carry out regular on-site and off-site inspections to monitor dust soiling effects, with cleaning to be provided if necessary. Increase the frequency of inspections when activities with a high potential to produce dust are being carried out;
- Erect barriers around the site, any dusty activities and stockpiles (the last of which should be covered);
- Screen areas of the building, where dust producing activities are taking place, with debris screens or sheeting;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Remove materials that have a potential to produce dust as soon as possible, unless they are being re-used. If they are to be re-used, on site covers should be used;
- Ensure all vehicles switch off engines when stationary, so that there are no idling vehicles;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine sprays on such equipment wherever possible;
- Avoid bonfires and the burning of waste materials; and
- Special provisions will apply for any materials containing asbestos. The safety method statement should outline the control measures necessary to minimise the

risks to an acceptable level and all statutory notices will be placed with the Health and Safety Executive (HSE).

A.12 It is important that attention is paid to any construction activity that takes place in close proximity to the site boundary, potentially at the closest location to sensitive receptors.

A.13 The implementation of the specific mitigation measures given above within a CEMP will ensure that any potential adverse impacts from construction dust during all construction stages are avoided. It is noted by the IAQM that, through the use of effective mitigation, the effects of dust from construction activity will normally be considered not significant.

Determine Significant Effects

A.14 Prior to the implementation of any mitigation measures the highest significance of adverse effects was 'high Risk' for all activities associated with the development. The mitigation measures listed have been chosen due to their suitability to the site and to reduce the risk of adverse effects from the four stages of construction.

A.15 Through the implementation of the site specific mitigation measures (secured by planning condition) which are designed to mitigate potential dust impact, will ensure that potential significant adverse dust effects will not occur and the residual effect will normally be 'not significant'.

Conclusions of Construction Dust Assessment

A.15 The completion of the construction dust assessment has shown that the residual effect of the proposed development in the context of construction dust emissions will be 'not significant'. This conclusion has been made based on the assumption that the suggested mitigation measures will be implemented (secured by planning condition) and is relevant for all sensitive receptors within 350m of the site.

A.16 It should be noted that even with a rigorous CEMP in place, it is not possible to guarantee that all mitigation measures will be effective at all times. If there is an interruption in the water supply used for dust suppression or adverse weather conditions are experienced that exacerbate dust emissions, the receptors may experience occasional, short term dust annoyance.

A.17 However, the likely scale of this would not normally be considered sufficient to change the conclusion of this assessment. It is therefore important to consider all mitigation measures and provide a frequent review and assessment procedure for each when in place to ensure that they continue to provide a full level of mitigation.