TEMPLAR HOUSE

AIR QUALITY ASSESSMENT

JULY 2015

NORTHWOOD INVESTORS

ASTUDIO

Northwood Investors
Templar House
Air Quality Assessment

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Contents

1 Introduction

Ove Arup and Partners Ltd has been commissioned by Northwood Investors to prepare an air quality assessment to accompany a Planning Application for the Templar House Project, which is a development consisting of two buildings in Camden, London; one will primarily be a commercial office with retail accommodation at ground level and the other will primarily be residential with ancillary accommodation at ground level.

Air quality studies are concerned with the presence of airborne pollutants in the atmosphere. This report outlines relevant air quality management policy and legislation, describes the existing air quality conditions in the vicinity of the site and outlines the nature of the development and the air quality issues associated with its construction and operation. Mitigation measures are also proposed where necessary which would be implemented to reduce the effect of the proposed development on air quality, as far as practicable.

2 Air Quality Legislation

In May 2008 the Directive 2008/50/EC[1] on ambient air quality and cleaner air for Europe came into force. This Directive presents limit values for specified pollutants and provides a new regulatory framework for $PM_{2.5}$.

The Directives were transposed into national legislation by the Air Quality Standards Regulations 2010[2]. The Secretary of State for the Environment has the duty of ensuring the air quality limit values are complied with.

Air quality limit values and objectives are quality standards for clean air. Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment (i.e. effects occur after a prolonged period of exposure to elevated concentrations) and others have standards expressed as 24-hour, 1-hour or 15-minute average concentrations due to the acute way in which they affect health or the natural environment (i.e. after a relatively short period of exposure). Some pollutants have standards expressed in terms of both long-term and short-term concentrations. Table 1 sets out these EU air quality limit values and national air quality objectives for the pollutants of greatest concern throughout the UK (NO_2 and PM_{10}).

In the majority of cases the air quality limit values and air quality objectives have the same pollutant concentration threshold and date for compliance. The key difference is that the Secretary of State for the Environment is required under European Law to ensure the air quality limit values are complied with whereas local authorities are only obliged under national legislation to undertake best efforts to comply with the air quality objectives.

[1] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
[2] The Air Quality Standards Regulations2010 No. 1001

Table 1 Air Quality Standards

Pollutant	Averaging Period	Limit value/Objective
Nitrogen Dioxide (NO_2)	Annual Mean	40µg/m^3
	1-hour mean	200µg/m^3 not to be exceeded more than 18 times a year (99.8th percentile)
Particulate Matter (PM_{10})	Annual Mean	40µg/m^3
	24-hour Mean	50µg/m^3 not to be exceeded more than 35 times a year (90.41st percentile)

3 Planning Policy and Guidance

3.1 National Policy and Guidance

The land use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality consideration that relates to land use and its development can be a material planning consideration in the determination of planning applications, dependent upon the details of the proposed development.

3.1.1 National Planning Policy Framework (2012)

The National Planning Policy Framework[3] (NPPF) was published in March 2012 with the purpose of planning to achieve sustainable development. Paragraph 124 of the NPPF on air quality states 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."

3.1.2 Planning Practice Guidance (2014)

As part of the NPPF, planning practice guidance on various topics was recently published[4]. In relation to air quality, the guidance refers to the significance of air quality assessments to determine the impacts of proposed developments in the area and describes the role of local and neighbourhood plans with regard to air quality. It also provides a flowchart method to assist local authorities to determine how considerations of air quality fit into the development management process. This is shown in Appendix A.

[3] Department for communities and local government (2012) National Planning Policy Framework
[4] Department for communities and local government (2014) Planning Practice Guidance: Air Quality

3.1.3 Local Air Quality Management Policy Guidance (2009)

Policy guidance note LAQM.PG(09)[5] provides additional guidance on the links between transport and air quality. LAQM.PG(09) describes how road transport contributes to local air pollution and how transport measures may bring improvements in air quality. Key transport related Government initiatives are set out, including regulatory measures and standards to reduce vehicle emissions and improve fuels, tax-based measures and the development of an integrated transport strategy.

LAQM.PG(09) also provides guidance on the links between air quality and the land use planning system. The guidance advises that air quality considerations should be integrated within the planning process at the earliest stage and is intended to aid local authorities in developing action plans to deal with specific air quality problems and create strategies to improve air quality. It summarises the main ways in which the land use planning system can help deliver compliance with the air quality objectives.

3.2 Local Policy and Guidance

3.2.1 London Plan

The London Plan, consolidated with alterations, 2015[6] forms part of the development strategy for the Greater London area until 2031 and integrates all economic, environmental, transport and social frameworks. This has been amended to be consistent with the NPPF.

Specifically for new development proposals, the London Plan, looks at air quality by proposing the following measures:

- minimise increased exposure to existing poor air quality and make provision to address local problems of air quality such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans;
- promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the Greater London Authority (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);
- ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site; and
- where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations.

[5] Defra (2009) Local Air Quality Management Policy Guidance PG(09)
[6] Greater London Authority (2015) *The London Plan: The Spatial Development Strategy for London Consolidated With Alterations Since 2011*

These policies have been considered throughout the completion of this Air Quality Assessment.

3.2.2 Sustainable Design and Construction SPG (2014)

The Sustainable Design and Construction Supplementary Planning Guidance[7] (SPG) was published in April 2014 from GLA. Section 4.3 of the guidance focuses on air pollution and provides guidance on when assessments should be undertaken and how intelligent design can help minimise the effect of a development on local air quality.

The primary way in which the guidance aims to minimise air quality impacts is by setting an air quality neutral policy for emissions associated with buildings and transport[8] as part of any proposed development, as well as setting emissions standards for combustion plant[9]. The air quality neutral policy sets benchmarks against which the annual emissions of NO_x and PM_{10} from traffic and combustion plant of a proposed development should be assessed.

3.2.3 London Borough of Camden (LBC)

LBC's Local Development Framework (LDF) was adopted in November 2010 and consists of a portfolio of documents, of which the Core Strategy is the principal overarching part. The LBC Development Policies[10] contribute towards delivering the Core Strategy by setting out detailed planning criteria that are used to determine applications for planning permission in the borough.

The Development Policies were reviewed and the following policies in relation to air quality identified:

> *"Policy DP22 - Promoting sustainable design and construction*
>
> *The Council will require development to be resilient to climate change by ensuring schemes include appropriate climate change adaptation measures, such as:*
>
> *i) reducing air pollution"*

And*:*

> *"Policy DP32 - Air quality and Camden's Clear Zone*
>
> *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."*

[7] Greater London Authority (2014) *Sustainable Design and Construction: Supplementary Planning Guidance*
[8] Air Quality Consultants (2013) *Air Quality Neutral Planning Support*
[9] AMEC (2013) *Greater London Authority Air Quality Support: Biomass and CHP Emission Standards*
[10] Camden Local Development Framework, Camden Development Policies, London Borough of Camden, 2010.

There has been a draft local plan[11] prepared in 2015 and Policy CC4 relates to air quality. Policy CC4 states that:

> *"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."*

These polices have been considered as necessary throughout the assessment.

3.3 Other Relevant Policy and Guidance

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

The latest Institute of Air Quality Management (IAQM) guidance[12] for assessing dust from demolition and construction was produced in consultation with industry specialists and gives guidance to development consultants and environmental health officers on how to assess air quality impacts from construction. The IAQM guidance provides a method for classifying the significance of effect from construction activities based on the 'dust magnitude' (high, medium or low) and proximity of the site to the closest receptors. The guidance recommends that once the significance of effect from construction is identified, the appropriate mitigation measures are implemented. Experience has shown that once the appropriate mitigation measures are applied in most cases the resulting dust impacts can be reduced to negligible levels.

[11] London Borough of Camden (2015) Draft Camden Local Plan 2015
[12] IAQM (2014) Guidance on the Assessment of Dust from Demolition and Construction

3.3.2 EPUK/IAQM Land-Use Planning & Development Control (2015)

The 2015 Land-Use Planning & Development Control guidance document [13] produced by Environmental Protection UK (EPUK) and the IAQM provides a framework for professionals operating within the planning system to provide a means of reaching sound decisions, having regard to the air quality implications of development proposals.

The document provides guidance on when air quality assessments are required by providing screening criteria regarding the size of a development, changes to traffic flows/composition energy facilities or combustion processes associated with the development.

[13] Moorcroft and Barrowcliffe. et al, (2015) Land-Use Planning & Development Control: Planning for Air Quality, Institute of Air Quality Management, London

4 Assessment Methodology

The overall approach to the air quality assessment comprises:

- A review of the existing air quality conditions at, and in the vicinity of, the proposed development site;
- An assessment of the potential changes in air quality arising from the construction and operation of the proposed development;
- An Air Quality Neutral assessment as required by the Sustainable Design and Construction SPG; and,
- Formulation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

4.1 Method of Baseline Assessment

Existing or baseline ambient air quality refers to the concentration of relevant substances that are already present in the environment. These are from various sources, such as industrial processes, commercial and domestic activities, traffic and natural sources.

A desk-based review of the local authority review and assessment reports and local air quality monitoring data available from LBC has been undertaken to determine baseline conditions of air quality in this assessment. In addition, a review of the UK Air Information Resource and ES website have been undertaken to supplement information available from LBC.

- Local authority review and assessment reports and local air quality monitoring data;
- The UK Air Information Resource website[14]; and
- The Environment Agency (EA) website[15].

4.2 Method of Construction Assessment

The construction effects have been assessed using the qualitative approach described in the latest IAQM guidance[12]. The guidance applies to the assessment of dust from construction activities.

An 'impact' is described as a change in pollutants concentrations or dust deposition, while an 'effect' is described as the consequence of an impact. The main impacts that may arise during construction of the proposed development are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes;
- Elevated PM_{10} concentrations as a result of dust generating activities on site; and

[14] Defra, http://uk-air.defra.gov.uk, Accessed July 2015
[15] Environment Agency, http://www.environment-agency.gov.uk, Accessed July 2015

- An increase in NO_2 and PM_{10} concentrations due to exhaust emissions from non-road mobile machinery (NRMM) and vehicles accessing the site.

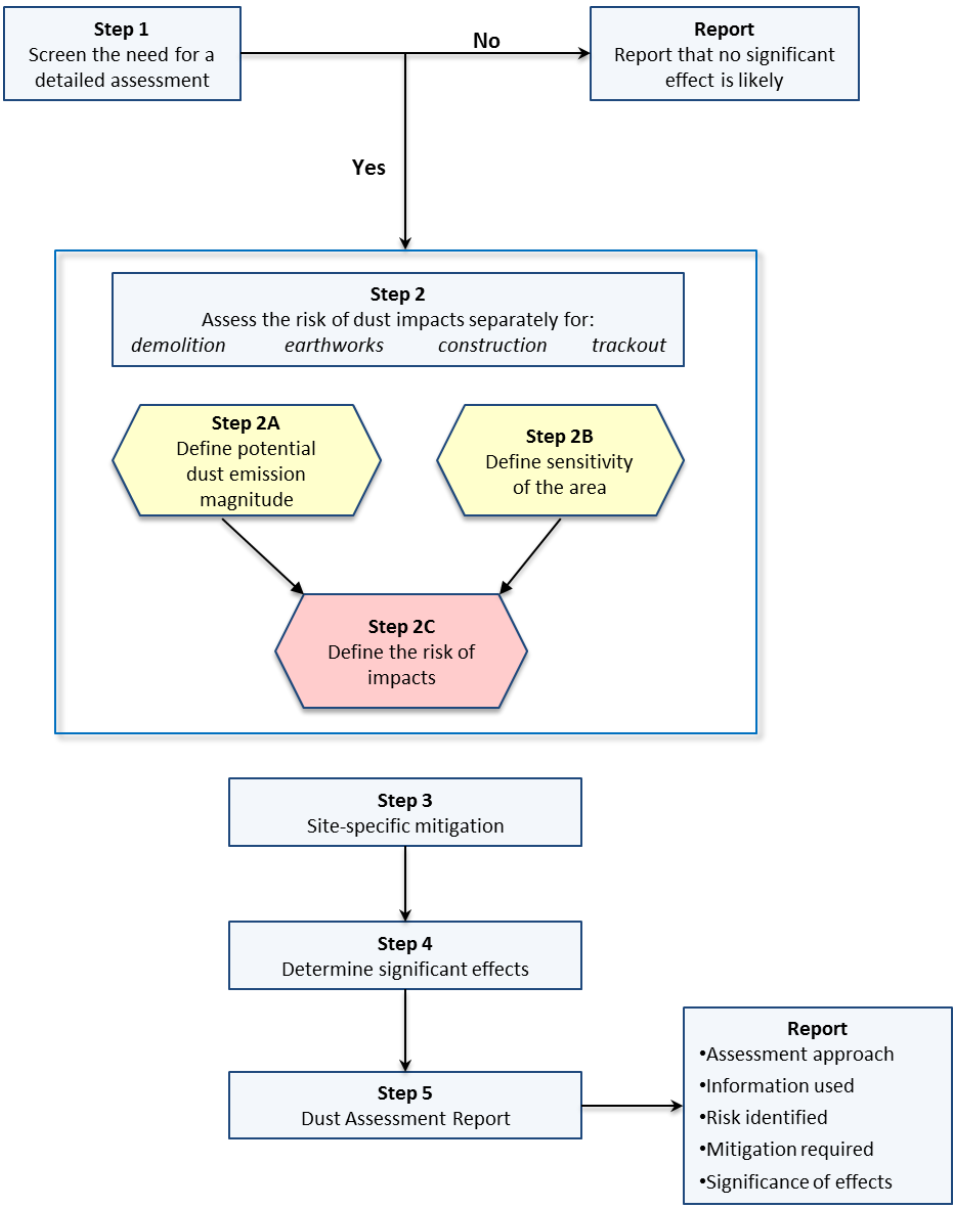
The IAQM guidance considers the potential for dust emissions from dust-generating activities, such as demolition of existing structures, earthworks, construction of new structures and trackout. Earthworks refer to the processes of soil stripping, ground levelling, excavation and land capping, while trackout is the transport of dust and dirt from the site onto the public road network where it may be deposited and then re-suspended by vehicles using the network. This arises when vehicles leave the site with dusty materials, which may then spill onto the road, or when they travel over muddy ground on site and then transfer dust and dirt onto the road network.

For each of these dust-generating activities, the guidance considers three separate effects: annoyance due to dust soiling; harm to ecological receptors; and the risk of health effects due to a significant increase in PM_{10} exposure. The receptors can be human or ecological and are chosen based on their sensitivity to dust soiling and PM_{10} exposure.

The methodology takes into account the scale to which the above effects are likely to be generated (classed as small, medium or large), along with the levels of background PM_{10} concentrations and the distance to the closest receptor, in order to determine the sensitivity of the area. This is then taken into consideration when deriving the overall risk for the site. Suitable mitigation measures are also proposed to reduce the risk of the site where necessary.

There are five steps in the assessment process described in the IAQM guidance. These are summarised in Figure 1 and a further description is provided in the following sections.

Figure 1 IAQM dust assessment methodology



Step 1: Need for assessment

The first step is the initial screening for the need for a detailed assessment. According to the IAQM guidance, an assessment is required where there are sensitive receptors within 350m of the site boundary (*for ecological receptors that is 50m*) and/or within 50m of the route(s) used by the construction vehicles on the public highway and up to 500m from the site entrance(s). In this instance, no sensitive ecological receptors are present within 50m of the proposed development, therefore the assessment focussed on human receptors only.

Step 2: Assess risk of dust impacts

This step is split into three sections as follows:

2A. Define the potential dust emission magnitude;

2B. Define the sensitivity of the area; and

2C. Define the risk of impacts.

Each of the dust-generating activities is given a dust emission magnitude depending on the scale and nature of the works (step 2A) based on the criteria shown in Table 2.

Table 2 Categorisation of dust emission magnitude

Dust Emission Magnitude		
Small	**Medium**	**Large**
Demolition		
• total building volume <20,000m^3 • construction material with low potential for dust release (e.g. metal cladding or timber) • demolition activities <10m above ground • demolition during wetter months	• total building volume 20,000 - 50,000m^3 • potentially dusty construction material • demolition activities 10 - 20m above ground level	• total building volume >50,000m^3 • potentially dusty construction material (e.g. concrete) • on-site crushing and screening • demolition activities >20m above ground level
Earthworks		
• total site area <2,500m^2 • soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • formation of bunds <4m in height • total material moved <10,000 tonnes • earthworks during wetter months	• total site area 2,500m^2 - 10,000m^2 • moderately dusty soil type (e.g. silt) • 5 – 10 heavy earth moving vehicles active at any one time • formation of bunds 4 - 8m in height • total material moved 20,000 - 100,000 tonnes	• total site area >10,000m^2 • potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • >10 heavy earth moving vehicles active at any one time • formation of bunds >8m in height • total material moved >100,000 tonnes
Construction		
• total building volume <25,000 m^3 • construction material with low potential for dust release (e.g. metal cladding or timber)	• total building volume 25,000 - 100,000m^3 • potentially dusty construction material (e.g. concrete) • on-site concrete batching	• total building volume >100,000m^3 • on-site concrete batching • sandblasting
Trackout		
• <10 HDV (>3.5t) outward movements in any one day • surface material with low potential for dust release • unpaved road length <50m	• 10 – 50 HDV (>3.5t) outward movements in any one day • moderately dusty surface material (e.g. high clay content) • unpaved road length 50 – 100m;	• >50 HDV (>3.5t) outward movements in any one day • potentially dusty surface material (e.g. high clay content) • unpaved road length >100m

The sensitivity of the surrounding area is then determined (step 2B) for each dust effect effect from the above dust-generating activities, based on the proximity and number of of receptors, their sensitivity to dust, the local PM_{10} background concentrations and any any other site-specific factors. Table 3 and

Table 4 show the criteria for defining the sensitivity of the area to different dust effects.

Table 3 Sensitivity of the area to dust soiling effects on people and property

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
	< 10	Medium	Low	Low	Low
Medium	> 1	Medium	Low	Low	Low
Low	> 1	Low	Low	Low	Low

Table 4 Sensitivity of the area to human health impacts

Background PM_{10} concentrations (annual mean)	Number of receptors	Distance from the source (m)				
		< 20	< 50	< 100	< 200	< 350
High receptor sensitivity						
> 32µg/m^3	> 100	High	High	High	Medium	Low
	10 – 100			Medium	Low	
	< 10		Medium	Low		
28 – 32µg/m^3	> 100	High	High	Medium	Low	Low
	10 – 100		Medium	Low		
	< 10					
24 – 28µg/m^3	> 100	High	Medium	Low	Low	Low
	10 – 100					
	< 10	Medium	Low			
< 24µg/m^3	> 100	Medium	Low	Low	Low	Low
	10 – 100	Low				
	< 10					
Medium receptor sensitivity						
–	> 10	High	Medium	Low	Low	Low
	< 10	Medium	Low			
Low receptor sensitivity						
–	> 1	Low	Low	Low	Low	Low

The overall risk of the impacts for each activity is then determined (step 2C) prior to the application of any mitigation measures (Table 5) and an overall risk for the site derived.

Table 5 Risk of dust impacts

Sensitivity of area	Dust emission magnitude		
	Large	Medium	Small
Demolition			
High	High risk site	Medium risk site	Medium risk site
Medium	High risk site	Medium risk site	Low risk site
Low	Medium risk site	Low risk site	Negligible
Earthworks			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible
Construction			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible
Trackout			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Low risk site	Negligible
Low	Low risk site	Low risk site	Negligible

Step 3: Determine the site-specific mitigation

Once each of the activities is assigned a risk rating, appropriate mitigation measures are identified. Where the risk is negligible, no mitigation measures beyond those required by legislation are necessary.

Step 4: Determine any significant residual effects

Once the risk of dust impacts has been determined and the appropriate dust mitigation measures identified, the final step is to determine whether there are any residual significant effects. Experience indicates that once mitigation measures are applied, in most cases the dust effects will be reduced to negligible levels.

Step 5: Prepare a dust assessment report

The last step of the assessment is the preparation of a 'Dust Assessment Report' outlining the outcomes of the assessment which is provided in section 0 of this report.

4.3 Method of Operational Assessment

The proposed development has the potential to impact on existing air quality as a result of road traffic exhaust emissions, such as NO_2 and PM_{10}, associated with vehicles travelling to and from the site during the operational phase. A screening assessment was therefore undertaken using the criteria contained within the EPUK/IAQM guidance document to determine the potential for trips generated by the development to affect local air quality.

The EPUK/IAQM guidance document states the following criteria to help establish when an air quality assessment is likely to be considered necessary:

A. If any of the following apply:

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

B. Coupled with any of the following:

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

Should these criteria not be met, then the EPUK/IAQM guidance document consider air quality impacts associated with a development to be negligible and no further assessment is required.

4.3.1 Road Traffic Emissions

The development has the potential to impact on existing air quality as a result of road traffic exhaust emissions, such as NO_2 and PM_{10}, associated with vehicles travelling to and from the site during the operational phase.

EPUK/IAQM Land-Use Planning & Development Control: Planning for Air Quality (2015) guidance documents states a two-stage approach to help establish when an air quality assessment is likely to be considered necessary. For a site with 10 or more residential units or of more than 0.5ha, and with a centralised energy facility, the following indicative criteria for requiring an air quality assessment apply:

- Proposals that will give rise to a change of Light Duty Vehicle (LDV) of more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA or more than 500 AADT elsewhere;
- Proposals that will give rise to a change of Heavy Duty Vehicle (HDV) of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- Proposals that will result in the realignment of roads, where the change is 5m or more and the road is within an AQMA;
- Proposals that will introduce a new junction or remove an existing junction near to relevant receptors; or
- Proposals that include an underground car park with extraction system, where the ventilation extract is within 29m of a relevant receptor and the car park will have more than 100 movements per day.

Should these criteria not be met, then the DMRB and EPUK guidance documents consider that it may not be necessary to carry out a detailed air quality assessment.

Should screening of the traffic data indicate that any of the above criteria are met, then potential impacts at sensitive receptor locations can be assessed by calculating the predicted change in NO_2 and PM_{10} concentrations as a result of the

proposed development. The significance of predicted impacts can then be determined in accordance with the methodology outlined in the EPUK guidance.

4.3.2 Energy Centre Emissions

Emissions associated with combustion plant have the potential to cause increases in pollutant concentrations in the vicinity of the site. The screening criteria in the EPUK/IAQM guidance states that a combustion process should be considered where the combustion unit is: any centralised plant using bio fuel; any combustion plant with single or combined thermal input >300kW; or a standby emergency generator associated with a centralised energy centre. Emissions from combustion plant proposed for installation as part of the energy centre are also considered as part of the Air Quality Neutral assessment.

4.3.3 Air Quality Neutral

An Air Quality Neutral Assessment has been undertaken as required by the Sustainable Design and Construction SPG. This assessment is carried out in accordance with Air Quality Neutral Planning Support[16] (2013), which specifies the assessment methodology for replacement developments as follows:

For "replacement use" development, where the site is in existing use, an air quality neutral policy would seek to ensure that emissions from the new development are no greater than the previous use.

Road Traffic

Road traffic emissions have been screened against the criteria outlined in the above section.

Energy Centre

Emissions associated with the energy centre have the potential to cause increases in pollutant concentrations in the vicinity of the site. These have been assessed through an Air Quality Neutral assessment. The assessment procedure was as follows:

- Obtain information on energy centre emission rates and operating hours;
- Obtain information on Gross Floor Area (GFA) and allocation of land use types of the proposed development;
- Enter the above information into the assessment tool; and
- Compare the study results with Building Emissions Benchmarks[17],[18] (BEBs).

In circumstances where the benchmark is exceeded, mitigation measures to reduce emissions may be applied on-site or off-site. Where this is not practical or desirable, some form of pollutant offsetting could be applied.

[16] Air Quality Consultants (2013) Air Quality Neutral Planning Support: GLA 80371
[17] AQC (2014) Air Quality Neutral Planning Support Update (GLA 80371)
[18] GLA (2014) Sustainable Design and Construction Supplementary Planning Guidance, Section 4.3 & Appendix 6

Building Emission Benchmarks (BEBs) have been set for NO_x according to the land-use classes of the development. These are presented in Table 6. NO_x emissions (g/m^2/annum) for each land-use class in the development need to be calculated and summed to give the total building emissions. The BEBs for the development are then calculated using the values in Table 6 and subtracted from the total building emissions for the development. Should the outcome be negative, then the building emissions from the development are within the benchmark, thus no mitigation or offsetting would be required.

No PM_{10} emissions are included, as none would be expected from the natural gas fired boilers.

Table 6 Air quality neutral emissions benchmarks for building emissions

Land-use class	**GFA (m^2)**	**Central Area Zone**	
		NOx (g/m^2/annum)	PM_{10} (g/m^2/annum)
Class A1	607	13.7	0.8
Class A2 and B1	17,306	533.0	30.6
Class C3	6,922	181.4	15.8

5 Assessment of Existing Air Quality

5.1 Sources of Air Pollution

Industrial processes

Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met and ensuring that any releases to the environment are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A or Part B processes, regulated through the Pollution Prevention and Control (PPC) system[19,20]. The larger more polluting processes are regulated by the Environment Agency (EA) and the smaller less polluting ones by the local authorities. Local authorities tend also to regulate only for emissions to air whereas the EA regulates emissions to air, water and land.

There is one regulated process for emissions to air within 1.5km of the proposed development, the Citigen plant located at 47-53 Charterhouse Street, which is around 900m to the east of the site. The operation of these processes and subsequent emissions are included in baseline monitoring data available from LBC and therefore their effect on ambient air quality at the proposed development site has been considered.

Road traffic

In recent decades, transport atmospheric emissions on a national basis have grown to match or exceed other sources in respect of many pollutants, particularly in urban areas. Vehicle emissions are likely to be the dominant source of air pollutants in the vicinity of the proposed development site.

The site is bounded to the north and south by Eagle Street and High Holborn respectively. Traffic data for the nearest traffic count points on High Holborn are shown in Table 7. Emissions from traffic using this road will significantly influence pollutant concentrations in the vicinity of the proposed development.

Table 7: Annual Average Daily Traffic Flows (AADF) for 2014[21]

Road Name	Count Point ID	Distance from site	2014 AADF for All Vehicles
High Holborn (A40)	75102	Adjacent to the south	15,902
High Holborn (A40)	6425	Adjacent to the south	16,928

[19] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)
[20] The Environmental Permitting (England and Wales) (Amendment) Regulations 2013, SI 2013/390
[21] Accessed from www.dft.gov.uk Accessed July 2015

5.2 Local Air Quality

The Environment Act 1995 requires local authorities to review and assess air quality with respect to the objectives for seven pollutants specified in the National Air Quality Strategy. Local authorities are required to carry out an Updating and Screening Assessment (USA) of their area every three years. If the USA identifies potential hotspot areas likely to exceed air quality objectives, then a Detailed Assessment of those areas is required. Where objectives are not predicted to be met, local authorities must declare the area as an AQMA. In addition, local authorities are required to produce an Air Quality Action Plan (AQAP) which includes measures to improve air quality within the AQMA.

As part of the review and assessment process, LBC has declared a borough wide AQMA. The AQMA has been declared due to exceedences of the annual mean NO_2 air quality objective, and the 24-hour mean PM_{10} objective. As such, the proposed development is located within an AQMA.

5.2.1 Local Monitoring

Air quality monitoring is undertaken in the borough using both continuous and passive monitoring methods. There are four automatic monitoring sites within 1.5km of the proposed development. One of the sites (Holborn) was only installed in 2015, and so annual average data are not yet available. Monitoring data for NO_2 and PM_{10} for the other three sites are shown in Table 8, for 2012 to 2014.

Table 8 shows that the annual mean NO_2 objective has been exceeded at all sites in 2012 to 2014, however there are no exceedences of the PM_{10} objective. Where concentrations of NO_2 are greater than 60µg/m^3 it is likely that there were also exceedences of the NO_2 hourly mean air quality objective[22].

Figure 2 presents the locations of the automatic monitoring sites within approximately 1.5km of the proposed development.

Table 8 Monitored annual mean pollutant concentrations at automatic monitoring sites within 1.5km of the proposed development

Site	**Site Type**	**Site OS Grid Ref**		**Annual mean NO_2 concentration (µg/m^3)**			**Annual mean PM_{10} concentration (µg/m^3)**		
		x	**y**	**2012**	**2013**	**2014**	**2012**	**2013**	**2014**
London Bloomsbury	Urban Background	530120	182034	**55**	**44**	**51**	19	18	20
Shaftesbury Avenue	Roadside	530060	181290	**71**	**74**	-	30	-	25
Euston Rd	Roadside	529878	182648	**106**	**106**	**104**	-	-	-
Air Quality Objective				**40**			**40**		

Note - exceedences of the annual mean objective are highlighted as **bold**

[22] Defra (20019) Local Air Quality Management: Technical Guidance LAQM.TG(09)

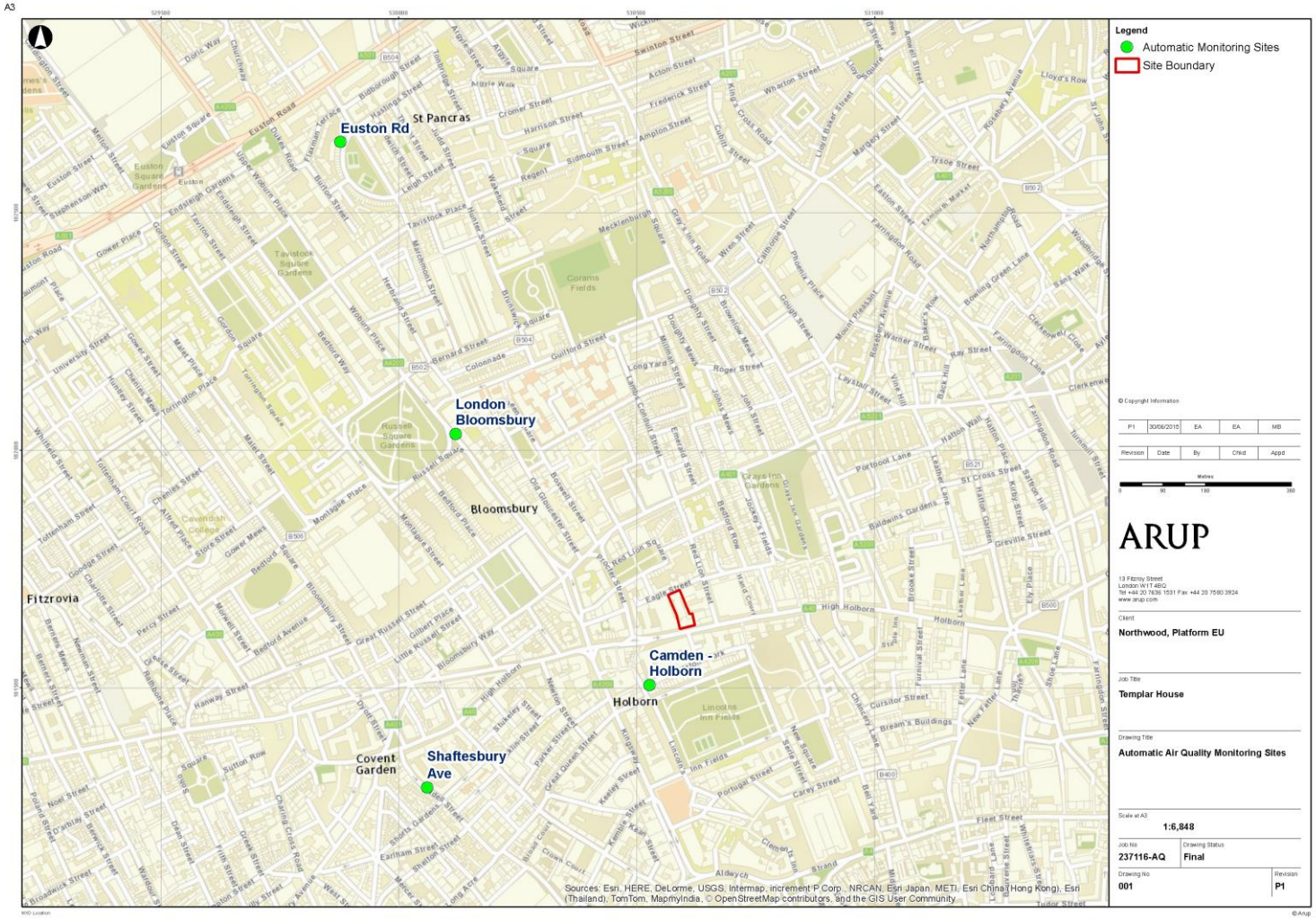
Table 9 shows the monitoring results for NO_2 measured using diffusion tubes in Camden, for the years 2012 and 2013. This shows that the annual mean NO_2 objective has been exceeded at the majority of sites in 2012 and 2013.

Table 9 Monitored annual mean NO_2 concentrations at diffusion tube monitoring sites in Camden

Site ID	Site Name	Site Type	Annual mean NO_2 concentration ($\mu g/m^3$)	
			2012	2013
CA4	Euston Road	Roadside	**82.1**	**107.8**
CA6	Wakefield Gdns	Urban background	**39.3**	**40.3**
CA16	Kentish Town Road	Roadside	**59.0**	**65.3**
CA7	Frognal Way	Urban background	28.9	**40.0**
CA17	47 Fitzjohn's Ave	Roadside	**61.2**	**65.2**
CA15	Swiss Cottage, Finchley Rd	Kerbside	**72.7**	**83.1**
CA20	Brill Place	Roadside	**50.0**	**49.4**
CA10	Tavistock Gdns	Urban background	**40.1**	**49.4**
CA11	Tottenham Court Road	Kerbside	**83.3**	**88.1**
CA25	Emmanuel Primary School	Roadside	**45.9**	**57.9**
CA23	Camden Rd	Roadside	**67.4**	**77.9**
CA21	Bloomsbury St	Roadside	**71.6**	**76.1**
CA24	Chetwynd Rd	Roadside	**43.7**	**47.8**
Temp	Wittanhurst Lane	Roadside	**52.4**	**53.1**
Air Quality Objective			**40**	

Note - exceedences of the annual mean objective are highlighted as **bold**

Figure 2 Air Quality monitoring Locations



5.3 Background concentrations

The DEFRA website[23] includes estimated background air pollution data for a baseline year of 2015 and for 2016, for NO_x, NO_2 and PM_{10} for the 1km by 1km OS grid square for the proposed development.

The estimated pollutant concentrations are shown in Table 10 this shows that background concentrations for the relevant grid square are predicted to be below the air quality objective for annual mean PM_{10}, and above the air quality objective for annual mean NO_2 in both 2015 and 2016.

Table 10 Baseline background pollutant concentrations

OS grid square		2015 annual mean concentration (µg/m^3)			2016 annual mean concentration (µg/m^3)		
X	**Y**	**NO_x**	**NO_2**	**PM_{10}**	**NO_x**	**NO_2**	**PM_{10}**
530500	181500	87.8	**48.9**	24.9	84.1	**47.2**	24.7
Air Quality Objective		-	40	40	-	40	40

Results in **bold** show an exceedence of the relevant annual mean objective for human health

[23] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

6 Assessment of Construction Effects

The site currently consists of a single office building, which comprises 7 levels of office space, a ground floor and 1 level of basement. The project involves the demolition of the existing commercial office building and the construction of two new buildings in its place. The effects from demolition, earthworks, construction and trackout activities on local air quality, are considered in the following section.

Sensitive Receptors

Receptors are defined as those properties that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction of the proposed development. The closest residential dwellings are considered to be less than 20m from the site boundary, see Figure 3.

The sensitivity of the area to dust soiling and human health effects has been assessed to be *high* due to the presence of more than 100 receptors within 20m of the site boundary, as a worst case assumption.

The sensitivity of the area to dust soiling and human health effects during the construction phase is shown in Table 11.

Table 11 Sensitivity of the area

Activity	Sensitivity of the surrounding area			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	High	High	High	High
Human health	High	High	High	High

Dust Emission Magnitude

Following the methodology outlined, and the criteria presented in **Table 2**, each dust-generating activity has been assigned a dust emission magnitude as shown in Table 12. For earthworks, it has been assumed that these will occur across the entire site area as a worst case.

Table 12 Dust emission magnitude for construction activities

Activity	Dust emission magnitude	Reasoning
Demolition	Medium	Total building volume to be demolished is around 43,000m^3
Earthworks	Medium	Total site area is less than 2,500m^2 Total material to be moved is approximately 8,000 tonnes. Site soil type is mainly sand and gravel, but there may be some clay.
Construction	Medium	Total building volume to be constructed is approximately 90,000m^3 Potentially dusty construction material
Trackout	Medium	It is anticipated that the number of heavy duty vehicle movements would be between 10 and 50 vehicle trips per day.

Using the criteria set out in the risk of dust impacts table (Table 5), the impacts on the area without mitigation are defined. Appropriate mitigation measures are outlined in section 8, and these will be included within the construction environmental management plan for the proposed development.

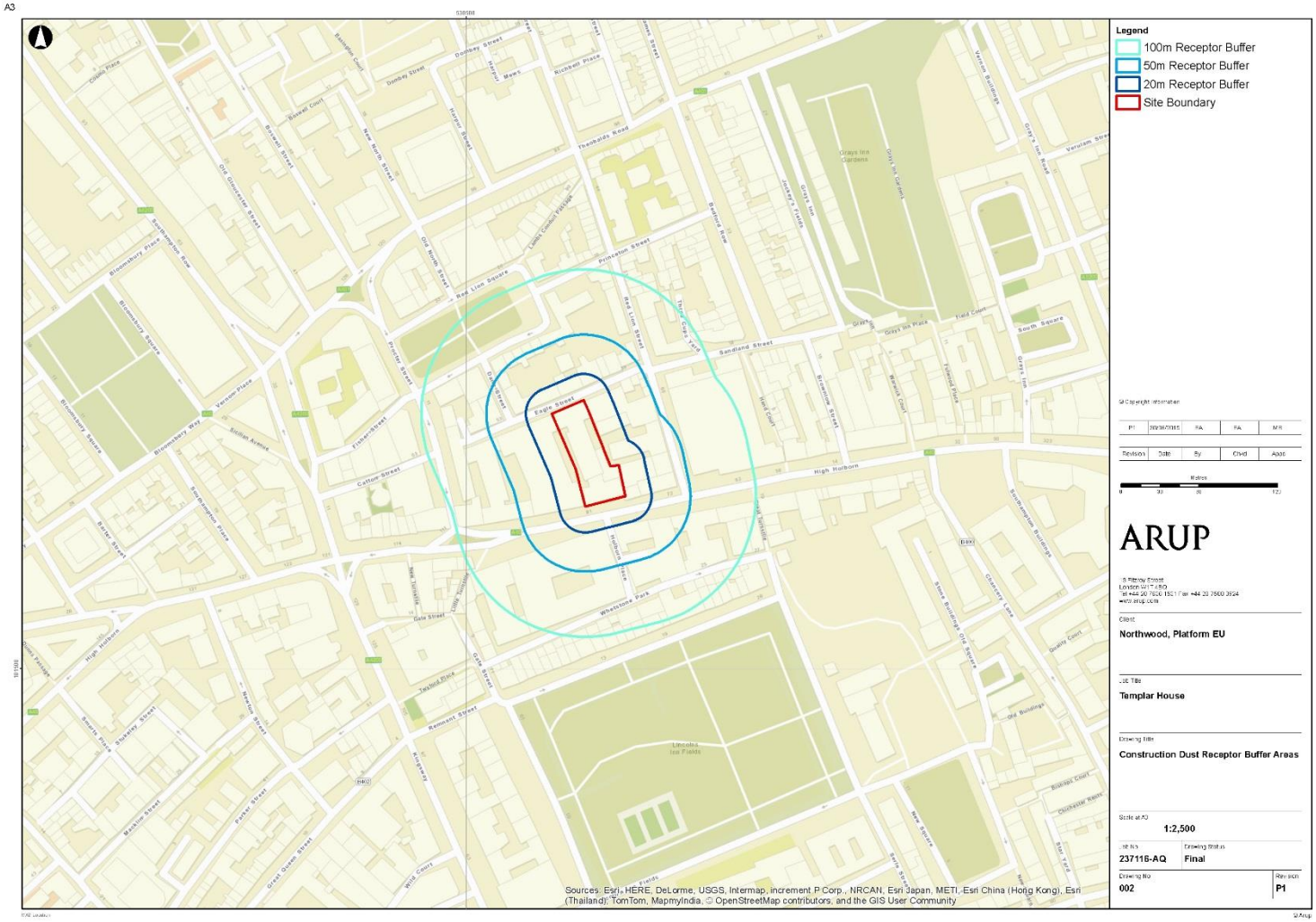
Risk of Impacts

Taking into consideration the dust emission magnitude and the sensitivity of the area, the site has been classified as *medium risk* for all activities at worst (Table 13).

Table 13 Summary dust risk table prior to mitigation

Activity	Dust Emission Magnitude	Risk of Dust Soiling	Human Health Risk
Demolition	Medium	Medium Risk	Medium Risk
Earthworks	Medium	Medium Risk	Medium Risk
Construction	Medium	Medium Risk	Medium Risk
Trackout	Medium	Medium Risk	Medium Risk

Figure 3 Construction Dust Effect Buffers



7 Assessment of Operational Effects

7.1 Road Traffic Emissions

The transport consultants for the proposed development (Arup) calculated the change in vehicle numbers likely to be created by the proposed development in comparison to the existing site use. The site is located in an area where public transportation is readily accessible.

The existing development has a number of parking places. These are disabled parking (for 1/2 vehicles), reserved parking (for 2 vehicles), VIP parking (for 5 vehicles), facilities management van parking (for 2 vehicles), and standard car parking (for 6 vehicles). Conversely, the proposed development would be car free except for one disabled parking space for office use and one disabled parking space for retail use.

The transport consultants have stated that with the new development in place there is predicted to be:

- 7 fewer car driver trips (AADT) than the existing development;
- 1 less car passenger trip (AADT) than the existing development; and
- 12 extra servicing trips (AADT) than the existing development – which would be a mixture of vans and HGVs.

Based on the above information, the proposed development is not anticipated to result in a change in AADT flows of more than 100, produce over 25 HDV movements per day or significantly affect average speeds on the local road network. As such, potential air quality impacts associated with operational phase road vehicle exhaust emissions are predicted to be *negligible*, in accordance with the EPUK screening criteria.

7.2 Energy Centre Emissions

The development is proposed to be served by four natural gas fired boilers, two boilers for the commercial development and two boilers for the residential development. The combined size of the boilers is greater than the 300kW criteria, however the combined NO_x emission rate for the four boilers is 10.7mg/s and the PM_{10} emission rate for both boilers is considered to be extremely low, at almost zero.

The residential boilers will provide domestic hot water for all apartments and operation is likely to span 2-3 hours in the morning and 2-3 hours in the evening while tenants are using hot water. The residential boilers do not provide space heating.

The commercial building boilers will be operated on a schedule and temperature sensing demand. In summer, they will operate for a short period, around 1-2 hours in the morning, and then will provide a baseline energy for heating domestic hot

water (which is likely to be less than 10% of the boiler's capacity). In winter it is anticipated that the boilers are likely to be operated throughout the day to provide space heating, for around 11 hours per day, for weekdays only. It is unlikely that the boilers will ever operate at their peak capacity.

Due to the low emission rates, and small number of operational hours, it is unlikely that the boilers will ever operate at their peak capacity, and unlikely that there will be a significant impact on local air quality and therefore no further detailed assessment is considered to be required. The emissions associated with the energy centre are considered further in the Air Quality Neutral assessment.

7.3 Air Quality Neutral

An Air Quality Neutral Assessment has been undertaken as required by the Sustainable Design and Construction SPG. This assessment is carried out in accordance with Air Quality Neutral Planning Support[24] (2013), which specifies the assessment methodology for replacement developments as follow:

For “replacement use” development, where the site is in existing use, an air quality neutral policy would seek to ensure that emissions from the new development are no greater than the previous use.

Road Traffic

As stated above, the proposed private residential development is proposed to be car free, and therefore is not anticipated to result in a significant increase of AADT flows on the local road network, or significantly affect average speeds. As such the proposed development meets the relevant Air Quality Neutral criterion of no increase in emissions above the current use.

Building emissions

An Air Quality Neutral assessment has been carried out as required by the Sustainable Design and Construction SPG using the methodology described in Section 4.3.3.

The residential boilers are anticipated to be operational for 6 hours a day at most, and the commercial building boilers are anticipated to be operational for around 11 hours a day in the winter. As a worst case assessment all boilers have been assumed to be operational for 11 hours a day, throughout the year. This results in total NOx emissions of 10.7mg/s.

The input data for the air quality neutral assessment of the proposed development are presented in Table 14. This has been provided by Arup, the building engineers for the development.

[24] Air Quality Consultants (2013) Air Quality Neutral Planning Support: GLA 80371

Table 14 Input data to air quality neutral assessment

Field	Quantity	Unit
Land use / Gross Floor Area	Class A1 / 607	m^2
	Class A2 and B1 / 17,306	m^2
	Class C3 / 6,922	m^2
Combined building NO_x emissions	0.0107	g/s
Combined building PM_{10} emissions	0	g/s
Operation hours	4015	hours

The building emission benchmarks (BEB) have been calculated using gross internal area and gross external area in the absence of gross floor area for each land use type, which provides more conservative assessment results. The relevant benchmarks for each land use types from the guidance are presented in Table 7. The overall BEB for the development is the sum of these emissions as presented in Table 15.

Table 15 Building emission benchmarks for the proposed development

Land use	NOx (kg/annum)	PM_{10} (kg/annum)
Class A1	13.7	0.8
Class A2 and B1	533.0	30.6
Class C3	181.4	15.8
Total BEB	728.1	47.2

Table 16 shows the comparison of the TBE and BEB for the development. The NO_x and PM_{10} emissions comply with the requirements of the GLA Sustainable Design and Construction SPG, being well within the benchmarks. Therefore, the proposed development is considered to be 'air quality neutral' in relation to building emissions and no further mitigation would be required.

Table 16 Comparison of the Total Building Emissions (TBE) and BEB (kg/annum)

Pollutant	TBE	BEB	Difference	Outcome
NOx (kg/annum)	154	728	-574	Within benchmark
PM_{10} (kg/annum)	0	47	-47	Within benchmark

8 Mitigation

Construction

The dust emitting activities assessed in Section 0 can be greatly reduced or eliminated by applying the site specific mitigation measures for *medium risk* sites according to the IAQM guidance. The following measures from the guidance are relevant and should be included in the Construction Environmental Management Plan for the site, which will be submitted as a planning condition. Where mitigation measures are successfully implemented, the residual air quality effects as a result of the construction phase of the proposed development are predicted to be negligible.

General

- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager; and
- Display the head or regional office contact information.

Site management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- Make the complaints log available to the local authority when asked; and
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site and the action taken to resolve the situation in the log book.

Monitoring

- Carry out regular site inspections to monitor compliance with the Dust Management Plan, record inspection results and make an inspection log available to the local authority, when asked;
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions; and
- Agree dust deposition, or real-time PM_{10} continuous monitoring with the local authority.

Site maintenance

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;

- Avoid site runoff of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site;
- Cover, seed or fence stockpiles to prevent wind whipping; and
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out.

Operating vehicle/machinery and sustainable travel

- 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 15mph on surfaced and 10mph on un-surfaced haul roads and work areas;
- Implement a Travel Plan than supports and encourages sustainable travel for staff at the site (public transport, cycling, walking and car-sharing);
- Ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport; and
- Implement a Construction Logistics Plan which outlines appropriate haul routes for HGVs.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques, such as water sprays or local extraction;
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use the fine water sprays on such equipment wherever appropriate; and
- Avoid scabbling (roughening of concrete surfaces) if possible.

Waste management

- Fires will not be held on site.

8.1.1 Specific Measures

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 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 needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground; and
- Bag and remove any biological debris or damp down such material before demolition.

Construction

- Avoid scabbling if possible; and
- Ensure bulk cement and other fine powder material bags are sealed after use and stored appropriately to prevent dust.

Trackout

- Regularly use water-assisted dust sweeper(s) on the access and local roads, to remove, as soon as practicable any material tracked out of the site;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport;
- Inspect haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- Record all inspections of haul routes and any subsequent action in a site log book;
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable); and
- Locate access gates away from receptors, where possible.

8.2 Operation

As the proposed development does not result in any significant effects for local air quality no mitigation for the operational phase is required.

The boilers used are below the benchmarks from the air quality neutral guidance so no mitigation is required.

9 Conclusion

This report presents the air quality assessment for the Templar House Project in Camden, London.

A review of the current legislation and planning policy has been undertaken, along with a baseline assessment describing the current air quality conditions in the vicinity of the proposed development and an assessment of air quality impacts associated with the operation of the scheme.

The site of the proposed development is located within the London Borough of Camden AQMA, designated due to exceedences of the annual mean NO_2 air quality objective, and the 24-hour mean PM_{10} objective.

The construction effects have been assessed using the qualitative approach described in the latest IAQM guidance and it was concluded that with appropriate mitigation measures in place there is likely to be a *negligible* effect from the dust-generating activities on site.

Potential impacts during the operational phase of the proposed development may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. An assessment was therefore undertaken using the EPUK/IAQM screening criteria which indicated that impacts are likely to be *negligible* throughout the operational phase.

An Air Quality Neutral assessment has been undertaken as required by the GLA Sustainable Design and Construction SPG. This indicated that the proposed development complies with the requirements of the SPG and no further mitigation is required.

As such, the operation of the proposed development is expected to have an overall *negligible* impact to the surrounding area and air quality is considered of minor significance in the planning process.

Appendix A

Air Quality - PPG Flowchart