GREENWOOD PLACE AND HIGHGATE ROAD SITE

Community Resource Centre, Centre for independent living and new residential units

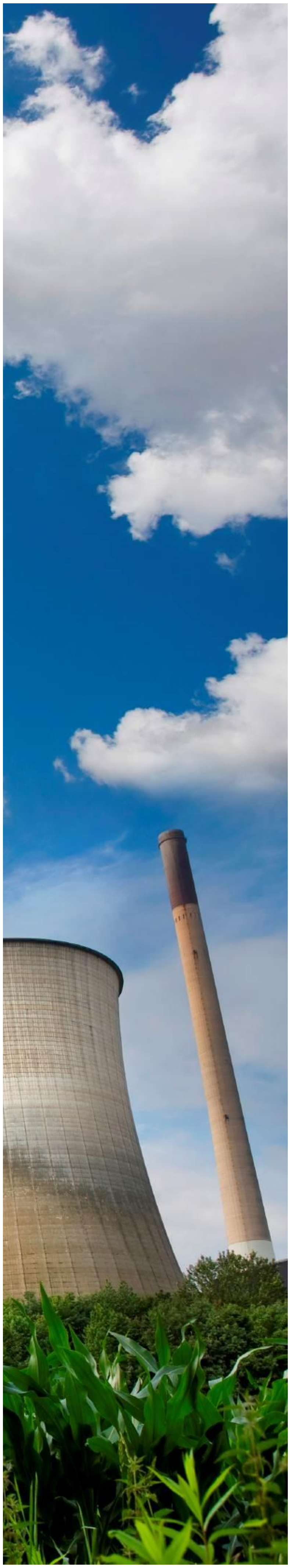
Air Quality Assessment

September 2013

Camden

Tibbalds Multidisciplinary Team

CampbellReith consulting engineers



Air Quality Assessment Greenwood Place and Highgate Road Site: Community Resource Centre, Centre for Independent Living and Residential Units

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EXECUTIVE SUMMARY

Resource and Environmental Consultants Ltd was commissioned by Campbell Reith Hill LLP to undertake an Air Quality Assessment in support of the planning application for a proposed Community Resource Centre, Centre for Independent Living and Residential units at Greenwood Place and Highgate Road, Kentish Town, London.

The proposals comprise the development of community use, residential units and associated infrastructure in order to deliver a centre of excellence for adult social care.

The development is located with an area identified by London Borough of Camden as having elevated pollutant levels. Subsequently there are concerns that the proposals will introduce future site users to an area of poor air quality. Additionally, the development has the potential to cause air quality impacts at sensitive locations during the construction and operational phases. These may include fugitive dust emissions from construction works, road vehicle exhaust emissions associated with traffic generated by the site and emissions from the proposed energy provision. As such, an Air Quality Assessment was required to quantify pollution levels across the site, consider its suitability for the proposed end-use and assess potential impacts upon pollution levels as a result of the proposals.

During the construction phase of the development there is potential for air quality impacts as a result of fugitive dust emissions from the site. These were assessed in accordance with Greater London Authority methodology. Assuming appropriate mitigation measures are implemented, air quality impacts during the construction phase are considered to be acceptable for a development of this size and nature.

Dispersion modelling was undertaken in order to quantify existing pollutant concentrations at the site and to predict air quality impacts as a result of road vehicle exhaust emissions associated with traffic generated by the development, as well as atmospheric emissions from the proposed on-site energy provision.

The results of the baseline dispersion modelling assessment predicted pollution levels above the relevant air quality standard across part of the development site at ground floor level. As such, mechanical ventilation should be included to reduce potential exposure of future site users to poor air quality. This type of mitigation is suggested within best practice guidance and is considered suitable for a development of this size and nature.

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 and combustion emissions from the proposed Energy Centre. An assessment was therefore undertaken to quantify pollutant concentrations both with and without the proposals in place. This indicated increases in pollutant concentrations would not be significant at any sensitive location in the vicinity of the site. The use of robust assumptions where necessary was considered to provide sufficient results confidence for an assessment of this nature.

Based on the assessment results, air quality issues are not considered a constraint to planning consent.

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APPENDICES

1.0 INTRODUCTION

1.1 Background

Resource and Environmental Consultants (REC) Ltd was commissioned by Campbell Reith Hill LLP to undertake an Air Quality Assessment in support of the planning application for a Community Resource Centre, Centre for Independent Living and Residential units at Greenwood Place and Highgate Road, Kentish Town, London.

Sensitive locations could potentially be affected by atmospheric emissions associated with the proposals during the construction and operational phases. Furthermore, the development site is located within an area of poor air quality that could result in exposure of future site users to elevated pollution levels. As such, an Air Quality Assessment was required to determine baseline conditions, consider site suitability for the proposed end-use and assess potential impacts as a result of the proposals.

1.2 Site Location and Context

The site is located at Greenwood Place and Highgate Road, Kentish Town, London at National Grid Reference (NGR): 528851, 185421. Reference should be made to Figure 1 for a location plan.

The proposals include the development of community use and residential units in order to deliver a centre of excellence for adult social care. A 65kW thermal/43kW electrical gas fired combined heat and power (CHP) plant and two 250kW gas boilers are also proposed within the on-site Energy Centre to provide low carbon energy for the development.

The site is located within the London Borough of Camden (LBoC) Air Quality Management Area (AQMA) which has been declared due to exceedences of the annual mean Air Quality Limit Value (AQLV) for nitrogen dioxide (NO_2) and the 24-hour AQLV for particulate matter with an aerodynamic diameter of less than 10µm (PM_{10}). Subsequently, there are concerns that the proposals will introduce new exposure into an area of poor air quality. Additionally, the development has the potential to cause air quality impacts at sensitive locations during the construction and operational phases. This may include fugitive dust emissions associated with construction works, road traffic exhaust emissions from vehicles travelling to and from the development site during the operational phase and atmospheric emissions from the proposed Energy Centre. An Air Quality Assessment was therefore undertaken in order to consider site suitability for the proposed end-use and assess potential impacts on pollutant levels as a result of the proposals.

1.3 Limitations

This report has been produced in accordance with REC's standard terms of engagement. REC has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from REC; a charge may be levied against such approval.

2.0 AIR QUALITY LEGISLATION AND POLICY

2.1 European Legislation

European Union (EU) air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new air quality objectives for particulate matter with an aerodynamic diameter of less than 2.5µm ($PM_{2.5}$). The consolidated Directives include:

- Directive 99/30/EC - the First Air Quality "Daughter" Directive - sets ambient AQLVs for NO_2, oxides of nitrogen (NO_x), sulphur dioxide, lead and PM_{10};
- Directive 2000/69/EC - the Second Air Quality "Daughter" Directive - sets ambient AQLVs for benzene and carbon monoxide; and,
- Directive 2002/3/EC - the Third Air Quality "Daughter" Directive - seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

The fourth daughter Directive was not included within the consolidation and is described as:

- Directive 2004/107/EC - sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

2.2 UK Legislation

The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and transpose the EU Directive 2008/50/EC into UK law. AQLVs were published in these regulations for 7 pollutants, as well as Target Values for an additional 5 pollutants. Table 1 presents the AQLVs for pollutants considered within this assessment.

Table 1 Air Quality Limit Values

Pollutant	Air Quality Limit Value	
	Concentration (µg/m^3)	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean; not to be exceeded more than 18 times a year
PM_{10}	40	Annual mean
	50	24-hour mean; not to be exceeded more than 35 times a year

Part IV of the Environment Act (1995) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by the Department for

Environment, Food and Rural Affairs (DEFRA) and published in July 2007[1]. The AQS sets out Air Quality Objectives (AQOs) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale.

2.3 Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves considering present and likely future air quality against the AQOs. If it is predicted that levels at sensitive locations where members of the public are regularly present for the relevant averaging period are likely to be exceeded, the LA is required to declare an AQMA. For each AQMA the LA is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.4 Dust

The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2010) and subsequent amendments, such as construction sites, is that provided in Section 79 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

> "any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance."

Enforcement of the Act, in regard to nuisance, is currently under the jurisdiction of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the LA is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Environmental Protection Act (1990). Enforcement can insist that there be no dust beyond the boundary of the works. The only defence is to show that the process to which the nuisance has been attributed and its operation are being controlled according to best practice measures.

2.5 National Planning Policy

The National Planning Policy Framework (NPPF)[2] was published on 27th March 2012 and sets out the Government's core policies and principles with respect to land use planning, including air quality. The document includes the following considerations which are relevant to this assessment:

> "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"

[1] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.
[2] National Planning Policy Framework, Department for Communities and Local Government, 2012.

> "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."

The implications of the NPPF have been considered throughout this assessment.

2.6 Local Planning Policy

2.6.1 The London Plan

The London Plan[3] was approved in 2011 and sets out a fully integrated economic, environmental, transport and social framework for the development of the capital until 2031. London boroughs' local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

The London Plan policies relating to air quality are outlined below:

"Policy 5.3 - Sustainable design and construction

Strategic

- The highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments and to adapt to the effects of climate change over their lifetime.

Planning decisions

- Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.
- Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:
- […]
- Minimising pollution (including noise, air and urban run-off)
- […]"

"Policy 7.14 - Improving air quality

Strategic

- 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,

3 The London Plan, Greater London Authority, 2011.

transport and design policies of this plan support implementation of his Air Quality and Transport strategies to achieve reductions in pollutant emissions and minimise public exposure to pollution.

Planning decisions

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 plans (see Policy 6.3).
- 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 Council's '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."

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

2.6.2 Camden Core Strategy

Camden’s Local Development Framework (LDF) consists of a portfolio of documents, of which the Core Strategy[4] and Development Policies are the principal overarching parts. These documents were formally adopted in 2010 and set out the spatial vision, objectives, development strategy and a series of key policies that will guide the scale, location and type of development in the borough until 2025. As such, the policies contained within the Core Strategy and Development Policies provide the current basis for the determination of planning applications within LBoC's area of jurisdiction.

A review of the Core Strategy and Development Policies indicated the following policy in relation to air quality that is relevant to this assessment:

"Policy CS16 – Improving Camden’s Health and Wellbeing.

The Council will seek to improve health and well-being in Camden. We will:

[4] Camden Core Strategy, London Borough of Camden, 2010.

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."

And

"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.

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."

The implications of these policies have been considered through the production of this Air Quality Assessment.

3.0 METHODOLOGY

The proposed development has the potential to cause air quality impacts during the construction and operational phases. These have been assessed in accordance with the following methodology.

3.1 Construction Phase Assessment

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Greater London Authority (GLA) document 'Best Practice Guidance: The Control of Dust and Emissions from Construction and Demolition'[5].

The potential for a demolition or construction site to impact at sensitive receptor locations is dependent on many factors. These include the following:

- Location of the building site;
- Proximity of sensitive receptors;
- Extent of excavation;
- Nature, location and size of stockpiles and the length of time they are on site;
- Necessity for on-site concrete crusher or cement batcher;
- Number and type of vehicles and plant required on site;
- Potential for dirt and mud to be made airborne through vehicle movements; and,
- Weather conditions.

The potential risk of impacts associated with fugitive dust emissions was assessed through comparison with a number of criteria. These take into account:

- The area of the development;
- The number of properties being developed; and,
- Potential impacts at sensitive receptors close to the development.

The evaluation criteria for assessing the dust risk category of a construction site outlined in the GLA[6] methodology are summarised in Table 2.

Table 2 Site Evaluation Guidelines

Risk Category	Criteria
Low	• Development of up to 1,000m^2 of land • Development of one property up to a maximum of ten • Potential for emissions and dust to have an infrequent impact on sensitive receptors

5 Best Practice Guidance: Control of Dust and Emissions from Construction and Demolition, Greater London Authority, 2006.
6 Best Practice Guidance: Control of Dust and Emissions from Construction and Demolition, Greater London Authority, 2006.

Risk Category	Criteria
Medium	• Development of between 1,000 and 15,000m^2 of land • Development of between ten and 150 properties • Potential for emissions and dust to have an intermittent or likely impact on sensitive receptors
High	• Development of over 15,000m^2 of land • Development of over 150 properties • Potential for emissions and dust to have significant impact on sensitive receptors

The guidance document provides suitable mitigation measures to control impacts to an acceptable level based on the results of the risk assessment. These were reviewed and included within the report where relevant.

3.2 Operational Phase Assessment

3.2.1 Road Traffic Exhaust Emissions

The proposed development has the potential to cause air quality impacts as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site during the operational phase, as well as introducing new residents and students into an area of poor air quality. In order to assess NO_2 and PM_{10} concentrations at sensitive locations, detailed dispersion modelling was undertaken using ADMS-Roads.

Modelling was undertaken for the following scenarios:

- 2012 - Verification year;
- 2015 - Opening year do-minimum scenario; and,
- 2015 - Opening year do-something scenario.

Reference should be made to Appendix II for assessment input data. The significance of predicted impacts was assessed in accordance with the methodology outlined in Section 3.2.3.

3.2.2 Energy Centre Emissions

The proposals include an energy centre comprising a 65kW thermal/43kW electrical gas fired CHP plant and two 250kW gas boilers. This will be located within the Greenwood Centre, with exhaust gases directed through three flues discharging at 1m above parapet level on Deane House to the west of the site.

The combustion of natural gas results in NO_x emissions, which can contribute to elevated ground level NO_2 concentrations. Potential impacts on existing pollution levels have been assessed though dispersion modelling, with the results combined with those obtained from the assessment of road vehicle exhaust emissions to calculate the cumulative impact of the development on NO_2 concentrations in the vicinity of the site. Reference should be made to Appendix III for assessment input data. The significance of predicted impacts was assessed in accordance with the methodology outlined in Section 3.2.3.

3.2.3 Impact Significance

The significance of predicted air quality impacts during the operation of the proposed development was defined at sensitive locations in the vicinity of the site. Receptors were initially identified in accordance with the following guidance provided in LAQM.TG(09)[7] on where annual mean AQLVs should apply:

- Residential properties;
- Schools;
- Hospitals; and,
- Care homes.

Potential impacts were then assessed in accordance with the guidance outlined within Environmental Protection UK (EPUK) Development Control: Planning for Air Quality (2010 update)[8]. This was undertaken in lieu of significance descriptors within the London Councils Air Quality and Planning Guidance[9] which are required to provide an indication of impacts associated with the development. The change in pollutant concentration predicted as a total of both traffic and Energy Centre emissions was used in the assessment in order to consider cumulative effects associated with the development.

It should be noted that predicted pollution concentrations at each receptor location are provided within this report to allow LBoC to use their professional judgement in determining the significance of impact, in accordance with the requirements of the London Councils Air Quality and Planning Guidance[10].

The sensitivity of each receptor was defined based on air quality conditions should the development proceed and the criteria contained within Table 3. These are based upon the guidance provided within the EPUK Development Control: Planning for Air Quality (2010 update)[11].

Table 3 Operational Impacts - Receptor Sensitivity

Sensitivity	Description
Very high	Pollutant levels above environmental assessment criteria e.g. • NO_2 or PM_{10} annual mean greater than 40µg/m^3 • More than 35-days with PM_{10} concentrations greater than 50µg/m^3
High	Pollutant levels between 90% and 100% of environmental assessment criteria e.g. • NO_2 or PM_{10} annual mean 36 - 40µg/m^3 • 32 to 35-days with PM_{10} concentrations greater than 50µg/m^3
Medium	Pollutant levels between 75% and 90% of environmental assessment criteria e.g. • NO_2 or PM_{10} annual mean 30 - 36µg/m^3 • 26 to 32-days with PM_{10} concentrations greater than 50µg/m^3

7 Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.
8 Development Control: Planning for Air Quality (2010 update), Environmental Protection UK, 2010.
9 London Councils Air Quality and Planning Guidance, London Councils, 2007.
10 London Councils Air Quality and Planning Guidance, London Councils, 2007.
11 Development Control: Planning for Air Quality (2010 update), Environmental Protection UK, 2010.

Sensitivity	Description
Low	Pollutant levels below 75% of environmental assessment criteria e.g. • NO_2 or PM_{10} annual mean below 30µg/m^3 • Less than 26-days with PM_{10} concentrations greater than 50µg/m^3

The magnitude of change in pollutant concentrations was defined based on the criteria outlined in Table 4.

Table 4 Operational Impacts - Magnitude of Change

Magnitude of Change	Change in Pollutant Level as Proportion of Assessment Criteria (%)
Large	Greater than 10
Medium	5 - 10
Small	1 - 5
Imperceptible	Less than 1

Impact significance was defined based on the interaction between the sensitivity of the affected receptor and the magnitude of change, as outlined in Table 5.

Table 5 Operational Impacts - Significance of Impact

Sensitivity	Magnitude of Change			
	Imperceptible	Small	Medium	Large
Very high	Negligible	Slight	Moderate	Substantial
High	Negligible	Slight	Moderate	Moderate
Medium	Negligible	Negligible	Slight	Slight
Low	Negligible	Negligible	Negligible	Slight

It should be noted that the criteria shown in Table 3 and Table 4 and the matrix shown in Table 5 are adapted from the EPUK Development Control: Planning for Air Quality (2010 update)[12] guidance document with sensitivity descriptors included to allow comparisons of various air quality impacts.

Following the prediction of impacts at discrete receptor locations the EPUK[13] document provides guidance on determining the overall air quality impact significance of the operation of a development. The following factors are identified for consideration by the assessor:

- Number of properties affected by significant air quality impacts and a judgement on the overall balance;

12 Development Control: Planning for Air Quality (2010 update), Environmental Protection UK, 2010.
13 Development Control: Planning for Air Quality (2010 update), Environmental Protection UK, 2010.

- Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant;
- The magnitude of changes and the descriptions of the impacts at the receptors;
- Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased;
- Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced; and,
- The extent to which an objective or limit value is exceeded e.g. an annual mean NO_2 concentration of 41µg/m^3 should attract less significance than an annual mean of 51µg/m^3.

These factors were considered and an overall significance determined for the impact of operational phase road traffic emissions. It should be noted that the determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts. The EPUK[14] guidance suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix III.

3.2.4 Predicted Concentrations at the Development Site

The proposed development includes residential land use and as such has the potential to introduce new receptors into an area of existing poor quality. Detailed dispersion modelling was therefore undertaken to quantify NO_2 and PM_{10} concentrations across the site and determine suitability for the proposed use.

Dispersion modelling was undertaken for the development opening year of 2015 and included both traffic and Energy Centre emissions, as previously outlined. Reference should be made to Appendix II and Appendix III for details of the assessment inputs.

The results of the dispersion modelling assessment were compared against the Air Pollution Exposure Criteria (APEC) contained within the London Councils Air Quality and Planning Guidance[15] from the London Air Pollution Planning and the Local Environment (APPLE) working group. These are outlined in Table 6.

Table 6 Air Pollution Exposure Criteria

Category	Applicable Range	Recommendation
APEC - A	Below 5% of the annual mean AQLV	No air quality grounds for refusal; however mitigation of any emissions should be considered
APEC - B	Between 5% below or above the annual mean AQLV	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered e.g. maximise distance from pollutant source, proven ventilation systems, parking considerations, winter gardens, internal layout considered and internal pollutant emissions minimised

14 Development Control: Planning for Air Quality (2010 update), Environmental Protection UK, 2010.
15 London Councils Air Quality and Planning Guidance, London Councils, 2007.

Category	Applicable Range	Recommendation
APEC - C	Above 5% of the annual mean AQLV	Refusal on air quality grounds should be anticipated, unless the LA has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures

It should be noted that a significant area of London would fall under APEC - C due to high NO_2 concentrations throughout the city. As such, a presumption against planning consent in these locations may result in large areas of land becoming undevelopable and prevent urban regeneration. The inclusion of suitable mitigation measures to protect future residents is therefore considered a suitable way to progress sustainable schemes in these locations and has been considered within this assessment.

4.0 BASELINE

Existing air quality conditions in the vicinity of the proposed development site were identified in order to provide a baseline for assessment. These are detailed in the following Sections.

4.1 Local Air Quality Management

As required by the Environment Act (1995), LBoC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that concentrations of NO_2 and PM_{10} are above the AQLVs within the borough. As such, an AQMA has been declared, which is described as:

"Camden AQMA - The whole borough."

The development is located within the Camden AQMA. As such, there is the potential for future residents to be exposed to elevated pollutant concentrations and also adverse impacts to existing pollution levels as a result of the scheme. These factors have been considered within this report.

LBoC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQLVs and as such no further AQMAs have been designated.

4.2 Air Quality Monitoring

Monitoring of pollutant concentrations is undertaken by LBoC using continuous and periodic methods throughout their area of jurisdiction. The closest automatic analyser to the development is Camden - Swiss Cottage at NGR: 526629, 184391. This is approximately 2.4km east of the proposed boundary at a kerbside location. The site is operated as part of the London Air Quality Network[16] and monitors NO_2 and PM_{10}.

Recent NO_2 monitoring results from Camden - Swiss Cottage are shown in Table 7, exceedences of the AQLV are highlighted in **bold**.

Table 7 Camden - Swiss Cottage - NO_2 Monitoring Results

Site	Annual Mean Concentration (µg/m^3)	
	2011	2012
Camden - Swiss Cottage	**71**	**70**

As indicated in Table 7, the annual mean AQLV for NO_2 was exceeded at Camden - Swiss Cottage during recent years. This is to be expected due to its roadside location in close proximity to the A41 and B511.

Recent PM_{10} monitoring results from Camden - Swiss Cottage are shown in Table 8.

16 http://www.londonair.org.uk.

Table 8 Camden - Swiss Cottage - PM_{10} Monitoring Results

Site	Annual Mean Concentration (µg/m³)	
	2011	2012
Camden - Swiss Cottage	27	23

As indicated in Table 8, there were no exceedences of the annual mean AQLV for PM_{10} at Camden - Swiss Cottage during recent years.

LBoC also utilise diffusion tubes to measure ambient levels of NO_2 within the area of their jurisdiction. There are two monitoring sites in the vicinity of the proposed development. Recent results are shown in Table 9 with exceedences highlighted in bold.

Table 9 NO_2 Diffusion Tube Monitoring Results

Site		Approximate Distance from Proposed Development (m)	Direction from Proposed Development	NGR (m)		Annual Mean NO_2 Concentration (µg/m³)	
				X	Y	2011	2012
CA16	Kentish Town Road (Roadside)	338	SE	529013	185102	**57.19**	**58.97**
CA24	Chetwynd Road (Roadside)	554	N	528722	185950	**44.12**	**47.26**

As indicated in Table 9, annual mean pollutant concentrations were above the AQLV for NO_2 during 2012 at the diffusion tube monitoring locations. This would be expected at roadside locations within an AQMA.

4.3 Background Pollutant Concentrations

Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The proposed development site is located in grid square NGR: 528500, 185500. The most recent data for this location, released in August 2012, was downloaded from the DEFRA website[17] for the purpose of this assessment and is summarised in Table 10.

17 http://laqm.defra.gov.uk/maps/maps2010.html.

Table 10 Predicted Background Pollutant Concentrations

Pollutant	Predicted Background Concentration (μg/m^3)		
	2011	2012	2013
NO_x	59.69	57.62	55.54
NO_2	33.73	32.83	31.92
PM_{10}	19.83	19.56	19.30

As shown in Table 10, background concentrations in the vicinity of the site are below the AQLVs. Comparison with the monitoring results indicates the significant influence of vehicle exhaust emissions on roadside pollution levels.

4.4 Sensitive Receptors

A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of a development. Receptors sensitive to potential operational phase impacts were identified from a desk-top study and are summarised in Table 11. The receptor height was defined at the lowest potential level of exposure in order to allow consideration of other uses, such as commercial units, at lower floor level.

Table 11 Sensitive Receptors

Receptor		NGR (m)		Height (m)
		X	Y	
R1	Residential - Highgate Road	528874	185454	1.5
R2	Residential - Highgate Road	528874	185454	10.5
R3	Residential - Highgate Road	528856	185466	1.5
R4	Residential - Highgate Road	528856	185466	10.5
R5	Residential - Highgate Road/Fortress Walk	528937	185358	4.5
R6	Residential - Highgate Road/Fortress Walk	528937	185358	10.5
R7	Residential - Highgate Road/Fortress Road	528966	185317	4.5
R8	Residential - Highgate Road/Fortress Road	528966	185317	10.5
R9	Residential - Fortress Road/Falkland Road	528989	185344	4.5
R10	Residential - Fortress Road/Falkland Road	528989	185344	7.5
R11	Residential - Fortress Road	528976	185449	1.5

Receptor		NGR (m)		Height (m)
		X	Y	
R12	Residential - Fortress Road	528976	185449	7.5
R13	Residential - Kentish Town Road	529020	185213	4.5
R14	Residential - Kentish Town Road	529020	185213	7.5
R15	Residential - Kentish Town Road	528997	185135	4.5
R16	Residential - Kentish Town Road	528997	185135	10.5
R17	Residential - Kentish Town Road	529012	185075	4.5
R18	Residential - Kentish Town Road	529012	185075	10.5
R19	Residential - Highgate Road	528786	185525	1.5
R20	Residential - Highgate Road	528786	185525	7.5
R21	Residential - Highgate Road	528949	185295	4.5
R22	Residential - Highgate Road	528949	185295	13.5

The sensitive receptors identified in Table 11 represent worst-case locations. However, this is not an exhaustive list and there may be other locations within the vicinity of the site that may experience air quality impacts as a result of the proposed development that have not been individually identified above. Reference should be made to Figure 3 for a graphical representation of road vehicle exhaust emission sensitive receptor locations.

Receptor sensitivity was defined based upon the methodology outlined in Table 3 and predicted pollutant concentrations for the development opening year with the proposals in place. These are detailed within Table 12.

Table 12 Receptor Sensitivity

Receptor	NO_2		PM_{10}			
	Predicted Annual Mean Concentration ($\mu g/m^3$)	Sensitivity	Predicted Annual Mean Concentration ($\mu g/m^3$)	Sensitivity	Predicted Number of 24-hr Periods >$50\mu g/m^3$	Sensitivity
R1	38.39	High	20.34	Low	4	Low
R2	34.50	Medium	19.77	Low	3	Low
R3	39.10	High	20.45	Low	4	Low
R4	34.40	Medium	19.75	Low	3	Low
R5	38.68	High	20.40	Low	4	Low
R6	34.67	Medium	19.80	Low	3	Low

Receptor	NO_2		PM_{10}			
	Predicted Annual Mean Concentration ($\mu g/m^3$)	**Sensitivity**	**Predicted Annual Mean Concentration ($\mu g/m^3$)**	**Sensitivity**	**Predicted Number of 24-hr Periods >50$\mu g/m^3$**	**Sensitivity**
R7	39.80	High	20.55	Low	4	Low
R8	34.85	Medium	19.83	Low	3	Low
R9	39.90	High	20.54	Low	4	Low
R10	36.82	High	20.10	Low	4	Low
R11	39.21	High	20.44	Low	4	Low
R12	35.75	Medium	19.95	Low	3	Low
R13	40.44	Very High	20.55	Low	4	Low
R14	36.79	High	20.06	Low	3	Low
R15	39.66	High	20.36	Low	4	Low
R16	34.64	Medium	19.77	Low	3	Low
R17	41.84	Very High	20.61	Low	4	Low
R18	34.84	Medium	19.79	Low	3	Low
R19	39.68	High	20.56	Low	4	Low
R20	35.07	Medium	19.87	Low	3	Low
R21	37.29	High	20.18	Low	4	Low
R22	33.99	Medium	19.71	Low	3	Low

As indicated in Table 12, receptor sensitivity to changes in PM_{10} concentrations was **low** at all receptor locations for both AQLVs. Receptor sensitivity to changes in annual mean NO_2 concentrations was **very high** at two receptors, **high** at eleven receptors and **medium** at nine receptors.

5.0 IMPACT ASSESSMENT

There is the potential for air quality impacts as a result of the construction and operation of the proposed development. These are assessed in the following Sections.

5.1 Construction Phase Assessment - Fugitive Dust Emissions

The undertaking of activities such as demolition, excavation, ground works, cutting, construction, concrete batching and storage of materials has the potential to result in fugitive dust emissions throughout the construction phase. Vehicle movements both on-site and on the local road network also have the potential to result in the re-suspension of dust from haul road and highway surfaces.

The potential for impacts at sensitive locations depends significantly on local meteorology during the undertaking of dust generating activities, with the most significant effects likely to occur during dry and windy conditions.

The potential risk of fugitive dust impacts was assessed in accordance with the GLA document 'Best Practice Guidance: The Control of Dust and Emissions from Construction and Demolition'. In accordance with the criteria outlined in Table 2, the development was identified as **high** risk. This was because the site is located within an AQMA declared for exceedences of the 24-hour AQLV for PM_{10} and is in close proximity to a number of sensitive receptors.

The GLA guidance provides a number of mitigation measures to reduce potential impacts from **high** risk sites. These have been adapted for the proposed site as summarised in Table 13. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan if required by the Local Planning Authority.

Table 13 Fugitive Dust Mitigation Measures

Issue	Control Measure
Site planning	• Erect solid barriers to site boundary • No bonfires • Plan site layout - machinery and dust causing activities should be located away from sensitive receptors • All site personnel to be fully trained • Trained and responsible manager on site during working times to maintain logbook and carry out site inspections • Hard surface site haul routes • Put in place real-time dust monitors across the site.

Issue	Control Measure
Construction traffic	• All vehicles to switch off engines – no idling vehicles • Effective vehicle cleaning and specific fixed wheel washing on leaving site and damping down of haul routes • All loads entering and leaving site to be covered • No site runoff of water or mud • On road vehicles to comply to set emission standards • All non road mobile machinery (NRMM) to use ultra low sulphur tax-exempt diesel (ULSD) where available and be fitted with appropriate exhaust after treatment from the approved list • Minimise movement of construction traffic around site • Hard surfacing and effective cleaning of haul routes and appropriate speed limit around site • On-road vehicles to comply with the requirements of the Low Emission Zone (LEZ)
Earth moving works	• Minimise dust generating activities • Use dust as water suppressant where applicable • Cover, seed or fence stockpiles to prevent wind whipping • Re-vegetate earthworks and exposed areas • If applicable, ensure concrete crusher or concrete batcher has permit to operate
Demolition	• Use water as a dust suppressant • Cutting equipment to use water as suppressant or suitable local extract ventilation • Use enclosed chutes and covered skips

Implementation of the suggested mitigation measures in Table 13 will help reduce the impact of the construction activities to **medium** to **low** risk. As such, they are considered suitable for a development of this size and nature.

5.2 Operational Phase Assessment

Additional vehicle movements associated with the operation of the proposed development will generate exhaust emissions on the local and regional road networks. Additionally, atmospheric emissions from the Energy Centre may cause air quality impacts in the vicinity of the site. An assessment was therefore undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at sensitive locations.

The assessment considered the following scenarios:

- Do-minimum; and,
- Do-something.

The "do-minimum" (i.e. without development) scenario was representative of baseline traffic data for 2015. The "do-something" scenario was representative of baseline traffic data for 2015 in addition to predicted operational traffic associated with the proposals and emissions from the Energy Centre.

Reference should be made to Appendix II and Appendix III for full assessment input details.

5.2.1 Nitrogen Dioxide

Predicted Impacts at Sensitive Receptors

Annual mean NO_2 concentrations were predicted for each scenario and are summarised in Table 14. Exceedences of the AQLV are shown in **bold** text. It should be noted that the do-something results include the NO_2 contribution from both road traffic and Energy Centre emissions.

Table 14 Predicted Annual Mean NO_2 Concentrations

Sensitive Receptor		Predicted Annual Mean NO_2 Concentration (μg/m^3)			Predicted Changed as Proportion of AQLV (%)
		Do-minimum	Do-something	Change	
R1	Residential - Highgate Road	38.20	38.39	0.19	0.48
R2	Residential - Highgate Road	34.32	34.50	0.18	0.46
R3	Residential - Highgate Road	38.88	39.10	0.22	0.54
R4	Residential - Highgate Road	34.19	34.40	0.21	0.53
R5	Residential - Highgate Road/Fortress Walk	38.62	38.68	0.06	0.16
R6	Residential - Highgate Road/Fortress Walk	34.62	34.67	0.05	0.13
R7	Residential - Highgate Road/Fortress Road	39.75	39.80	0.05	0.13
R8	Residential - Highgate Road/Fortress Road	34.82	34.85	0.03	0.08
R9	Residential - Fortress Road/Falkland Road	39.87	39.90	0.03	0.08
R10	Residential - Fortress Road/Falkland Road	36.79	36.82	0.03	0.08
R11	Residential - Fortress Road	39.16	39.21	0.05	0.13
R12	Residential - Fortress Road	35.70	35.75	0.05	0.13
R13	Residential - Kentish Town Road	**40.41**	**40.44**	0.03	0.08
R14	Residential - Kentish Town Road	36.77	36.79	0.02	0.06
R15	Residential - Kentish Town Road	39.63	39.66	0.03	0.08

Sensitive Receptor		Predicted Annual Mean NO_2 Concentration (µg/m^3)			Predicted Changed as Proportion of AQLV (%)
		Do-minimum	Do-something	Change	
R16	Residential - Kentish Town Road	34.62	34.64	0.02	0.05
R17	Residential - Kentish Town Road	**41.80**	**41.84**	0.04	0.09
R18	Residential - Kentish Town Road	34.83	34.84	0.01	0.02
R19	Residential - Highgate Road	39.60	39.68	0.08	0.19
R20	Residential - Highgate Road	35.01	35.07	0.06	0.14
R21	Residential - Highgate Road	37.25	37.29	0.04	0.10
R22	Residential - Highgate Road	33.96	33.99	0.03	0.07

As indicated in Table 14, predicted NO_2 concentrations were above the AQLV at two receptors for both scenarios considered. This would be expected due to the AQMA designation throughout Camden.

Predicted impacts on annual mean NO_2 concentrations at the sensitive receptor locations are summarised in Table 15.

Table 15 Predicted NO_2 Impacts

Sensitive Receptor		Magnitude of Change	Receptor Sensitivity	Significance of Impact
R1	Residential - Highgate Road	Imperceptible	High	Negligible
R2	Residential - Highgate Road	Imperceptible	Medium	Negligible
R3	Residential - Highgate Road	Imperceptible	High	Negligible
R4	Residential - Highgate Road	Imperceptible	Medium	Negligible
R5	Residential - Highgate Road/Fortress Walk	Imperceptible	High	Negligible
R6	Residential - Highgate Road/Fortress Walk	Imperceptible	Medium	Negligible
R7	Residential - Highgate Road/Fortress Road	Imperceptible	High	Negligible
R8	Residential - Highgate Road/Fortress Road	Imperceptible	Medium	Negligible
R9	Residential - Fortress Road/Falkland Road	Imperceptible	High	Negligible

Sensitive Receptor		Magnitude of Change	Receptor Sensitivity	Significance of Impact
R10	Residential - Fortress Road/Falkland Road	Imperceptible	High	Negligible
R11	Residential - Fortress Road	Imperceptible	High	Negligible
R12	Residential - Fortress Road	Imperceptible	Medium	Negligible
R13	Residential - Kentish Town Road	Imperceptible	Very High	Negligible
R14	Residential - Kentish Town Road	Imperceptible	High	Negligible
R15	Residential - Kentish Town Road	Imperceptible	High	Negligible
R16	Residential - Kentish Town Road	Imperceptible	Medium	Negligible
R17	Residential - Kentish Town Road	Imperceptible	Very High	Negligible
R18	Residential - Kentish Town Road	Imperceptible	Medium	Negligible
R19	Residential - Highgate Road	Imperceptible	High	Negligible
R20	Residential - Highgate Road	Imperceptible	Medium	Negligible
R21	Residential - Highgate Road	Imperceptible	High	Negligible
R22	Residential - Highgate Road	Imperceptible	Medium	Negligible

As indicated in Table 15, the significance of impacts as a result of the development was predicted to be **negligible** at all receptor locations. It should be noted that the predicted change in pollutant concentrations was based on emissions associated with both road traffic and the Energy Centre and therefore provides a robust assessment scenario.

Predicted Concentrations at the Development Site

Annual mean NO_2 concentrations were predicted at a number of different heights across the proposed development site for the development opening year of 2015. Results are summarised in Table 16. Exceedences of the AQLV are shown in **bold** text. It should be noted that the results include the NO_2 contribution from both road traffic and Energy Centre emissions.

Table 16 Predicted Annual Mean NO_2 Concentrations at the Development Site

Height (m)	Annual Mean NO_2 Concentration Range (µg/m^3)	APEC Category
1.5	34.00 - **40.02**	A and B
4.5	33.98 - 37.55	A
7.5	33.93 - 35.19	A
10.5	33.83 - 34.32	A
13.5	33.73 - 34.31	A

Height (m)	Annual Mean NO_2 Concentration Range (µg/m^3)	APEC Category
16.5	33.65 - 37.81	A
19.5	33.47 - 37.26	A

Figure 5 and Figure 6 display the contour plots for predicted annual mean NO_2 concentrations at the various modelled heights. These indicate predicted exceedences of the annual mean AQLV throughout the development site at a height of 1.5m only. This is also shown in Table 16. Predicted concentrations above 5% of the annual mean AQLV are shown in blue on the relevant contour plots. These relate to areas defined as APEC - C within the London Councils Air Quality and Planning Guidance[18]. Predicted concentrations within 5% of the annual mean AQLV are shown in green. These relate to areas defined as APEC - B within the London Councils Air Quality and Planning Guidance.

Although the majority of the development site falls under APEC - A, areas of the ground floor level towards the north of the site were classified as APEC - B. Consideration of potential mitigation options for this area, as required by the London Councils Air Quality and Planning Guidance[19], is provided in Section 6.2.

Predictions of 1-hour NO_2 concentrations were not produced as part of the dispersion modelling assessment due to the uncertainties associated with short-term modelling of this pollutant species. However, as stated in DEFRA Guidance LAQM.TG(09)[20], if annual mean NO_2 concentrations are below 60µg/m^3, then it is unlikely that the 1-hour AQLV will be exceeded. The roof garden on the south building corresponds to a height of approximately 13.5m. As shown in Table 16 and Figure 6, annual mean NO_2 concentrations are below the relevant AQLV across the site. As such, future users of this element of the development will not be exposed to exceedences of the 1-hour AQLV for NO_2.

Based on the results of the dispersion modelling assessment, it is considered that NO_2 concentrations at the development site should not provide air quality grounds for planning consent refusal.

5.2.2 Particulate Matter

Predicted Impacts at Sensitive Receptors

Annual mean PM_{10} concentrations were predicted for each scenario and are summarised in Table 17.

18 London Councils Air Quality and Planning Guidance, London Councils, 2007.
19 London Councils Air Quality and Planning Guidance, London Councils, 2007.
20 Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

Table 17 Predicted Annual Mean PM_{10} Concentrations

Sensitive Receptor		Predicted Annual Mean PM_{10} Concentration (µg/m^3)			Predicted Changed as Proportion of AQLV (%)
		Do-minimum	Do-something	Change	
R1	Residential - Highgate Road	20.34	20.34	0.00	0.01
R2	Residential - Highgate Road	19.77	19.77	0.00	0.00
R3	Residential - Highgate Road	20.45	20.45	0.00	0.01
R4	Residential - Highgate Road	19.75	19.75	0.00	0.00
R5	Residential - Highgate Road/Fortress Walk	20.40	20.40	0.00	0.01
R6	Residential - Highgate Road/Fortress Walk	19.80	19.80	0.00	0.00
R7	Residential - Highgate Road/Fortress Road	20.55	20.55	0.00	0.01
R8	Residential - Highgate Road/Fortress Road	19.83	19.83	0.00	0.00
R9	Residential - Fortress Road/Falkland Road	20.54	20.54	0.00	0.00
R10	Residential - Fortress Road/Falkland Road	20.10	20.10	0.00	0.00
R11	Residential - Fortress Road	20.44	20.44	0.00	0.00
R12	Residential - Fortress Road	19.95	19.95	0.00	0.00
R13	Residential - Kentish Town Road	20.55	20.55	0.00	0.01
R14	Residential - Kentish Town Road	20.06	20.06	0.00	0.00
R15	Residential - Kentish Town Road	20.36	20.36	0.00	0.01
R16	Residential - Kentish Town Road	19.77	19.77	0.00	0.00
R17	Residential - Kentish Town Road	20.61	20.61	0.00	0.01
R18	Residential - Kentish Town Road	19.79	19.79	0.00	0.00
R19	Residential - Highgate Road	20.56	20.56	0.00	0.01
R20	Residential - Highgate Road	19.87	19.87	0.00	0.00
R21	Residential - Highgate Road	20.18	20.18	0.00	0.00

Sensitive Receptor		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)			Predicted Changed as Proportion of AQLV (%)
		Do-minimum	Do-something	Change	
R22	Residential - Highgate Road	19.71	19.71	0.00	0.00

As indicated in Table 17, predicted annual mean PM_{10} concentrations were below the relevant AQLV at all receptor locations for both scenarios considered.

Predicted impacts on annual mean PM_{10} concentrations at the sensitive receptor locations are summarised in Table 18.

Table 18 Predicted Annual Mean PM_{10} Impacts

Sensitive Receptor		Magnitude of Change	Receptor Sensitivity	Significance of Impact
R1	Residential - Highgate Road	Imperceptible	Low	Negligible
R2	Residential - Highgate Road	Imperceptible	Low	Negligible
R3	Residential - Highgate Road	Imperceptible	Low	Negligible
R4	Residential - Highgate Road	Imperceptible	Low	Negligible
R5	Residential - Highgate Road/Fortress Walk	Imperceptible	Low	Negligible
R6	Residential - Highgate Road/Fortress Walk	Imperceptible	Low	Negligible
R7	Residential - Highgate Road/Fortress Road	Imperceptible	Low	Negligible
R8	Residential - Highgate Road/Fortress Road	Imperceptible	Low	Negligible
R9	Residential - Fortress Road/Falkland Road	Imperceptible	Low	Negligible
R10	Residential - Fortress Road/Falkland Road	Imperceptible	Low	Negligible
R11	Residential - Fortress Road	Imperceptible	Low	Negligible
R12	Residential - Fortress Road	Imperceptible	Low	Negligible
R13	Residential - Kentish Town Road	Imperceptible	Low	Negligible
R14	Residential - Kentish Town Road	Imperceptible	Low	Negligible
R15	Residential - Kentish Town Road	Imperceptible	Low	Negligible
R16	Residential - Kentish Town Road	Imperceptible	Low	Negligible
R17	Residential - Kentish Town Road	Imperceptible	Low	Negligible

Sensitive Receptor		Magnitude of Change	Receptor Sensitivity	Significance of Impact
R18	Residential - Kentish Town Road	Imperceptible	Low	Negligible
R19	Residential - Highgate Road	Imperceptible	Low	Negligible
R20	Residential - Highgate Road	Imperceptible	Low	Negligible
R21	Residential - Highgate Road	Imperceptible	Low	Negligible

As indicated in Table 18, predicted impacts on annual mean PM_{10} concentrations as a result of the development were predicted to be **negligible** at all receptor locations.

The number of days with PM_{10} concentrations greater than 50µg/m^3 were calculated following the procedure described in DEFRA guidance LAQM.TG(09). The results of this process are presented in Table 19.

Table 19 Predicted 24-hour Mean PM_{10} Concentrations

Sensitive Receptor		Predicted Number of Days with PM_{10} Concentrations Greater than 50µg/m^3		
		Do-minimum	Do-something	Change
R1	Residential - Highgate Road	4	4	0
R2	Residential - Highgate Road	3	3	0
R3	Residential - Highgate Road	4	4	0
R4	Residential - Highgate Road	3	3	0
R5	Residential - Highgate Road/Fortress Walk	4	4	0
R6	Residential - Highgate Road/Fortress Walk	3	3	0
R7	Residential - Highgate Road/Fortress Road	4	4	0
R8	Residential - Highgate Road/Fortress Road	3	3	0
R9	Residential - Fortress Road/Falkland Road	4	4	0
R10	Residential - Fortress Road/Falkland Road	4	4	0
R11	Residential - Fortress Road	4	4	0
R12	Residential - Fortress Road	3	3	0
R13	Residential - Kentish Town Road	4	4	0
R14	Residential - Kentish Town Road	3	3	0

Sensitive Receptor		Predicted Number of Days with PM_{10} Concentrations Greater than 50µg/m^3		
		Do-minimum	Do-something	Change
R15	Residential - Kentish Town Road	4	4	0
R16	Residential - Kentish Town Road	3	3	0
R17	Residential - Kentish Town Road	4	4	0
R18	Residential - Kentish Town Road	3	3	0
R19	Residential - Highgate Road	4	4	0
R20	Residential - Highgate Road	3	3	0
R21	Residential - Highgate Road	4	4	0
R22	Residential - Highgate Road	3	3	0

As indicated in Table 19, the predicted number of days with PM_{10} concentrations greater than 50µg/m^3 was below the permitted 35-days for both scenarios considered.

Predicted impacts on 24-hour mean PM_{10} concentration are summarised in Table 20.

Table 20 Predicted 24-hour Mean PM_{10} Impacts

Sensitive Receptor		Magnitude of Change	Receptor Sensitivity	Significance of Impact
R1	Residential - Highgate Road	Imperceptible	Low	Negligible
R2	Residential - Highgate Road	Imperceptible	Low	Negligible
R3	Residential - Highgate Road	Imperceptible	Low	Negligible
R4	Residential - Highgate Road	Imperceptible	Low	Negligible
R5	Residential - Highgate Road/Fortress Walk	Imperceptible	Low	Negligible
R6	Residential - Highgate Road/Fortress Walk	Imperceptible	Low	Negligible
R7	Residential - Highate Road/Fortress Road	Imperceptible	Low	Negligible
R8	Residential - Highate Road/Fortress Road	Imperceptible	Low	Negligible
R9	Residential - Fortress Road/Falkland Road	Imperceptible	Low	Negligible
R10	Residential - Fortress Road/Falkland Road	Imperceptible	Low	Negligible
R11	Residential - Fortress Road	Imperceptible	Low	Negligible

Sensitive Receptor		Magnitude of Change	Receptor Sensitivity	Significance of Impact
R12	Residential - Fortress Road	Imperceptible	Low	Negligible
R13	Residential - Kentish Town Road	Imperceptible	Low	Negligible
R14	Residential - Kentish Town Road	Imperceptible	Low	Negligible
R15	Residential - Kentish Town Road	Imperceptible	Low	Negligible
R16	Residential - Kentish Town Road	Imperceptible	Low	Negligible
R17	Residential - Kentish Town Road	Imperceptible	Low	Negligible
R18	Residential - Kentish Town Road	Imperceptible	Low	Negligible
R19	Residential - Highgate Road	Imperceptible	Low	Negligible
R20	Residential - Highgate Road	Imperceptible	Low	Negligible
R21	Residential - Highgate Road	Imperceptible	Low	Negligible

As indicated in Table 20, impacts on 24-hour mean PM_{10} concentrations were predicted to be **negligible** at all receptor locations.

5.2.3 Overall Impact Significance

The overall significance of operational phase road traffic emission impacts was determined as **negligible**. This was based on the most significant predicted impact at discrete receptor locations and the considerations outlined in Section 3.2. Further justification is provided in Table 21.

Table 21 Overall Road Traffic Exhaust Emission Impact Significance

Guidance	Comment
Number of properties affected by slight, moderate or substantial air quality impacts and a judgement on the overall balance	Air quality impacts were predicted to be negligible at all receptors. These represent worst-case locations and therefore it is unlikely that any other sensitive receptors would be significantly affected by the proposed development
Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant	The proposed development includes the provision of residential units. Pollutant concentrations at these locations were considered and suitable mitigation identified to control exposure of future site users
The magnitude of changes and the descriptions of the impacts at the receptors	An imperceptible increase in pollutant concentrations was predicted at all receptors

Guidance	Comment
Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased	There were predicted exceedences of the annual mean AQLV for NO_2 at sensitive receptor locations within the study area both with and without the development. There were no locations where an exceedence was predicted as a result of the development where none existed before. Predicted PM_{10} concentrations were below the AQLV throughout the assessment extents
Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced	Exceedences of the annual mean AQLV for NO_2 were predicted for both scenarios modelled. It is not considered that the area of exceedence will be reduced as a result of the proposals. Predicted PM_{10} concentrations were below the AQLV throughout the assessment extents
The extent to which an objective or limit value is exceeded e.g. an annual mean NO_2 concentration of 41µg/m^3 should attract less significance than an annual mean of 51µg/m^3	There were a number of predicted exceedences at sensitive receptor locations in both scenarios. However, the maximum concentration was 41.84µg/m^3, significantly lower than levels predicted elsewhere within the modelling extents, such as in kerbside locations

6.0 MITIGATION

6.1 Construction Phase

Reference should be made to Table 13 for suggested fugitive dust mitigation measures for the construction phase of the development. These are based on the GLA guidance[21] and as such are considered suitable for proposals of this size and nature.

6.2 Operational Phase

There are a number of air quality mitigation options available to reduce potential exposure of future site users to elevated pollutant concentrations or off-set impacts associated with a development. However, all techniques have financial implications and may therefore affect scheme viability. As such, they should only be included if necessary.

Detailed dispersion modelling indicated an area of the north building, proposed for residential usage, where annual mean NO_2 concentrations were classified as APEC - B. This was because values were within 5% of the relevant AQLV. The inclusion of appropriate mitigation measures is therefore required in this area in order to reduce the potential for exposure of future development users to elevated pollutant concentrations. As such, mechanical ventilation with an air inlet located on the southern elevation of the building should be included for rooms at ground level. Consideration to positioning the inlet at roof height should also be provided if practicable. This should ensure the supply of clean air for future development users.

It should be noted that background pollution concentrations are likely to be lower at elevated heights due to increased distance from background pollutant sources. This has not been directly represented within the results and therefore predicted levels at heights above ground level are considered to represent worst-case concentrations.

Consideration to the provision of sealed glazing in the units served by the mechanical ventilation system should also be provided. This would ensure all air entering the properties was from an area with pollutant concentrations below the relevant AQLVs. However, it may be preferable to include opening windows in order to allow residents freedom of choice over whether natural ventilation is preferable during certain periods. The key to reducing exposure using this method is to ensure occupants are informed over the potential impacts associated with prolonged exposure to elevated pollution levels. As such, it may also be possible to provide residents with a welcome pack containing air quality information which would allow them to follow appropriate advice on protection against high concentrations during certain periods.

The proposed mitigation is suggested within the EPUK guidance document 'Development Control: Planning for Air Quality (2010 Update)' and is considered a suitable solution for a development of this size and nature.

Emissions during the operational phase have the potential to cause an adverse impact on local air quality. Although a **negligible** impact was predicted, an aim for the development should to be to reduce vehicle trips to and from the site or help to reduce pollution levels in

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[21] Best Practice Guidance: Control of Dust and Emissions from Construction and Demolition, Greater London Authority, 2006.

sensitive areas through funding of other mitigation methods. Specific consideration should be made to the following measures:

- Promotion of alternative transport options within development;
- Implementation of a Travel Plan;
- Integration of public transport provisions; and,
- Arranging deliveries outside of peak hours to avoid congested periods within the nearby AQMA if possible.

Implementing traffic management measures may result in fewer vehicle trips and, therefore, fewer occasions of network capacity exceedences. This is likely to result in reductions of the mean roadside concentrations of traffic-related pollutant concentrations.

7.0 CONCLUSION

REC Ltd was commissioned by Campbell Reith Hill LLP to undertake an Air Quality Assessment in support of the planning application for a proposed Community Resource Centre, Centre for Independent Living and Residential units at Greenwood Place and Highgate Road, Kentish Town, London.

The scheme has the potential to cause air quality impacts at sensitive locations during the construction and operational phases. This may include fugitive dust emissions associated with construction works, road vehicle exhaust emissions from traffic generated by the development during the operational phase and atmospheric emissions from the Energy Centre. Additionally, the proposed site is located within an area identified by LBoC as having elevated pollutant concentrations. As such, an Air Quality Assessment was required in order to consider site suitability for the proposed end usage and assess potential impacts as a result of the development.

During the construction phase of the development there is potential for air quality impacts as a result of fugitive dust emissions from the site. These were assessed in accordance with the GLA Best Practice guidance methodology. Assuming appropriate mitigation measures are implemented, the site was classified as **medium** to **low** risk, which is considered to be acceptable for a development of this size and nature.

Dispersion modelling was undertaken in order to quantify pollutant concentrations at the site and predict air quality impacts as a result of emissions associated with traffic generated by the development and the Energy Centre. Results were subsequently verified using monitoring results obtained from LBoC.

Predicted impacts on annual mean pollutant concentrations as a result of operational phase emissions were predicted to be **negligible** at all sensitive receptor locations within the vicinity of the site.

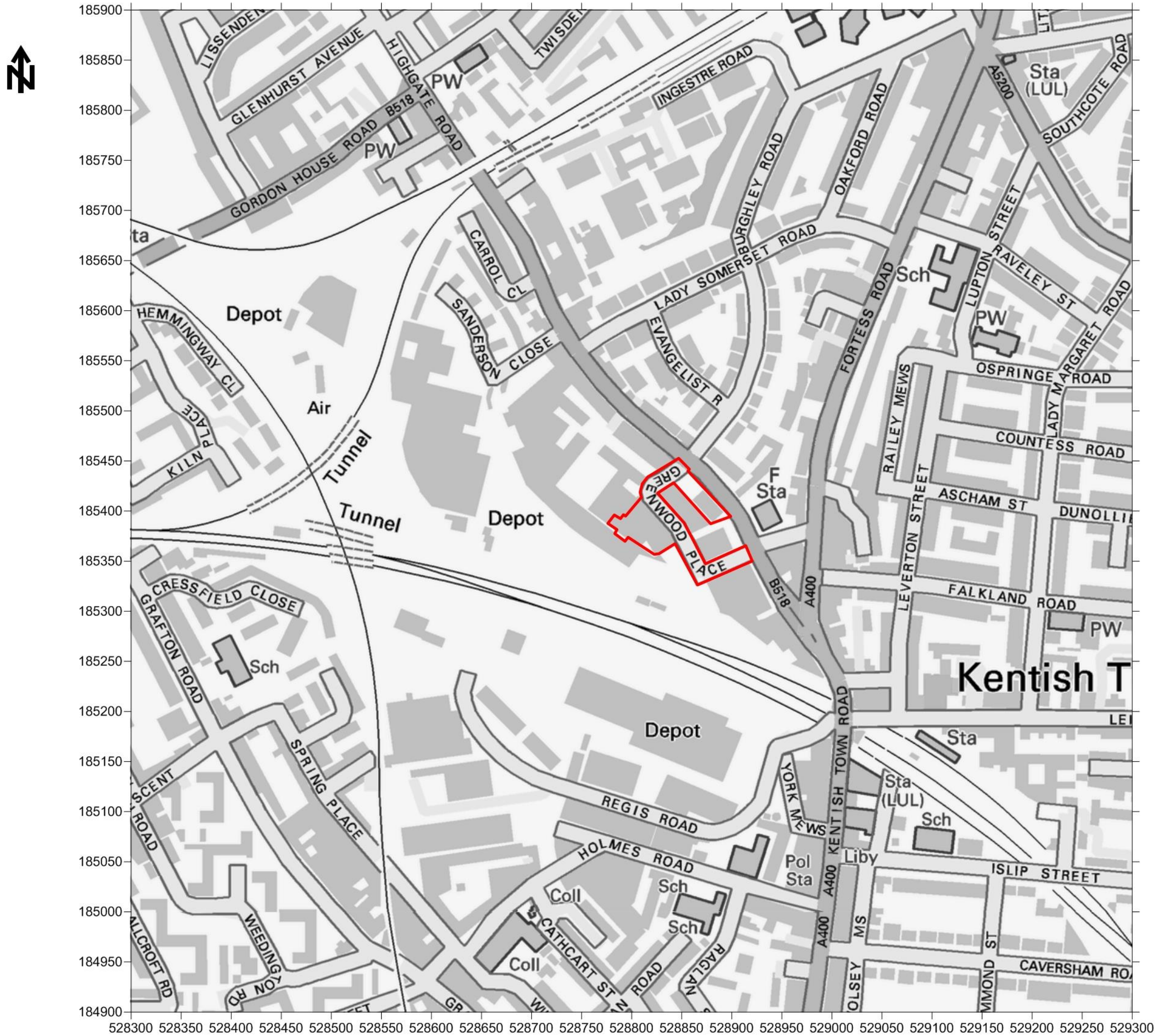
The overall significance of potential impacts was determined to be **negligible**, in accordance with the EPUK guidance. It should be noted that the assessment utilised worst-case assumptions as far as practicable, including consideration of uncertainty over future background NO_2 concentrations, and actual impacts are likely to be lower than those predicted.

Due to the elevated NO_2 concentrations at the proposed development site, mechanical ventilation should be included on the northern building, proposed for residential usage, at ground floor level. This type of mitigation is suggested within EPUK guidance and is therefore considered suitable for a development of this size and nature.

8.0 ABBREVIATIONS

AADT	Annual Average Daily Traffic
APEC	Air Pollution Exposure Criteria
APPLE	Air Pollution Planning and Local Environment
AQAP	Air Quality Action Plan
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Strategy
CHP	Combined Heat and Power
DEFRA	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
EPUK	Environmental Protection UK
EU	European Union
GLA	Greater London Authority
HDV	Heavy Duty Vehicle
LA	Local Authority
LAQM	Local Air Quality Management
LBoC	London Borough of Camden
LDF	Local Development Framework
LEZ	Low Emission Zone
NDP	Northumberland Development Project
NGR	National Grid Reference
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NRMM	Non-Road Mobile Machinery
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5µm
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10µm
REC	Resource and Environmental Consultants
TG	Technical Guidance
UDP	Unitary Development Plan
ULSD	Ultra-Low Sulphur Diesel
Z_0	Roughness Length

APPENDIX I FIGURES



Legend

Site Boundary

Title

Figure 1 - Site Location Plan

Project

Air Quality Assessment
Greenwood Place, Kentish Town

Project Number

33421

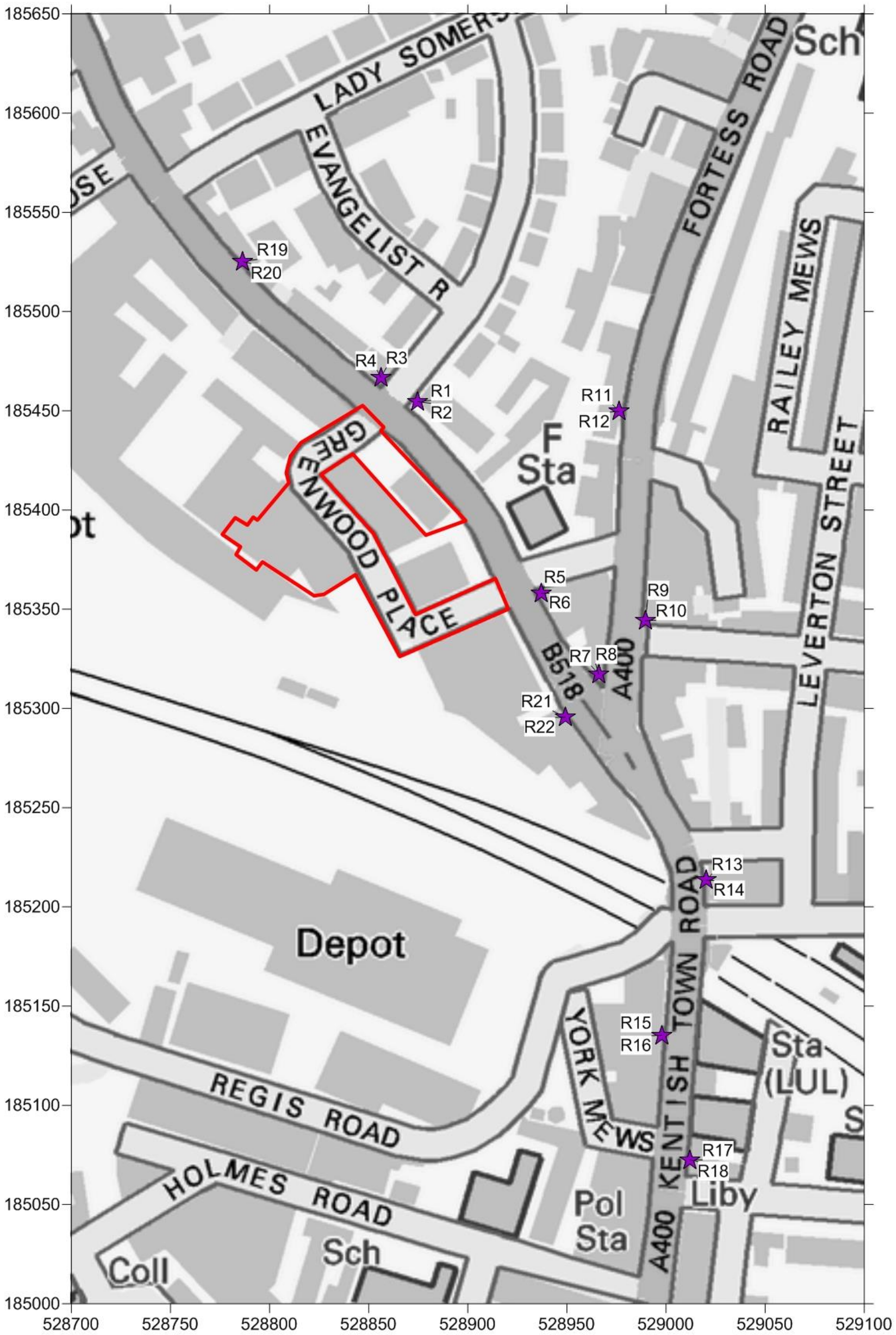
Client

Campbell Reith Hill LLP

REC
Resource & Environmental Consultants Ltd

Resource and Environmental Consultants Ltd
Osprey House, Broadway, Manchester M50 2UE

Tel – 0161 868 1300 Fax – 0161 868 1301
www.recltd.co.uk



Legend

Site Boundary

Receptor Locations

Title

Figure 2 - Operational Phase Emission Sensitive Receptors

Project

Air Quality Assessment
Greenwood Place, Kentish Town

Project Number

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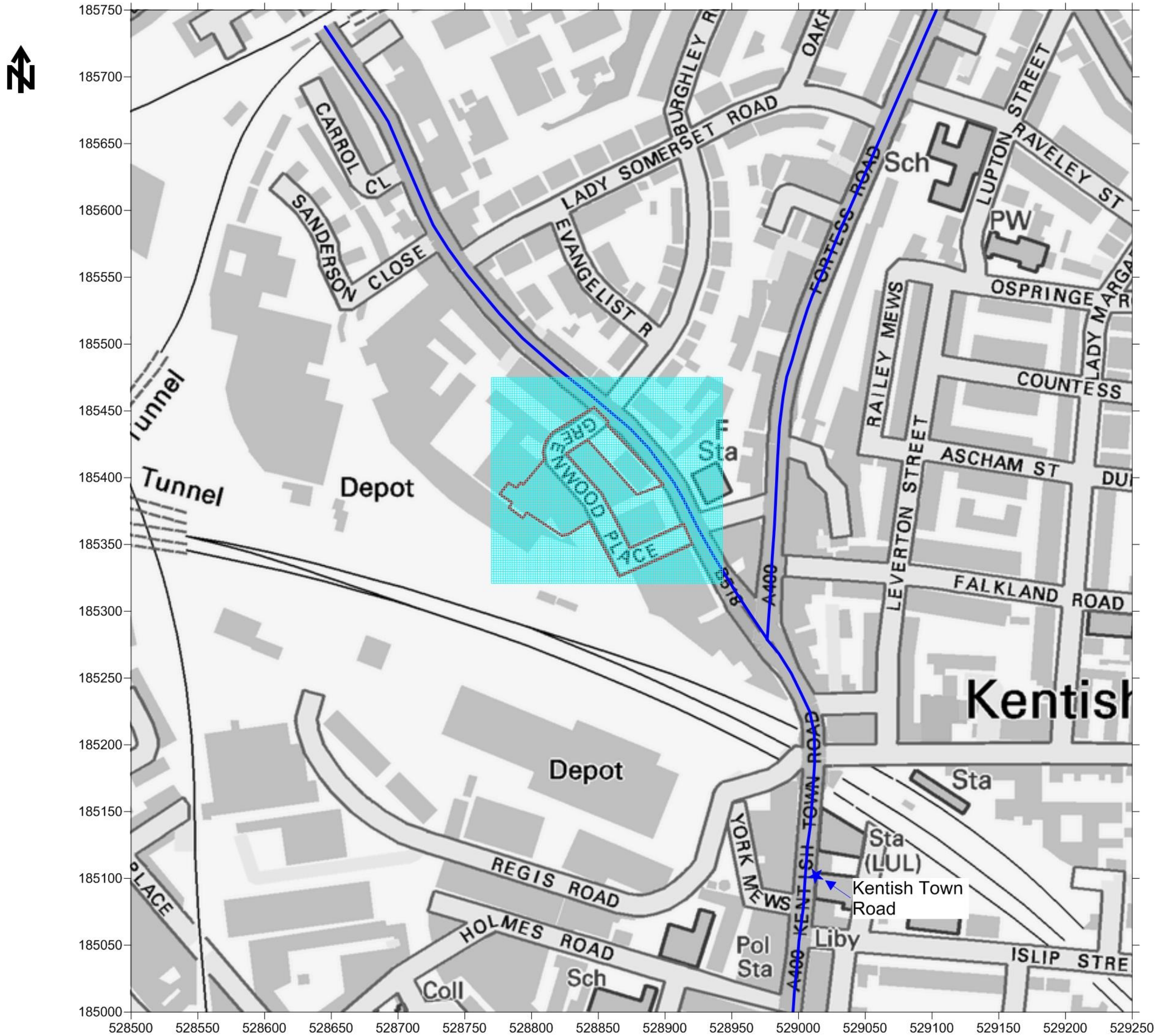

Legend

Site Boundary

Road Link Location

Output Grid

Diffusion Tube

Title

Figure 3 - ADMS Roads Inputs

Project

Air Quality Assessment
Greenwood Place, Kentish Town

Project Number

33421

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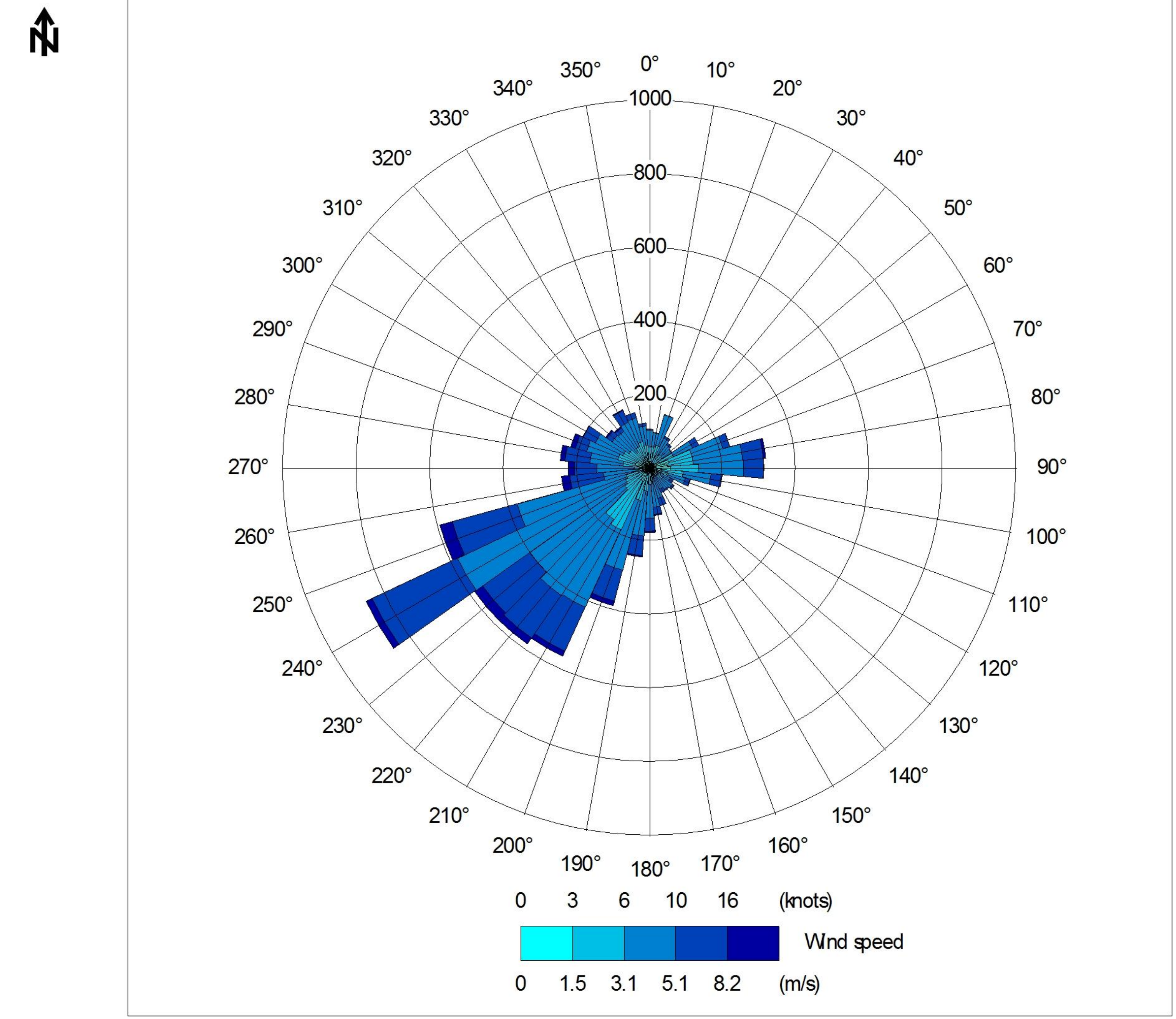

Legend

Title

Figure 4 - Wind Rose of 2012 London Meteorological Data

Project

Air Quality Assessment
Greenwood Place, Kentish Town

Project Number

33421

Client

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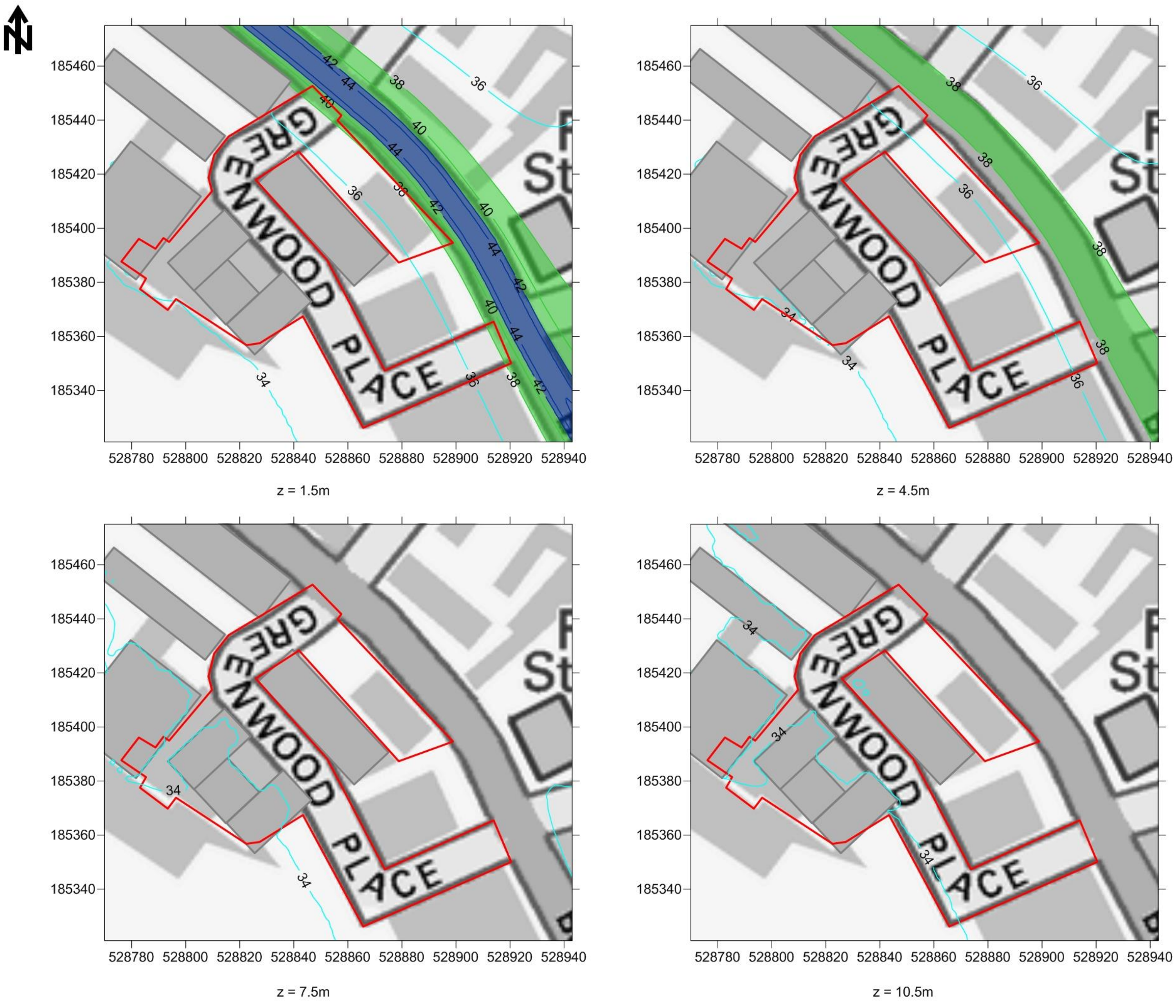

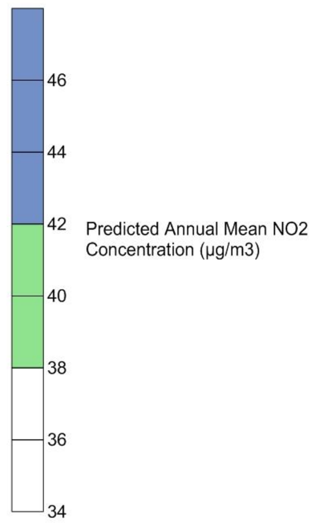

Title

Figure 5 - Predicted 2015 Annual Mean NO_2 Concentrations (µg/m3)
Do-something Scenario
z = 1.5m - 10.5m

Project

Air Quality Assessment
Greenwood Place, Kentish Town

Project Number

33421

Client

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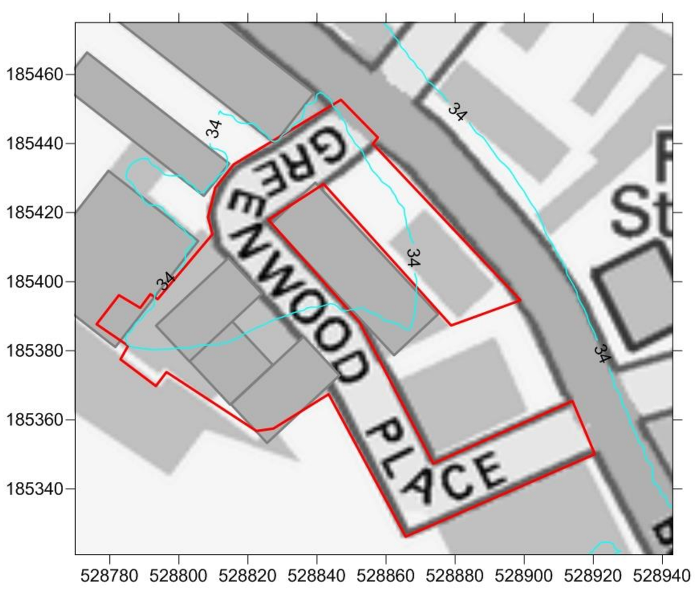
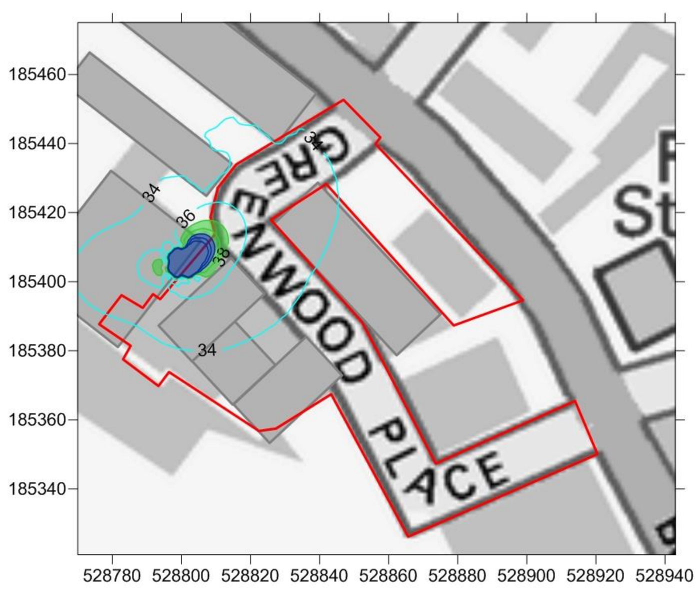
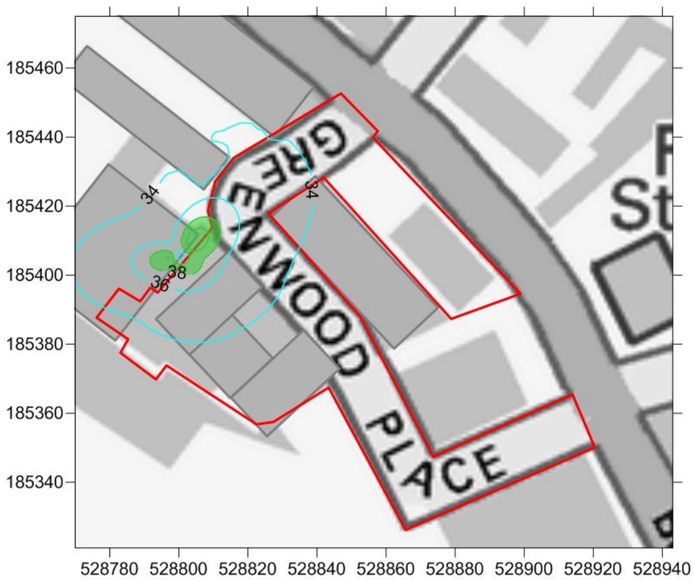


z = 13.5m

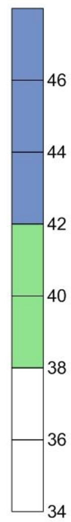


z = 16.5m



z = 19.5m

Legend



Predicted Annual Mean NO2 Concentration (µg/m3)

Title

Figure 6 - Predicted 2015 Annual Mean NO2 Concentrations (µg/m3)
Do-something Scenario
z = 13.5m - 19.5m

Project

Air Quality Assessment
Greenwood Place, Kentish Town

Project Number

33421

Client

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APPENDIX II ADMS-ROADS INPUT DATA

ASSESSMENT INPUTS

Vehicle trips associated with the development have the potential to result in air quality impacts as a result of increased traffic exhaust emissions. Additionally, the site is located within an AQMA and the development may result in exposure of new residents to elevated pollution levels. Dispersion modelling using ADMS-Roads was therefore undertaken to predict NO_2 and PM_{10} concentrations at sensitive locations both with and without the development in order to consider potential changes as a result of the proposals.

The dispersion model requires input data that details the following parameters:

- Assessment area;
- Traffic flow data;
- Vehicle emission factors;
- Spatial co-ordinates of emissions;
- Street width;
- Meteorological data;
- Roughness length; and,
- Monin-Obukhov length.

Assessment inputs are described in the following subsections.

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 3.1.4). ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

Assessment Area

Ambient concentrations were predicted over the development site and at discrete receptor locations. A Cartesian grid was included in the model over the area NGR: 528770, 185321 to 528942, 185475 at a resolution of 1.7m and heights to represent each floor of the development. Results were subsequently used to produce contour plots within the Surfer software package.

It should be noted that although the grid only covered the area immediately surrounding the proposed site, road links were extended in order to ensure the impact of all relevant vehicle emissions in the vicinity of the development were considered.

Reference should be made to Figure 3 for a graphical representation of the assessment extents.

Traffic Flow Data

Traffic data for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition was provide by Campbell Reith Hill LLP, the Transport Engineers for the proposed development. The 24-hour AADT flows for 2011, provided by Campbell Reith Hill LLP, have been utilised to represent 2012 conditions. As traffic levels in

Greater London have remained relatively constant or shown a downward trend in recent years[22], 2011 24-hour AADT data were considered to provide a suitable representation of existing flows.

Reference should be made to the Transport Assessment for details of the relevant calculation methodology.

Road widths were estimated from aerial photography and UK highway design standards. Table AII.1 shows the 2011 baseline traffic data used for the verification scenario.

Table AII.1 2011 Traffic Data

Road Link		Road/ Canyon Width (m)	24-hour AADT Flow	HDV Proportion (%)	Mean Vehicle Speed (km/h)	Canyon Height (m)
L1	Highgate Road	9.0	13,621	5.51	30	0
L2	Fortress Road	10.0	14,822	6.87	30	0
L3a	Kentish Town Road	11.5	18,600	6.12	25	0
L3b	Kentish Town Road Traffic Lights	16.8	18,600	6.12	15	10.5

Table AII.2 shows the 2015 traffic data used for the do-minimum and do-something scenarios.

Table AII.2 2015 Traffic Data

Road Link		24-hour AADT Flow	
		Do-minimum	Do-something
L1	Highgate Road	13,900	13,955
L2	Fortress Road	15,126	15,126
L3	Kentish Town Road	18,982	19,044
L3a	Kentish Town Road Traffic Lights	18,982	19,044

Emission Factors

There is current uncertainty over NO_2 concentrations within the UK, with roadside levels not reducing as previously expected due to the implementation of new vehicle emission standards. Therefore, 2012 emission factors from the Emissions Factor Toolkit (version 5.2c), released in January 2013, have been utilised for the prediction of pollution levels in preference to the development opening year in order to provide a robust assessment. The data base incorporates updated COPERT4v8.1 vehicle emission factors for NO_x and vehicle

[22] Travel in London: Report 3, Transport for London, 2010.

fleet information and as such is considered to provide an accurate representation of exhaust emissions.

Meteorological Data

Meteorological data used in the assessment was taken from London City Airport weather station over the period 1st January 2012 to 31st December 2012 (inclusive). London City Airport observation station is located at NGR: 542998, 180430, which is approximately 14.9km south-east of the proposed development. DEFRA guidance LAQM.TG(09)[23] recommends meteorological stations within 30km of an assessment area as being suitable for detailed modelling.

All meteorological data used in the assessment was provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of meteorological data within the UK. Reference should be made to Figure 4 for a wind rose of utilised meteorological data.

Roughness Length

A roughness length (z_0) of 1.5m was used in this dispersion modelling study. This value of z_0 is considered appropriate for the morphology of the dispersion modelling assessment area and is suggested within ADMS-Roads as being suitable for 'large urban areas'.

Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 100m was used in this dispersion modelling study. This value is considered appropriate for the nature of the assessment area and is suggested within ADMS-Roads as being suitable for 'large conurbations > 1 million'.

Background Concentrations

Background concentrations provided by DEFRA and shown in Table 10 were used in the dispersion modelling assessment to represent existing annual mean NO_2 concentrations in the vicinity of the site. Similarly to emission factors, background concentrations from 2012 were utilised in preference to the development opening year. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of the proposal.

NO_x to NO_2 Conversion

Predicted annual mean NO_x concentrations from the dispersion model were converted to NO_2 concentrations using the spreadsheet provided by DEFRA, which is the method detailed within LAQM.TG(09).

Verification

The predicted results from a dispersion model may differ from measured concentrations for a large number of reasons, including:

[23] Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

- Estimates of background concentrations;
- Uncertainties in source activity data such as traffic flows and emission factors;
- Variations in meteorological conditions;
- Overall model limitations; and,
- Uncertainties associated with monitoring data, including locations.

Model verification is the process by which these and other uncertainties are investigated and where possible minimised. In reality, the differences between modelled and monitored results are likely to be a combination of all of these aspects.

For the purpose of this assessment model verification was undertaken for 2012, using meteorological data and monitoring results from this year.

LBoC undertakes diffusion tube monitoring of NO_2 concentrations at one location in close proximity to the site, Kentish Town Road. Monitoring results for this location were obtained from the LBoC Diffusion Tube Data 2012 spreadsheet[24] for the purpose of this assessment. The road contribution to total NO_x concentration at monitored location was calculated following the methodology contained within DEFRA guidance LAQM.TG(09)[25]. The monitored annual mean NO_2 concentration and calculated roadside NO_x concentrations are summarised in Table AII.3.

Table AII.3 Diffusion Tube Monitoring Results

Site ID	Location	2012 Monitored NO_2 Concentration ($\mu g/m^3$)	Calculated Roadside NO_x Concentration ($\mu g/m^3$)
CA16	Kentish Town Road	58.97	68.46

The dispersion model was run to predict NO_x concentrations at the diffusion tube monitoring location. The results are shown in Table AII.4.

Table AII.4 Modelled Concentrations

Site ID	Location	Modelled Roadside NO_x Concentration ($\mu g/m^3$)
CA16	Kentish Town Road	43.29

The monitored and modelled roadside NO_x concentrations were compared and the ratio calculated. This indicated a verification factor of **1.5814** was required to be applied to all modelling results.

As PM_{10} monitoring is not undertaken within the assessment extent, a verification factor of 1.5814 was also used to adjust the model predictions of the pollutant in accordance with the guidance provided within LAQM.TG(09)[26].

24 NO_2 Diffusion Tube Data, London Borough of Camden, 2012.
25 Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.
26 Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

APPENDIX III ADMS-5 INPUT DATA

ASSESSMENT INPUTS

Atmospheric emissions from the Energy Centre have the potential to result in air quality impacts in the vicinity of the development. Dispersion modelling using ADMS 5 was therefore undertaken to predict increases in NO_2 concentrations at sensitive locations in order to consider potential changes as a result of the proposals.

Assessment inputs are described in the following subsections.

Dispersion Model

Dispersion modelling was undertaken using ADMS 5 (v5.0.0), which is developed by Cambridge Environmental Research Consultants (CERC) Ltd. ADMS 5 is a short-range dispersion modelling software package that simulates a wide range of buoyant and passive releases to atmosphere. It is a new generation model utilising boundary layer height and Monin-Obukhov length to describe the atmospheric boundary layer and a skewed Gaussian concentration distribution to calculate dispersion under convective conditions.

The model utilises hourly meteorological data to define conditions for plume rise, transport and diffusion. It estimates the concentration for each source and receptor combination for each hour of input meteorology, and calculates user-selected long-term and short-term averages.

Assessment Area

Ambient concentrations were predicted over the development site and at discrete receptor locations. A Cartesian grid was included in the model over the area NGR: 528770, 185321 to 528942, 185475 at a resolution of 1.7m and heights to represent each floor of the development. Results were subsequently used to produce contour plots within the Surfer software package.

Process Conditions

Process conditions were provided through correspondence with TGA Consulting Engineers, the Mechanical and Electrical Engineers for the development. Reference should be made to Table AIII.1 for dispersion modelling inputs.

Table AIII.1 Process Conditions

Condition	Unit	CHP	Gas Boiler Stack 1	Gas Boiler Stack 2
Stack location	NGR	528800.7, 185405.3	528800.5, 185405,1	528800.4, 185405.0
Stack height	m	16.35	16.35	16.35
Stack diameter	m	0.10	0.25	0.25
Flue gas volumetric flow rate (per unit)	m^3/s	0.05	0.62	0.62
Temperature	˚C	100	80	80

Emissions

Pollutant emission rates were provided by TGA Consulting Engineers. Reference should be made to Table AIII.2 for emission rates.

Table AIII.2 Mass Emission Rates

Plant Unit	NO_x Mass Emission Rate (g/s)
CHP	0.0046
Gas Boiler	0.0028

All units are modulating and are therefore able to provide full and partial loads. However, for the purpose of the dispersion modelling study it was assumed that the CHP and boilers operated constantly at full power. This provided a worst-case scenario and results are therefore likely to overestimate actual air quality impacts in the vicinity of the site.

Meteorological Data

Meteorological data used in this assessment was taken from London City Airport weather station, over the period 1st January 2012 to 31st December 2012 (inclusive).

Roughness Length

A roughness length (z_0) of 1.5m was used in this dispersion modelling study.

Monin-Obukhov Length

A minimum Monin-Obukhov length of 100m was used in this dispersion modelling study.

Building Effects

Analysis of the site layout indicated that a number of structures should be included within the model in order to take account of effects on pollutant dispersion. Building input geometries are shown in Table AIII.3.

Table AIII.3 Building Geometries

Building	NGR (m)		Height (m)	Length (m)	Width (m)	Angle (˚)
	X	Y				
Greenwood Centre	528830.8	185368.7	11.55	28.7	15.3	137
Greenwood Centre	528815.1	185376.5	11.55	16.9	17.3	137
Greenwood Centre	528808.7	185391.9	11.55	28.7	14.2	137
Deane House	528780.6	185406.6	15.35	39.0	33.0	128
AA Storage	528850.9	185403.7	11.88	17.4	52.1	137
No 33	528790.3	185445.6	21.63	11.9	52.2	128

Building	NGR (m)		Height (m)	Length (m)	Width (m)	Angle (˚)
	X	Y				
Linton House	528810.1	185465.5	19.76	18.4	59.1	128

It should be noted that ADMS 5 only allows input of cuboid buildings and therefore simplification of some structures was required.

NO_x to NO_2 Conversion

Emissions of NO_x from combustion processes are predominantly in the form of nitric oxide (NO). Excess oxygen in the combustion gases and further atmospheric reactions cause the oxidation of NO to NO_2. Recent comparisons of ambient NO and NO_2 concentrations in the vicinity of point sources has indicated that it is unlikely that more than 30% of the emitted NO_x is present at ground level as NO_2.

Ground level NO_x concentrations were predicted through dispersion modelling. NO_2 concentrations reported in the results section assume 70% conversion from NO_x to NO_2 based upon Environment Agency guidance[27].

[27] Conversion Ratios for NO_x and NO_2, EA, undated.

APPENDIX IV ASSESSOR'S CURRICULUM VITAE

Lauren Haynes

Graduate Air Quality Consultant

BSc (Hons)

KEY EXPERIENCE:

Lauren is a Graduate Environmental Consultant with specialist experience in the air quality sector. Her key capabilities include:

- Production of Air Quality Assessments to the Department for Environment, Food and Rural Affairs (DEFRA), Environment Agency and Environmental Protection UK (EPUK) methodologies for clients from the residential, retail, infrastructure and commercial sectors.
- Detailed dispersion modelling of road vehicle emissions using ADMS-Roads. Studies have included impact assessment of pollutant concentrations at various floor levels and assessment of suitability of development sites for proposed end-use.
- Assessment of road vehicle exhaust emissions using the Design Manual for Roads and Bridges (DMRB) calculation spreadsheet.
- Production of air quality mitigation strategies for developments throughout the UK.
- Defining baseline air quality conditions and identification of sensitive areas.

QUALIFICATIONS:

- Bachelor of Science

PROJECTS SUMMARY:

Mixed-Use Development, Rutherglen Low Carbon Zone, Glasgow

Air Quality Assessment in support of a mixed-use development consisting of a multi-purpose business space. Construction phase assessment of fugitive dust emissions in accordance with IAQM methodology was undertaken. Additionally, dispersion modelling of road vehicle exhaust emissions was undertaken using ADMS-Roads to provide consideration of potential impacts to the surrounding area as a result of the proposals. Impacts were not predicted to be significant at any sensitive receptors in the vicinity of the site and no mitigation was required.

Residential Development, Land at Former Cathedral Choir School, Whitcliffe Lane, Ripon

Air Quality Assessment in support of the development of 98 residential units. The site had the potential to create adverse impacts to sensitive receptors in the vicinity of the site during both the construction and operational phases. These impacts were assessed using the DMRB Calculation spreadsheet. The potential impacts on NO_2 and PM_{10} concentrations were assessed and determined to be negligible for both the construction and operational phases of the development. Therefore, air quality was not considered to be a constraint to planning consent.

Residential Development, Leopold Street, Wigan

Air Quality Assessment in support of a development consisting of 24 residential units. Wigan Council declared an AQMA over a section of the highway in close vicinity of the site. The proposed development had the potential to create adverse impacts to both the AQMA and to sensitive locations as a result of traffic generated by the scheme. Dispersion modelling of road vehicle exhaust emissions was undertaken using ADMS-Roads to provide consideration of potential impacts to the surrounding area. It was concluded that predicted impacts were negligible at all sensitive receptor locations and therefore air quality issues should not be a constraint to planning.

Educational and Residential Development, Romford Road, London

Air Quality Assessment in support of the creation of a mixed use development comprising an educational college and seven residential units. The development was located within Newham AQMA. Residential units were proposed on each of the buildings four storeys. Therefore, there was potential for future residents to be exposed to elevated pollution concentrations. Dispersion modelling was undertaken over all floors using ADMS-Roads to consider site suitability for the proposed end-use. As a result of the modelling, suitable mitigation techniques, including mechanical ventilation and non-opening windows were suggested for both the ground and first floor.

Residential Development, Borough High Street, Southwark

Air Quality Assessment in support of change of use to five residential units. Dispersion modelling of road vehicle exhaust emissions was completed using ADMS-Roads. Due to the site location, within central London, the AQLV for NO_2 was exceeded on each of the developments four floors. Therefore, in order to protect future residents a mechanical ventilation system combined with NO_x filtration was suggested.

JETHRO REDMORE

Manager - Air Quality Impact Group

BEng (Hons), MSc, MIAQM, MIEnvSc, AIEMA, CEnv

KEY EXPERIENCE:

Jethro is a Chartered Environmentalist with specialist experience in the air quality and odour sector. His key capabilities include:

- Production and management of Air Quality and Odour Assessments to DEFRA, Environment Agency and EPUK methodologies for a wide-range of clients from the retail, residential, infrastructure, commercial and industrial sectors.
- Significant proportion of assessments produced as part of over-arching Environmental Statements (ES) for large developments throughout the UK.
- Detailed dispersion modelling of road vehicle and industrial emissions using ADMS-ROADS, ADMS-4, AERMOD-PRIME and BREEZE-ROADS. Studies have included impact assessment of ground level pollutant and odour concentrations and assessment of suitability of development sites for proposed end-use.
- Project management and co-ordination of EIAs and scoping reports for developments throughout the UK.
- Design and project management of pollutant monitoring campaigns to define baseline conditions and inform future assessment in accordance with DEFRA and Environment Agency guidance.
- Co-ordination and management of large-scale multi-disciplinary projects and submissions.
- Provision of expert advice to local government and international environmental bodies.

PROJECTS SUMMARY:

Residential Developments

Wood St Mill, Bury - residential development adjacent to scrap metal yard.

Church Way Doncaster - mixed use scheme adjacent to AQMA.

North Wharf Gardens, London - peer review of EIA undertaken for residential development.

Mill Street, Crewe - residential development in proximity of 2-AQMAs.

Wheatstone House, London - mixed use scheme in AQMA.

Elephant and Castle Leisure Centre - baseline AQA for redevelopment.

Carr Lodge, Doncaster - EIA for large residential development.

Poplar Business Park, Tower Hamlets – AQA for residential development.

Queensland Road, Highbury - residential scheme including CHP.

Bicester Ecotown - dispersion modelling of energy centre for EIA.

Castleford Growth Delivery Plan - baseline air quality constraints assessment for town redevelopment.

Temple Point Leeds - residential development adjacent to M1.

Bury Road, Bury - residential development in proximity of AQMA.

Commercial and Retail Developments

Pleasington Lakes, Blackburn - EIA for holiday village adjacent to M65.

Wakefield College - redevelopment of city centre campus in AQMA.

Pleckgate School, Blackburn - biomass boiler and odour assessment.

Deptford Terrace, Sunderland - AQA for mixed use development.

Pakeezah Gourmet, Bradford - AQA including DMRB for new food store.

Lidl, Honiton - Food store development close to AQMA.

Witton Park School, Blackburn - biomass boiler feasibility assessment.

Manchester Airport Cargo Shed - commercial development.

New Crown Wood School, Greenwich - biomass boiler emission assessment.

Basford West, Crewe - AQA of industrial and business park.

Farnworth Superstore - AQA in support of new food superstore.

Basford West, Crewe - mixed use development in proximity of AQMA.

Wild Rose Holiday Park, Cumbria - EIA for holiday park extension.

Coolmore Estates, Seaham - EIA in support of creative centre of excellence.

Morton District Shopping Centre, Carlisle - air quality EIA for commercial development.

Westwood Park, Wigan - air quality EIA for new business park.

Manchester Airport Apron Extension - EIA including aircraft emission modelling.

Preston East - EIA for employment park.

Industrial Developments

Blue Star Fibres, Grimsby - fibre manufacturing plant adjacent to SPA.

Maesgwyn Biomass Plant - AQA including ecological assessment.

Lynchford Lane Waste Transfer Station - biomass facility energy recovery plant.

Barnes Wallis Heat and Power, Cobham - biomass facility adjacent to AQMA.

Countrystyle Biomass Plant, Kent - EIA for biomass facility.

Beddington Heat and Power, London - biomass energy recovery plant.

Brook Bridge Poultry Farm - Ammonia dispersion modelling of quail farm.