BACTON LOW RISE REDEVELOPMENT

Camden

pba peterbrett

AIR QUALITY ASSESSMENT

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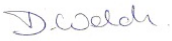
Prepared by:	Denise Welch	Principal Air Quality Scientist		November 2012
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Executive Summary

The London Borough of Camden has commissioned Peter Brett Associates LLP (PBA) to undertake an air quality assessment for the proposed redevelopment of the Bacton Low Rise Estate and District Housing Office site, to provide 290 residential units, three employment units, new open space and ancillary development.

The proposed development is car-free and will only provide a small number of disabled car parking spaces; consequently, it will not generate a significant amount of traffic. The site is bound to the north by the mainline railway line which runs between Kentish Town and West Hampstead, to the east by Vicars Road and Wellesley Road, to the south by Wellesley Road and to the west by Haverstock Road. The London Borough of Camden is concerned to ensure that the air quality at the site is suitable for residential use.

Concentrations of nitrogen dioxide and PM_{10} from existing road and rail traffic were predicted using the ADMS-Roads (v3.1.2) dispersion model. Concentrations of both pollutants are predicted to be below the objectives in 2011 at all worst-case locations within the proposed development. Air quality is thus considered acceptable for future residents of the site and no additional mitigation is required.

The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise the potential for dust annoyance and elevated PM_{10} concentrations. With mitigation measures in place, the overall impacts during construction are judged to be not significant.

The executive summary contains an overview of the key findings and conclusions. However, no reliance should be placed on any part of the executive summary until the whole of the report has been read.

1 Introduction

1.1 Proposed Development

1.1.1 The London Borough of Camden has commissioned Peter Brett Associates LLP (PBA) to undertake an air quality assessment for the proposed redevelopment of the Bacton Low Rise Estate and District Housing Office site, to provide 290 residential units, three employment units, new open space and ancillary development.

1.1.2 The site is located in north London, within the London Borough of Camden and within the Gospel Oak ward. It is located well away from any major roads; it is, however, bounded to the north by a railway line utilised by diesel trains. The proposed development is car-free, with only a limited amount of disabled parking provided; residents will not be able to obtain parking permits for on-street parking. Energy for the site will be provided from the existing CHP at the Royal Free Hospital, with an on-site back-up boiler only operating occasionally, when energy from the CHP is unavailable, for example, when it is being serviced. The back-up boiler will be 'low NO_x' (emitting <40mg/m^3), in line with Camden's Planning Guidance. Consequently, the development is unlikely to significantly impact on air quality in the area.

1.2 Scope

1.2.1 This assessment describes existing air quality in proximity to the site, considers the suitability of the site for residential development and assesses the impact of the construction of the development on local air quality. The main air pollutants of concern related to traffic and rail emissions are nitrogen dioxide and fine particulate matter (PM_{10}), whilst for construction activities they are dust and PM_{10}.

1.2.2 This assessment has been prepared taking into account all relevant local and national guidance and regulations, and follows a methodology agreed with the LB Camden.

2 Legislation and Policy

2.1 The Air Quality Strategy

2.1.1 The Air Quality Strategy (2007) establishes the policy framework for ambient air quality management and assessment in the UK. The primary objective is to ensure that everyone can enjoy a level of ambient air quality which poses no significant risk to health or quality of life. The Strategy sets out the National Air Quality Objectives (NAQOs) and Government policy on achieving these objectives.

2.1.2 Part IV of the Environment Act 1995 introduced a system of Local Air Quality Management (LAQM). This requires local authorities to regularly and systematically review and assess air quality within their boundary, and appraise development and transport plans against these assessments. The relevant NAQOs for LAQM are prescribed in the Air Quality (England) Regulations 2000 and the Air Quality (Amendment) (England) Regulations 2002.

2.1.3 Where an objective is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the objectives within its AQMA.

2.1.4 The Local Air Quality Management Technical Guidance 2009 (LAQM.TG(09))[1] issued by the Department for Environment, Food and Rural Affairs (Defra) for Local Authorities provides advice as to where the NAQOs apply. These include outdoor locations where members of the public are likely to be regularly present for the averaging period of the objective (which vary from 15 minutes to a year). Thus, for example, annual mean objectives apply at the façades of residential properties, whilst the 24-hour objective (for PM_{10}) would also apply within the garden. They do not apply to occupational, indoor or in-vehicle exposure.

2.2 EU Limit Values

2.2.1 The Air Quality Standards Regulations 2010 implements the European Union's Directive on ambient air quality and cleaner air for Europe (2008/50/EC), and includes limit values for NO_2. These limit values are numerically the same as the NAQO values but differ in terms of compliance dates, locations where they apply and the legal responsibility for ensuring that they are complied with. The compliance date for the NO_2 EU Limit Value is 1 January 2010 which is five years later than the date for the NAQO.

2.2.2 Directive 2008/50/EC consolidated the previous framework directive on ambient air quality assessment and management and its first three daughter directives. The limit values remained unchanged, but it now allows Member States a time extension for compliance, subject to European Commission (EC) approval.

2.2.3 The Directive limit values are applicable at all locations except:

- Where members of the public do not have access and there is no fixed habitation;

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

- On factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply; and
- On the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access.

2.2.4 The limit values are mandatory whereas there is no legal obligation to meet the NAQOs. Therefore, the limit values carry more weight than the NAQOs.

2.3 Assessment Criteria

Health Criteria

2.3.1 The NAQOs for nitrogen dioxide and PM_{10} set out in the Air Quality Regulations (England) 2000 and the Air Quality (England) (Amendment) Regulations 2002, are shown in **Table 2.1**.

Table 2.1: Nitrogen Dioxide and PM_{10} Objectives

Pollutant	Time Period	Objective
Nitrogen dioxide (NO_2)	1-hour mean	200µg/m^3 not to be exceeded more than 18 times a year
	Annual mean	40µg/m^3
Particulate matter (PM_{10})	24-hour mean	50µg/m^3 not to be exceeded more than 35 times a year
	Annual mean	40µg/m^3

2.3.2 The objectives for nitrogen dioxide and PM_{10} were to have been achieved by 2005 and 2004, respectively, and continue to apply in all future years thereafter. Analysis of long term monitoring data suggests that if the annual mean NO_2 concentration is less than 60µg/m^3 then the one-hour mean NO_2 objective is unlikely to be exceeded where road transport is the main source of pollution. This concentration has been used to screen whether the one-hour mean objective is likely to be achieved[2].

Significance

2.3.3 There is no official guidance in the UK on how to assess the significance of air quality impacts of existing sources on a new development. The approach developed by the Institute of Air Quality Management[3], and incorporated in Environmental Protection UK's guidance document on planning and air quality[4], has therefore been used. This guidance states that the assessment of significance should be based on professional judgement, taking into account the factors set out in **Table 2.2**, with the overall air quality impact on the scheme described as either, 'insignificant', 'minor', 'moderate' or 'major'.

[2] Defra, 2009. Local Air Quality Management Technical Guidance LAQM.TG(09).
[3] Institute of Air Quality Management, 2009. Position on the Description of Air Quality Impacts and the Assessment of their Significance, November 2009. The IAQM is the professional body for air quality practitioners in the UK.
[4] EPUK, 2010. Development Control: Planning for Air Quality (2010 Update)

Table 2.2: Factors to be Taken into Account in Assigning Significance

Factors to be taken into account in assigning significance
Where new exposure is being 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.
Uncertainty, including the extent to which worst-case assumptions have been made.
The extent to which an objective or limit value is exceeded e.g. an annual mean NO_2 of 41µg/m^3 should attract less significance than an annual mean of 51µg/m^3.

2.4 Planning Policy

National Policy

2.4.1 The National Planning Policy Framework was published in March 2012. This sets out the Government's planning policies for England and how they are expected to be applied. In relation to conserving and enhancing the natural environment, paragraph 109 states that:

"The planning system should contribute to and enhance the natural and local environment by…. preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability."

2.4.2 Paragraph 124, also states that:

"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."

2.4.3 Paragraph 203 goes on to say:

"Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition."

The London Plan

2.4.4 The London Plan[5] provides strategic planning guidance for Greater London. Each Borough's development plans must be in 'general conformity' with it.

2.4.5 The plan includes Policy 7.14 (Improving Air Quality) which states that development proposals should:

[5] Available at: www.london.gov.uk/priorities/planning/londonplan

- Promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils';

- Where biomass boilers are included, set out a detailed air quality assessment that should forecast pollutant concentrations. Permission should only be granted if no adverse impacts from biomass are identified; and

- Aim to be 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as AQMAs).

2.4.6 Boroughs and others with relevant responsibilities should also have policies that:

- Seek reductions in levels of pollutants referred to in the Government's National Air Quality Strategy having regard to the Mayor's Air Quality Strategy; and

- Take account of the findings of the Air Quality Review and Assessments and Action Plans, in particular where AQMAs have been designated.

2.4.7 The Mayor will work with strategic partners to ensure the spatial, transport and design policies of the London Plan support his Air Quality Strategy.

Mayor's Air Quality Strategy

2.4.8 The Mayor's Air Quality Strategy[6] sets out policies to improve air quality in London and includes the following measures:

- Ensuring that public transport becomes cleaner;

- Reducing traffic growth by improving public transport and encouraging developers to make easy access to public transport in new developments;

- Introduction of Phase 3 of the Low Emission Zone (LEZ) in 2012 to cover PM_{10} emissions from minibuses and heavier Light Goods Vehicles (LGVs), and a LEZ nitrogen oxides (NOx) standard from 2015.

2.4.9 Policy 7 on 'Using the planning process to improve air quality' aims to ensure that no new development has a negative impact on air quality in London. It states that the Mayor will use his planning powers to:

- Develop a check list to guide boroughs and developers in the assessment of potential emissions from new developments;

- Minimise increased exposure to existing poor air quality, particularly in AQMAs and where developments are to be used by large numbers of vulnerable people;

[6] Available at: www.london.gov.uk/sites/default/files/Air%20Quality%20Strategy%20v3.pdf

- Ensure air quality benefits are realised through planning conditions and Section 106 agreements; and
- A package of non-transport policy measures is also proposed to reduce localised pollution sources.

Local Planning Policy

2.4.10 The Camden Development Polices 2010-2025 document[7], adopted in 2010, forms part of the Local Development Framework and sets out the local development policies for the borough. Policy DP32 Air quality and Camden's Clear Zone, states:

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

2.4.11 The Camden Core Strategy[8] was adopted in November 2010. It contains Policy CS16 Improving Camden's Health and Well-being, which states:

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

e) recognise the impact of poor air quality on health and implement Camden's Air Quality Action Plan which aims to reduce air pollution levels."

2.4.12 In addition, Camden adopted the Camden Planning Guidance document CPG6[9] on Amenity in September 2011. This document is a formal Supplementary Planning Document supporting the policies of the Core Strategy and Development Policies. Chapter two provides guidance on amenity issues relating to air quality. It highlights that Camden has declared a whole borough AQMA for nitrogen dioxide and PM_{10}, and that all developments are required to limit their impact on local air quality. It sets out when an air quality assessment will be required, what an assessment should cover, and measures which may be introduced where a development is shown to negatively impact on air quality.

London Borough of Camden Air Quality Action Plan 2009 – 2012

2.4.13 The London Borough of Camden prepared a revised and updated Air Quality Action Plan covering the period 2009 – 2012. The plan sets out the measures in order to improve air quality within the borough. The AQAP sets out the sources of emissions within the borough and identifies that road transport and gas boilers are the largest contributors to both NO_x and $PM_{10.}$

2.4.14 The AQAP includes a range of measures relating to four themes:

[7] Available at: http://camden.gov.uk/ccm/content/environment/planning-and-built-environment/two/planning-policy/local-development-framework/development-policies.en
[8] Available at: www.camden.gov.uk/ccm/navigation/environment/planning-and-built-environment/planning-policy/local-development-framework--ldf-/core-strategy/
[9] Available at: www.camden.gov.uk/ccm/content/environment/planning-and-built-environment/two/planning-policy/supplementary-planning-documents/camden-planning-guidance.en

- Reducing transport emissions;
- Reducing emissions associated with new development;
- Reducing emissions from gas boilers and industrial processes; and
- Air quality awareness raising initiatives.

2.4.15 The measures relating to new developments include the requirement for an air quality assessment where a development may have a negative impact on air quality, reductions in emissions from construction sites, the reduction of transport and gas boiler emissions, and controlling emissions from biomass heating.

3 Methodology

3.1 Existing Conditions

3.1.1 Information on existing air quality has been obtained by collating the results of monitoring carried out by LB Camden. Background concentrations for the site have been defined using the recently updated national pollution maps published by Defra. These cover the whole country on a 1x1 km grid[10].

3.2 Construction Impacts

3.2.1 During demolition and construction the main potential effects are dust annoyance and locally elevated concentrations of PM_{10}. The suspension of particles in the air is dependent on surface characteristics, weather conditions and on-site activities. Impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source.

3.2.2 Separation distance is also an important factor. Large dust particles (greater than 30µm), responsible for most dust annoyance, will largely deposit within 100m of sources. Intermediate particles (10-30µm) can travel 200-500m. Consequently, significant dust annoyance is usually limited to within a few hundred metres of its source. Smaller particles (less than 10µm) are deposited slowly and may travel up to 1km, however, the impact on the short-term concentrations of PM_{10} occurs over a shorter distance. This is due to the rapid decrease in concentrations with distance from the source due to dispersion.

3.2.3 The Greater London Authority (GLA, 2006) provides guidelines to determine the likely level of risk construction and demolition impacts will have on local dust complaints and PM_{10} concentrations. Sites are categorised into low, medium and high risk (**Table 3.1**) based on the size of the development, and potential for impacts at sensitive receptors, and the appropriate level of mitigation consequently required. By applying the recommended mitigation, the site is reduced to a low risk site.

Table 3.1: Risk Criteria for Control of Dust and Emissions from Construction

Risk	Criteria
High	Development of over 15,000 square metres. Development of over 150 properties. Potential for emissions and dust to have significant impact on sensitive receptors.
Medium	Development of between 1,000 and 15,000 square metres. Development of between 10 to 150 properties. Potential for emissions and dust to have an intermittent or likely impact on sensitive receptors.
Low	Development of up to 1,000 square metres. Development of one property and up to a maximum of ten. Potential for emissions and dust to have an infrequent impact on sensitive receptors.

[10] http://laqm.defra.gov.uk/maps/maps2010.html

3.2.4 The sensitivity of the study area to construction dust impacts is defined based on the examples provided within the Institute of Air Quality Management (2012) guidance (**Table 3.2**), taking into account professional judgement.

Table 3.2: Area Sensitivity Definitions

Sensitivity	Health Receptors
Very High	More than 100 dwellings within 20m. PM_{10} concentrations exceed the daily mean objective. Contamination present. Very sensitive receptors (schools / hospitals). Construction activities in one area for more than one year.
High	10 – 100 dwellings within 20m. PM_{10} concentrations approach the daily mean objective.
Medium	Less than 10 dwellings within 20m. PM_{10} concentrations below the daily mean objective.
Low	No dwellings within 20m. PM_{10} concentrations well below the daily mean objective.

3.2.5 Consideration was also given to wind and rainfall data due to these affecting the potential for dust generation. A ten year wind rose from London City Airport weather station (2000 – 2009) was used along with average rainfall data (1981-2010) obtained from the Met Office website.

Significance Criteria – Construction

3.2.6 The construction impact significance criteria are based on:

- Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance, IAQM 2012;
- The control of dust and emissions from construction and demolition Best Practice Guidance, GLA 2006;
- Particulate Matter in the United Kingdom, Air Quality Expert Group, 2005; and
- Air Quality (England) Regulations, 2000 and Air Quality (England) (Amendment) Regulations 2002.

3.2.7 The significance criteria take account of the risk of impact and the likely magnitude (taking into account the scale and nature of the works, the proximity of sensitive receptors, and existing conditions in the area) and the sensitivity of the receptors (as defined by the IAQM guidance). The significance criteria also assume that mitigation appropriate to the level of risk (defined in the mitigation section, based on the GLA 2006 guidance) is put into place. **Table 3.3** presents the significance criteria used to assess the construction impacts.

Table 3.3: Construction Phase Significance Criteria

Sensitivity of Area	Risk of site giving rise to dust effects		
	High	Medium	Low
Without Mitigation			
Very High	Substantial adverse	Moderate adverse	Moderate Adverse
High	Moderate adverse	Moderate Adverse	Minor Adverse
Medium	Moderate Adverse	Minor Adverse	Negligible
Low	Minor Adverse	Negligible	Negligible
With Mitigation			
Very High	Minor adverse	Minor adverse	Negligible
High	Minor adverse	Negligible	Negligible
Medium	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible

3.3 Road Traffic and Rail Impacts

Sensitive Locations

3.3.1 Relevant sensitive locations are places where members of the public might be expected to be regularly present over the averaging period of the objectives. For this assessment, this includes the residential properties.

3.3.2 Predictions have been made at six receptors, representing worst-case locations within the development site, closest to roads and the railway line (**Figure 1**), in order to determine whether the proposed residential properties and amenity areas are suitable in terms of air quality. Concentrations have been predicted at a height of 1.5 m, representing exposure at ground floor level.

Impact Predictions

3.3.3 Predictions of nitrogen dioxide and PM_{10} concentrations for the six receptors have been carried out assuming that the development is in place in 2011, which provides a worst-case assessment. In addition, concentrations have been predicted at diffusion tube location CA3, located on Mansfield Road, in order to verify the modelled results (see **Appendix C** for further details on the verification method).

3.3.4 Predictions have been carried out using the ADMS-Roads dispersion model (v3.1.2). The model requires the user to provide various input data, including the emissions for each section of road (or railway), and road characteristics (including road width, height above ground level, and street canyon height, where applicable). It also requires meteorological data; the model has been run using meteorological data from the London City Airport monitoring station (2011), which is considered suitable for this area.

3.3.5 Annual Average Daily Traffic (AADT) flows, and the proportions of each vehicle class, for roads within 250m of the proposed site have been taken from the London Atmospheric Emissions Inventory (LAEI). In addition, an ATC count was carried out on Wellesley Road, and flows on Vicars Road and Haverstock Road were estimated based on the count data and observations during a site visit. Traffic speeds were based either on those presented in

the LAEI or speed restrictions, taking into account the proximity to a junction. Traffic data used in this assessment are summarised in **Table 3.4**.

Table 3.4: Summary of Traffic Data Used in the Assessment (AADT)

Road	AADT	%Car	%Taxi	%LGV	% HGV	%Bus and Coach	%MCL
LAEI Flows							
Mansfield Road	13,887	79.5	3.1	8.9	5.5	1.2	1.7
Oak Village	6,163	81.8	3.2	9.2	4.0	0.0	1.7
Lamble Street	6,163	81.8	3.2	9.2	4.0	0.0	1.7
Grafton Road	6,163	81.8	3.2	9.2	4.0	0.0	1.7
Southampton Road	29,445	79.6	3.2	9.0	4.9	1.7	1.7
Malden Road	29,445	79.6	3.2	9.0	4.9	1.7	1.7
ATC Data							
	AADT	**%HDV**					
Wellesley Road	986	18.1	-	-	-	-	-
Haverstock Road	493	11.3	-	-	-	-	-
Vicars Road	493	11.3	-	-	-	-	-

3.3.6 Emissions were calculated (for 2011) using the recently released Emission Factor Toolkit (EFT) v5.1.1, which utilises NO_x emission factors taken from the European Environment Agency COPERT 4 (v8.1) emission calculation tool. The traffic data were entered into the EFT, along with speed data, to provide combined emission rates for each of the road links entered into the model.

3.3.7 A railway line runs adjacent to the northern boundary of the proposed development site, between Kentish Town and West Hampstead Heath stations. The LAEI includes emissions for this stretch of railway line. The NO_x and PM_{10} emission data provided have been converted into total emission rates of 0.068 g/km/s and 0.001 g/km/s, respectively, and input into the model as a line source. The railway line adjacent to the site is located within a cutting. The railway has been included within the model at ground level, which is considered a conservative approach.

3.4 Consultation

3.4.1 The methodology used in this assessment was agreed with LB Camden[11].

[11] Telephone correspondence with Poppy Lyle, 6th September 2012

4 Existing Air Quality

4.1 LAQM

4.1.1 LB Camden has investigated air quality within its area as part of its responsibilities under the LAQM regime. A whole borough AQMA has been declared for exceedences of the nitrogen dioxide and PM_{10} objectives.

4.2 Monitoring

4.2.1 LB Camden operates three automatic monitoring stations within its area. The Council also deploys nitrogen dioxide diffusion tubes, prepared and analysed by Gradko Environmental (50% TEA in acetone), at a number of monitoring sites. The Mansfield Road diffusion tube is located approximately 250m north of the site. This tube ceased to operate at the end of 2010. Data for the automatic monitoring sites, and available data for the Mansfield Road diffusion tube, are presented in **Tables 4.1**, **4.2** and **4.3**.

Table 4.1: Measured Annual Mean Nitrogen Dioxide Concentrations, 2008 - 2011

Site ID	Site	Annual mean (µg/m^3)			
		2008	2009	2010	2011[a]
Automatic					
CD1	Swiss Cottage	**75**	**84**	**82**	**71.2**
CD3	Shaftesbury Avenue	**78**	**87**	**89**	**75.5**
LB	London Bloomsbury	**55**	**54**	**55**	**48.4**
Diffusion Tubes					
CA3	Mansfield Road	**42.9**	**45.6**	**42**	**-**
Objective		**40**	**40**	**40**	**40**

2008 – 2010 data taken from the LB Camden Air Quality Progress Report 2010. Diffusion tube data have been bias adjusted by the Council. 2011 automatic data downloaded from the London Air Quality Network website (www.londonair.org.uk)

Table 4.2: Measured Exceedences of the Hourly Mean Nitrogen Dioxide Objective, 2008 - 2011

Site ID	Site	Number of Hours >200µg/m^3			
		2008	2009	2010	2011
Automatic					
CD1	Swiss Cottage	**70**	**151**	**128**	**79**
CD3	Shaftesbury Avenue	9	11	**21**	15
LB	London Bloomsbury	0	2	1	0
Objective		**18**	**18**	**18**	**18**

2008 – 2010 data taken from the LB Camden Air Quality Progress Report 2010. 2011 automatic data downloaded from the London Air Quality Network website (www.londonair.org.uk); contains provisional data.

4.2.2 Nitrogen dioxide concentrations at all of the monitoring sites remained similar over the four year period 2008 – 2011, although a slight reduction is evident in the 2011 data.

Table 4.3: Measured PM_{10} Concentrations, 2008 - 2011

Site ID	Site	Year	Annual Mean ($\mu g/m^3$)	Number Days >50$\mu g/m^3$
CD1	Swiss Cottage	2008	26	12
		2009	25	8
		2010	26	11
		2011	27.3	31
CD3	Shaftesbury Avenue	2008	29	20
		2009	32	19
		2010	29	5
		2011	31.0	24
LB	London Bloomsbury	2008	23	10
		2009	19	9
		2010	18	2
		2011	22.5	19
Objectives			**40**	**35**

2008 – 2010 data taken from the LB Camden LAQM Progress Report 2010. 2011 automatic data downloaded from the London Air quality Network website (www.londonair.org.uk); contains provisional data.

4.2.3 There is no clear trend in the PM_{10} data presented in **Table 4.3**, although concentrations have remained below the objectives during the 2008 – 2011 period.

4.3 Background Concentrations

4.3.1 In addition to these measured concentrations, estimated background concentrations for the site have been obtained from the recently updated national maps (**Table 4.4**).

Table 4.4: Estimated Annual Mean Background Concentrations in 2011 ($\mu g/m^3$)

Year	NO_x	NO_2	PM_{10}
2011	59.7	33.7	19.8
Objectives	**-**	**40**	**40**

5 Impact Assessment

5.1 Construction Impacts

5.1.1 The main potential effects during demolition and construction are dust deposition and elevated PM_{10} concentrations. The following activities have the potential to cause emissions of dust:

- Site preparation including delivery of construction material, erection of fences, barriers and scaffolding, removal of existing surfaces and structures;
- Earthworks including digging foundations and landscaping;
- Materials handling such as storage of material in stockpiles and spillage;
- Movement of construction traffic including haulage, vehicles and plant;
- Construction and fabrication of infrastructure and buildings; and
- Disposal of waste materials off-site.

5.1.2 Typically the main cause of unmitigated dust generation on construction sites is from demolition and vehicles using unpaved haul roads, and off-site from the suspension of dust from mud deposited on local roads by construction traffic.

5.1.3 The main determinants of unmitigated dust annoyance are the weather and the distance to the nearest receptor. Based on the GLA criteria (**Table 3.1**), the site is classified as high risk. Mitigation measures set out for high risk sites will therefore be required in order to reduce the level of risk to low risk. The study area is considered to be of high sensitivity (**Table 3.2**), as the proposed development is surrounded by residential properties. There is also the potential for future residents to be impacted where they occupy properties prior to completion of construction of the adjacent properties.

5.1.4 The ten year wind rose for London City weather station (2000 to 2009; **Figure 2**) shows that the dominant wind directions are from the southwest through to the west. Winds from these sectors occur for approximately 38% of the time.

5.1.5 Wind speeds of moderate strength (3m/s) or greater are required to suspend dust in the air. The wind data for this period shows that for approximately 20% of the time the wind speed was less than moderate strength (3m/s); therefore for 20% of the time dust is unlikely to become suspended in the air.

5.1.6 A daily rainfall of 0.2mm is considered sufficient to prevent fugitive dust generation. Analysis of rainfall data for the area around the site shows that, over the 30 year period from 1981 to 2010, an average of 41 - 44% of days were ‘wet days’ (i.e. with a rainfall over 0.2mm) when there will be natural dust suppression.

5.1.7 For the majority of the time there will be little potential for dust generation and effects even without mitigation in place because:

- On approximately 41 - 44% of days the rainfall is greater than 0.2mm when there will be natural dust suppression to minimise emissions of dust;
- In winter months surfaces tend to stay damp for significant periods of time; and
- 20% of the time winds are typically less than moderate strength and would not suspend dust in the air from stockpile and open surfaces.

5.1.8 There may, however, be periods when sufficient dust is generated and crosses the site boundary to cause annoyance. This is more likely in the summer months, when higher temperatures evaporate surface moisture more readily.

5.2 Impacts of the Development

Road Traffic

5.2.1 The proposed development will provide limited car parking for disabled users. It is considered that the site will not generate a significant amount of traffic, and the impacts on air quality are thus considered insignificant.

5.3 Impacts on the Development

5.3.1 The impact of emissions from existing traffic and rail emissions on air quality for residents of the proposed development was predicted at six locations representing worst-case exposure at ground floor level (1.5m height) (**Table 5.1**).

Table 5.1: Predicted Concentrations of Nitrogen Dioxide and PM_{10} in 2011 for Receptors within the Development

Receptor	NO_2	PM_{10}	
	Annual Mean ($\mu g/m^3$)	Annual Mean ($\mu g/m^3$)	Number of Days >50$\mu g/m^3$
1	37.8	21.0	5
2	37.4	20.8	5
3	37.3	20.7	4
4	36.1	20.5	4
5	38.4	20.7	4
6	37.6	20.6	4
Objectives	**40**	**40**	**35**

Exceedences of the objective are highlighted in bold.

5.3.2 Predicted concentrations of nitrogen dioxide and PM_{10} are below the relevant objectives at all six of the worst-case receptors in 2011. The predicted nitrogen dioxide concentrations are well below 60$\mu g/m^3$, and therefore it is unlikely that the hourly mean objective would be exceeded. Air quality for future residents of the proposed development would thus be acceptable.

5.4 Uncertainty

5.4.1 There are many components that contribute to the uncertainty in predicted concentrations. The model used in this assessment is dependant upon the traffic data that have been input which will have inherent uncertainties associated with them. There is then additional uncertainty as the model is required to simplify real-world conditions into a series of algorithms.

5.4.2 A disparity between the road transport emission projections and measured annual mean concentrations of nitrogen oxides and nitrogen dioxide has recently been identified[12]. Whilst projections suggest that both annual mean nitrogen oxides and nitrogen dioxide concentrations should have fallen by around 15-25% over the past 6 to 8 years, at many monitoring sites levels have remained relatively stable, or have even shown a slight increase. This pattern is evident in the monitoring data presented in **Section 4**. Assessing the impact on the development in 2011 removes the uncertainty associated with future year emission factors.

5.4.3 Model uncertainty can be reduced through model verification, in which model outputs are compared with measured concentrations. Because the model has been verified and adjusted against monitoring data, there can be reasonable confidence in the predicted concentrations.

5.5 Impact Significance

5.5.1 The impact of existing road traffic emissions on air quality for future residents has been determined, and is judged to be insignificant. This judgement is made in accordance with the methodology set out in **Paragraph 2.3.3**, and takes account of the factors set out in **Table 2.2**, in particular that concentrations will be below the air quality objectives for all future residents.

[12] Carslaw, D, Beevers, S, Westmoreland, E and Williams, M, 2011. Trends in NOx and NO_2 emissions and ambient measurements in the UK. Available at: http://uk-air.defra.gov.uk/library/reports?report_id=645

6 Mitigation

Construction

6.1.1 The construction effects can be minimised through use of appropriate mitigation measures. The following mitigation measures are included within a Construction Management Plan (CMP) and Environment Management Plan (EMP) to be agreed with the local authority. In addition, the site will employ the Considerate Constructors Scheme[13]. The proposed measures are consistent with those set out in the GLA Best Practice Guidance (GLA, 2006).

6.1.2 Dust control measures should be rigorously applied close to existing dwellings, and when ongoing construction occurs close to completed dwellings, to reduce the risk of dust complaints and exposure to elevated PM_{10} concentrations.

Site Preparation and Demolition:

- Set-up and secure the site with hoarding;
- Wrap buildings to be demolished (scaffolding sheeted in fire retardant plastic sheeting);
- Excavators fitted with boom and dipper arm mounted water sprays to 'damp down' any dust generated; and
- Use of gas powered generators and electric equipment, rather than diesel/petrol, where practicable.

Construction:

- Temporary one-way site access system;
- Deliveries to site on a 'just in time basis' to avoid congestion, as well as avoiding peak hours;
- All roadways and vehicle stopping areas will be sealed (for example with tarmac);
- Road sweeping to control mud on roads;
- Exhaust systems to be fitted with catalytic converters;
- Regular servicing of on-site plant and equipment;
- All vehicle engines should be switched off when not in use; and
- On-road vehicles should comply with set emission standards.

[13] A voluntary scheme to which construction companies and sites can register, and which commits those registered to be '*considerate and good neighbours, as well as respectful, environmentally conscious, responsible and accountable.*'

Operation

6.1.3 The assessment has demonstrated that air quality for future residents of the proposed development would be acceptable; mitigation measures are therefore unnecessary.

6.1.4 The Government has made a commitment to fully electrify the Midland Main Line over the coming years. The reduction or removal of diesel trains from the line adjacent to the site as part of these plans will bring about an improvement in local air quality.

7 Conclusions

7.1.1 The air quality impacts associated with the construction and operation of the proposed redevelopment of the Bacton Low Rise Estate and District Housing Office site have been assessed. The site lies within the whole borough AQMA declared by the LB Camden for exceedences of the nitrogen dioxide and PM_{10} objectives; it is bounded by a railway line which carries diesel locomotives, but is located away from any major roads.

7.1.2 The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise the risk of elevated PM_{10} concentrations and dust nuisance in the surrounding area.

7.1.3 Concentrations of nitrogen dioxide and PM_{10} have been predicted for six worst-case receptors within the proposed development, in order to determine the impacts of emissions from existing traffic and railway sources on air quality for future residents of the new development. Predicted concentrations of both pollutants are below the air quality objectives. It is concluded that air quality does not provide any constraints to the proposed development, and mitigation measures are not required during the operational phase of the development.

Appendix A: Glossary

Appendix A: Glossary

AADT	Annual Average Daily Traffic
AQMA	Air Quality Management Area
Diffusion Tube	A passive sampler used for collecting nitrogen dioxide in the air
HDV	Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes. Includes HGVs and buses.
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle
NAQO	National Air Quality Objective as set out in the Air Quality Strategy and the Air Quality Regulations
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides, generally considered to be nitric oxide and nitrogen dioxide. Its main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles
PM_{10}	Small airborne particles less than 10μm in diameter
Receptor	A location where the effects of pollution may occur

Appendix B: Reference List

Appendix B: Reference List

Air Quality Expert Group (2005) Particulate Matter in the United Kingdom, Defra, London.

Environmental Act 1995, Part IV.

Department of the Environment, Food and Rural Affairs in partnership with the Scottish Executive, The National Assembly for Wales and the Department of the Environment for Northern Ireland, 2009, Local Air Quality Management Technical Guidance, LAQM.TG(09), Stationery Office, London.

Department of the Environment, Transport and the Regions in Partnership with the Welsh Office, Scottish Office and Department of the Environment for Northern Ireland. 2007. The Air Quality Strategy for England, Scotland, Wales, Northern Ireland, Stationery Office, London.

Greater London Authority (2006) The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance, Greater London Authority, London

Institute of Air Quality Management (2012) Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance, IAQM, London

Statutory Instrument 2000, No 921, The Air Quality (England) Regulations 2000, Stationery Office, London.

Statutory Instrument 2002, No 3034, The Air Quality (England) (Amendment) Regulations 2002, Stationery Office, London.

Statutory Instrument 2007, No. 64, The Air Quality Standards Regulations 2007, Stationery Office, London.

Appendix C: Verification

Appendix C: Verification

Nitrogen Dioxide

Most nitrogen dioxide (NO_2) is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides (NO_x = NO + NO_2). The model has been run to predict the 2011 annual mean road-NO_x concentrations at the Mansfield Road diffusion tube monitoring site. Concentrations have been predicted at the height of the diffusion tube (2.5m). A background nitrogen dioxide concentration of 33.7µg/m^3 was determined from Defra's recently updated background maps. Monitoring ceased at the Mansfield Road site at the end of 2010. The measured 2010 concentration has assumed to be the same as that which would have been measured in 2011.

AADT flows, and the proportions of HDVs, for roads within 250m of the Mansfield Road diffusion tube have been taken from the London Atmospheric Emissions Inventory (LAEI), along with NO_x emissions for nearby rail sources. Traffic speeds were based on those presented in the LAEI, taking into account the proximity to a junction. Traffic data, and rail emissions data, used in the verification are summarised in **Tables C1** and **C2**. The railway line is elevated, and has been included within the model at a height of 8m.

Table C1: Summary of Traffic Data Used in the Verification (AADT)

Road Link	2011
Mansfield Road	13,887 (6.8%)
Oak Village	6,613 (4.0%)

Values in parentheses are proportions of HDVs

Table C2: Rail Emissions Used in the Verification (g/km/s)

	NO_x	PM_{10}
Gospel Oak to Hampstead Heath	0.337	0.404

The model output of road-NO_x has been compared with the 'measured' road-NO_x, which was calculated from the measured NO_2 concentration and the predicted background NO_2 concentration within the recently updated NO_x from NO_2 calculator[14].

An adjustment factor was determined as follows:

- Measured NO_2 : 42.0µg/m^3
- 'Measured' road-NO_x (from NO_x to NO_2 calculator): 19.35µg/m^3
- Modelled road-NO_x = 15.8µg/m^3
- Road-NOx adjustment factor: 19.35/15.8 = 1.222

The factor implies that the model is slightly under-predicting the road-NO_x contribution. This is a common experience with this and most other models.

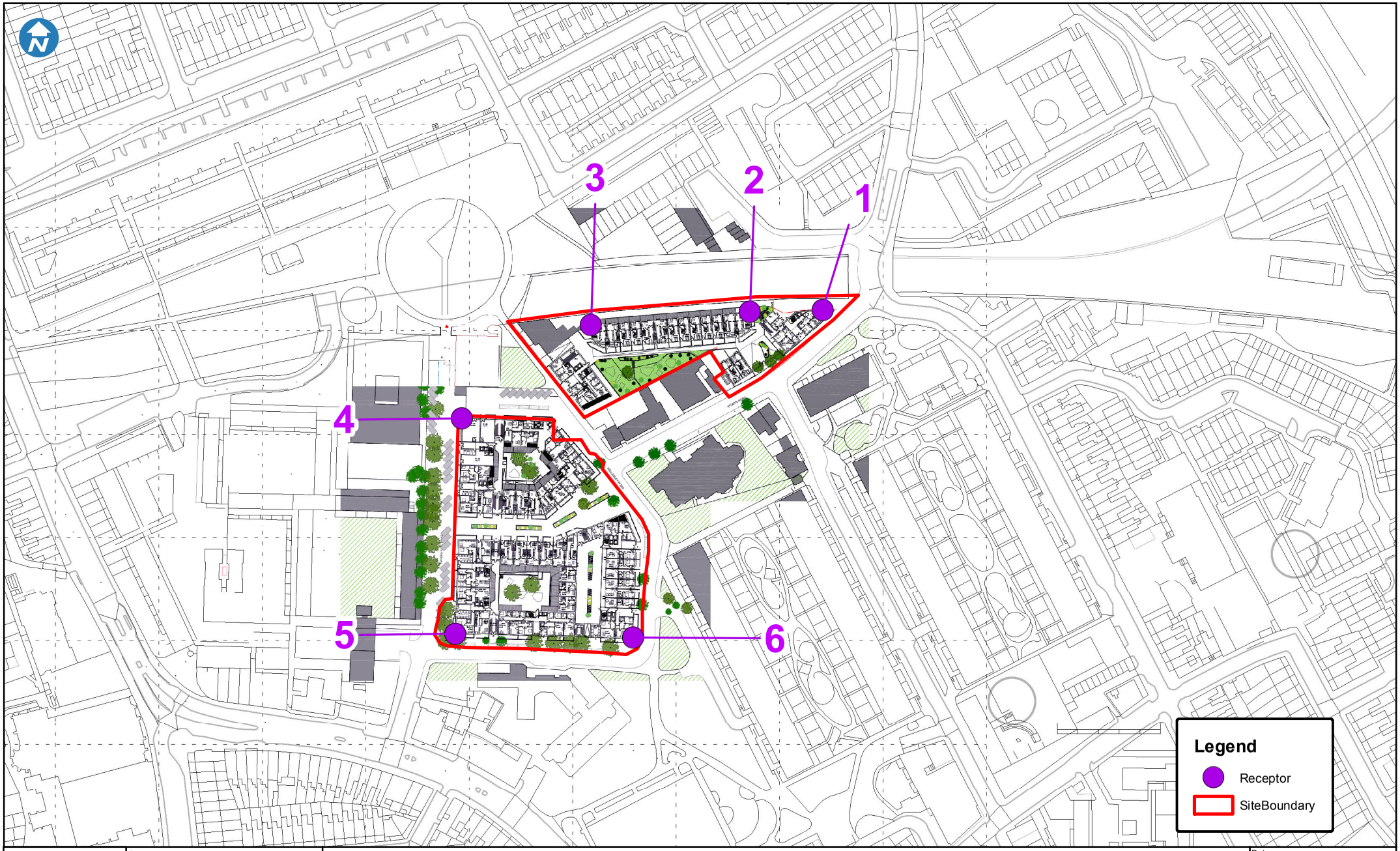
[14] http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html

This factor was then applied to the modelled road-NO_x concentration for each receptor to provide adjusted modelled road-NO_x concentrations. The total nitrogen dioxide concentrations were then calculated using the NO_x from NO_2 calculator.

PM_{10}

The Camden automatic monitoring sites are located some distance from the proposed development site, and are not in locations representative of the site. The model outputs of road-PM_{10} have therefore been adjusted by applying the adjustment factor calculated for road-NO_x.

Appendix D: Figures



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Client
London Borough of Camden

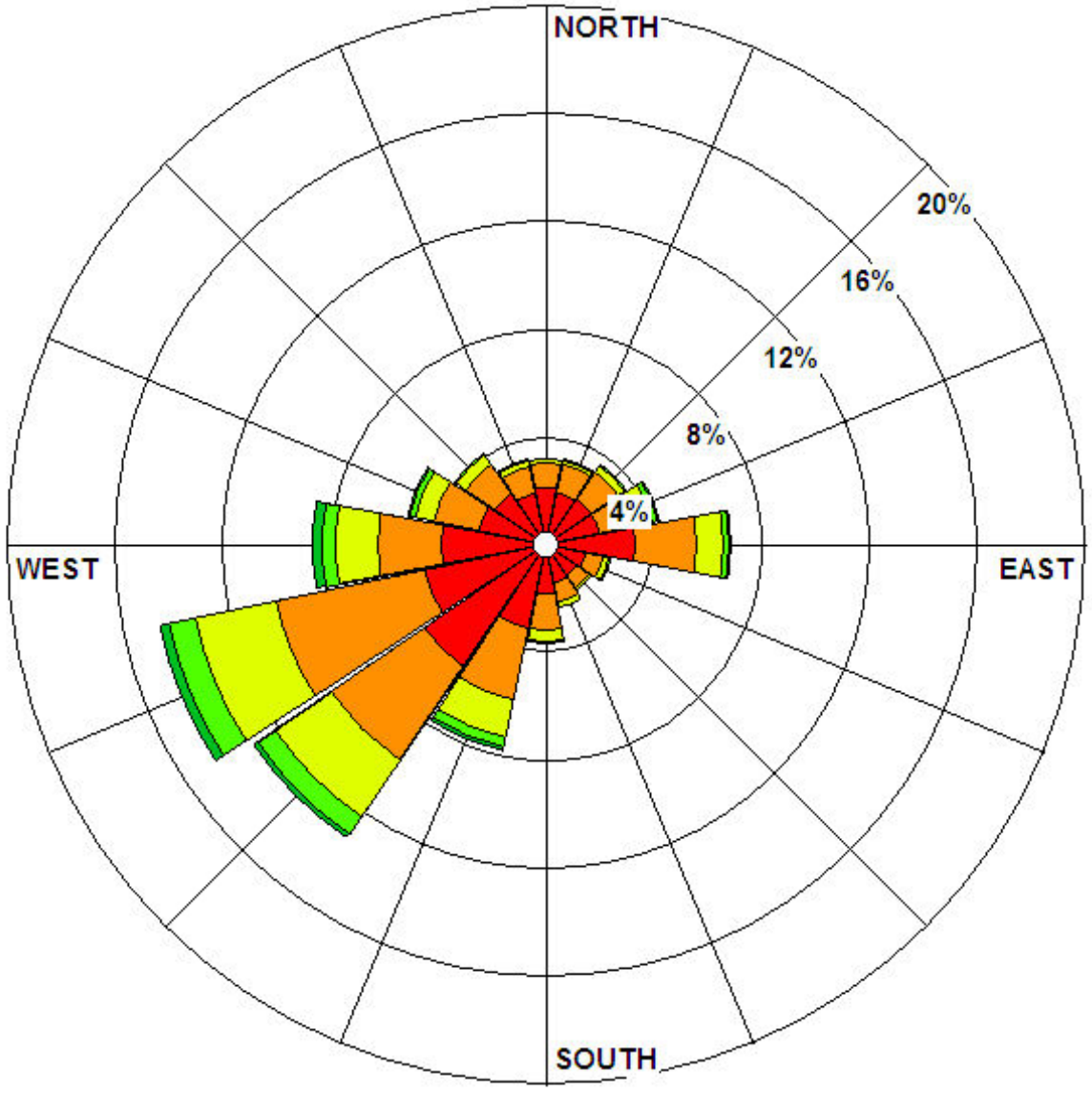
Bacton Low Rise Redevelopment

Receptor Locations

Date	~~October 2012~~
Scale	~~N.T.S.~~
Drawn By	~~ZD~~
Checked By	~~DW~~
Figure Number	

Figure 1

PBA: BRISTOL Drive:\J:\26572 Bacton Estate\Plans and Figures\PDF's



London City Airport 2000-2009 (Annual)

Wind Speed (m/s)

- >= 10.0
- 8.0 - 10.0
- 6.0 - 8.0
- 4.0 - 6.0
- 0.5 - 4.0

Calms: 11.27%

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Client
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Bacton Low Rise Redevelopment

Wind Rose

Date	September 2012
Scale	N.T.S.
Drawn By	ZB
Checked By	DW
Figure Number	**Figure 2**