



Linden Ltd t/a Linden Homes Southern and Ankers and Rawlings Developments

Havant Retail Park Proposed Residential Development

Portsdown Hill Road, Bedhampton Havant

Air Quality Assessment

March 2013

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Document Control

Project: Proposed Residential Development Portsdown Hill Road, Bedhampton Havant
Air Quality Assessment

Client: Linden Ltd t/a Linden Homes Southern and Ankers and Rawlings Developments

Job Number: A080809

File Origin: O:\Acoustics Air Quality and Noise\Active

Document Checking:

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Issue	Date	Status
1	21 st February 2013	First Draft
2	7 th March 2013	First Issue
3		



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1.0 Introduction

Linden Ltd t/a Linden Homes Southern and Ankers and Rawlings Developments commissioned WYG Planning and Environment (WYG) to prepare an Air Quality Assessment for a planning application for a proposed residential development on land off Portsdown Hill Road, Bedhampton, Havant.

1.1 Site Location and Context

The approximate United Kingdom (UK) National Grid Reference (NGR) for the proposed development site is 469650,106400. Reference should be made to Figure 1 for an indication of the proposed development site boundary and surrounding area. The proposal is for demolition of existing buildings and erection of 86 dwellings, acoustic fencing together with improvements to existing site access and the provision of open space, landscaping and car parking.

1.2 Overview and Scope of Air Quality Assessment

The following assessment stages and scope have been undertaken as part of this assessment:

- Baseline evaluation of air quality within the vicinity of the proposed development;
- Effects of existing traffic emissions sources on the proposed new residential developments; and,
- Construction phase emissions from construction, on site plant and HGVs associated with the construction activities.

The results are detailed in the following sections of this report.

The construction phase assessment considers the potential effects of dust and particulate emissions from site activities and materials movement using a qualitative risk assessment method based on the Institute of Air Quality Management's 'Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance' document.

The assessment of the potential air quality impacts that are associated with the operational phase has focused on the predicted impact of changes in ambient nitrogen dioxide (NO₂) and particulate matter (PM₁₀) as a result of the development, at key local receptor locations. The changes have been referenced to EU air quality limit values and UK air quality objectives and the magnitude and significance of the changes have been referenced to non statutory guidance issued by Environmental Protection UK.



2.0 Extant Policy, Legislation and Relevant Agencies

2.1 Documents Consulted

The following documents were consulted during the undertaking of this Assessment:

2.1.1 Legislation and Best Practice Guidance

- The Air Quality Standards Regulations, 2010;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007;
- The Environment Act, 1995;
- Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009;
- Development Control: Planning for Air Quality (2010 Update) Updated guidance from Environmental Protection UK on dealing with air quality concerns within the development control process, April 2010;
- National Planning Policy Framework, Department for Communities and Local Government, March 2012;
- Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, HA 207/07 - Air Quality, Highways Agency, 2007;
- The Control of Dust and Emissions from Construction and Demolition – Best Practice Guide, Greater London Authority and London Councils, 2006; and,
- Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance, Institute of Air Quality Management, January 2012

2.1.2 Websites Consulted

- The UK National Air Quality Archive (www.airquality.co.uk);
- EMAPSITE (www.emapsite.com); and,
- Havant Borough Council website (<http://www.havant.gov.uk>)
- MAGIC (<http://magic.defra.gov.uk/>)

2.1.3 Site Specific Reference Documents

- Havant Borough Core Strategy- Adopted March 2011; and,
- 2011 Air Progress Report for Havant Borough Council August, 2011



2.2 Air Quality Legislative Framework

2.2.1 European Legislation

European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality objectives for fine particulates. The consolidated Directives include:

- **Directive 99/30/EC** – the First Air Quality "Daughter" Directive – sets ambient air limit values for NO₂ and NO_x, sulphur dioxide, lead and particulate matter;
- **Directive 2000/69/EC** – the Second Air Quality "Daughter" Directive – sets ambient air limit values 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.

2.2.2 UK Legislation

The Air Quality Standards Regulations 2010, seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives and also transpose the Fourth Daughter Directive within the United Kingdom (UK). The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. SI 2007 No. 64 Regulation 14 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

The UK Air Quality Strategy is the method for implementation of the air quality limit values in England, Scotland, Wales and Northern Ireland, and provides a framework for improving air quality and protecting human health from the effects of air pollution.

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For each nominated pollutant, the Air Quality Strategy sets clear, measurable, outdoor air quality standards and target dates by which these must be achieved; the combined standard and target date is referred to as the AQO for that pollutant. Adopted national standards are based on the recommendations of the Expert Panel on Air Quality Standards (EPAQS) and have been translated into a set of Statutory Objectives within the Air Quality (England) Regulations (2000) SI 928, and subsequent amendments.

The AQOs for pollutants included within the Air Quality Strategy and assessed as part of the scope of this report are presented in Table 1 along with European Commission (EC) Directive Limits and World Health Organisation (WHO) Guidelines.

Table 1 Air Quality Standards, Objectives, Limit and Target Values

Pollutant	Applies	Objective	Concentration Measured as ¹⁰	Date to be Achieved by and Maintained thereafter	European Obligations	Date to be achieved and maintained thereafter	New or existing
PM ₁₀	UK	50µg/m ³ by end of 2004 (max 35 exceedences a year)	24-hour mean	1 st January 2005	50µg/m ³ by end of 2004 (max 35 exceedences a year)	1 st January 2005	Retain Existing
	UK	40µg/m ³ by end of 2004	Annual mean	1 st January 2005	40µg/m ³	1 st January 2005	
Nitrogen Dioxide	UK	200µg/m ³ not to be exceeded more than 18 times a year	1 Hour Mean	31 st December 2005	200µg/m ³ not to be exceeded more than 18 times a year	1 st January 2010	Retain Existing
	UK	40µg/m ³	Annual Mean	31 st December 2005	40µg/m ³	1 st January 2010	

Within the context of this assessment, the annual mean objectives are those against which residential receptors will be assessed and the short term objectives apply to all receptor locations, both residential and non residential.

2.2.3 Local Air Quality Management

Under the Environment Act 1995 all local authorities 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 assessing present and likely future ambient pollutant concentrations against AQOs, the process of which is set out in the Department of Environment's Local Air Quality Management Policy Guidance LAQM TG (09). If it is predicted that levels at receptor locations

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where members of the public are regularly present (normally residential properties) are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA, the LA is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutants levels in pursuit of the Objective levels.

2.3 Planning and Policy Guidance

2.3.1 National Policy

The National Planning Policy Framework (NPPF) principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policy making. The NPPF broadly retains the principles of PPS 23: Planning and Pollution Control and states that:

'Planning policies should sustain compliance with and contribute towards 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.'

2.3.2 Local Policy

Havant Borough Council (HBC) formally adopted the 'Local Development Framework Core Strategy' (CS) in March 2011, which outlines the Council's broad planning strategy for the future. The following has been identified as being relevant to the proposed development from an air quality perspective:

'DM10 Pollution

Development that may cause pollution of water, air or soil or pollution through noise, smell, smoke, fumes, gases, steam, dust, vibration, light, heat, electromagnetic radiation and other pollutants will only be permitted where all of the following relevant criteria can be met:

- 1. The health and safety of existing and future users of the site, or nearby occupiers and residents is not put at risk.*
- 2. National air quality standards or objectives would not be breached (...)'*



3.0 Baseline Conditions

This section provides a review of the existing air quality in the vicinity of the proposed development in order to provide a benchmark against which to assess potential air quality impacts.

3.1 Air Quality Review and Assessment

As required under section 82 of the Environment Act 1995, HBC has conducted an ongoing exercise to review and assess air quality within its area of jurisdiction. The assessments have indicated that concentrations of NO₂ are below the relevant AQOs. As such, currently, there are no Air Quality Management Areas (AQMA) designated at any location within the borough, although previous assessments have identified local areas within Havant Town centre where concentrations of Nitrogen Dioxide have the potential to exceed the AQOs at relevant locations.

3.2 Air Quality Monitoring

Monitoring of air quality within HBC is undertaken through non-automatic monitoring methods. These have been reviewed in order to provide an indication of existing air quality in the surrounding area of the proposed development site.

In 2012 the Council undertook non-automatic monitoring for nitrogen dioxide using passive diffusion tubes. The closest NO₂ diffusion tube monitoring results are presented in Table 2.

Table 2 Monitored Annual Mean Nitrogen Dioxide Concentrations (Non-Automatic)

Site		Location		Annual Mean Nitrogen Dioxide Concentrations (µg/m ³)				
		Easting	Northing	2008	2009	2010	2011	2012
7	Brockhampton Lane	471191	106063	28.09	26.54	30.47	29.91	26.82
10	Ramblers Way	470025	110031	24.10	24.17	27.37	24.27	23.02
24	Compton Court	471382	106818	48.44	42.96	47.13	44.15	48.23
25	New Road	468479	107721	29.98	35.07	33.47	30.89	29.47
W10	Stakes Hill Road	471368	106805	-	-	-	36.11	32.44

As Table 2 illustrates, the closest nitrogen dioxide diffusion tube monitoring site to the application site did not exceed the National Air Quality Objective of 40µg/m³ except at Compton Court. Only monitoring location 10 at Ramblers Way lie within the extents of the main study area. Therefore this monitoring location has been utilised within the verification process.



3.3 Meteorology

Meteorological conditions have significant influence over air pollutant concentrations and dispersion. Pollutant levels can vary significantly from hour to hour as well as day to day, thus any air quality predictions need to be based on detailed meteorological data. The ADMS model calculates the dispersion of pollutants on an hourly basis using a year of local meteorological data. The meteorological data used in the assessment is derived from Shoreham. This is the nearest meteorological station considered representative of the development site, with all the complete parameters necessary for the ADMS model. Reference should be made to Figure 2 for an illustration of the prevalent wind conditions at Shoreham Meteorological Station site.

3.4 Emission Sources

A desktop assessment has identified that traffic movements are likely to be the most significant local source of pollutants affecting the site and its surroundings. The principal traffic derived pollutants likely to impact local receptors are nitrogen dioxide and particulate matter.

The assessment has therefore modelled all roads within the immediate vicinity of the application site. Full details of the traffic data input into the ADMS Roads 3 model can be found in Appendix A, with Figure 1 providing a visual illustration of the modelled road sources.

It should be noted that the contribution of minor roads and rail sources that are not included within the dispersion model is considered to be accounted for via the use of background air quality levels.

3.5 Sensitive Receptors

Receptors that are considered as part of the air quality assessment are primarily the proposed receptor locations and those existing receptors that are situated along routes in the vicinity of the proposed.

The receptor locations are summarised in Table 3 below and the spatial locations of all of the receptors are illustrated in Figure 1.

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Table 3 Modelled Sensitive Receptors

Discrete Sensitive Receptor		UK NGR (m)	
		X	Y
PR1	Proposed Apartment Units 50-61	469597.1	106444.4
PR2	Proposed Apartment Units 50-61	469597.8	106434.6
PR3	Proposed Apartment Units 50-61	469599.9	106446.5
PR4	Proposed Apartment Units 62-71	469601.8	106422.2
PR5	Proposed Apartment Units 62-71	469606.7	106402.4
PR6	Proposed Apartment Units 72-78	469614.2	106380.8
PR7	Proposed Apartment Units 79-85	469623.9	106366.5
PR8	Proposed Residential Unit No. 10	469664	106460.1
PR9	Proposed Residential Unit No. 7	469700.1	106467.1
PR10	Proposed Residential Unit No. 2	469730.6	106479.8
PR11	Proposed Residential Unit No. 21	469623.8	106425.4
PR12	Proposed Residential Unit No. 25	469636.1	106390.6
PR13	Proposed Residential Unit No. 29	469647.6	106369.9
PR14	Proposed Residential Unit No. 30	469667.5	106375.7
PR15	Proposed Residential Unit No. 37	469709.3	106379.8
PR16	Proposed Residential Unit No. 44	469692.2	106407.8
PR17	Proposed Residential Unit No. 40	469719.9	106413.5
PR18	Proposed Residential Unit No. 15	469694.6	106441.5
R1	1 Pennant Hills	469585.4	106477.2
R2	34 Pennant Hills	469632.5	106488.9
R3	28 Pennant Hills	469738.4	106516.2
R4	23 Pennant Hills	469797.1	106528.8
R5	32 Portsdown Hill Road	469802.1	106491.9
R6	38d Portsdown Hill Road	469768.8	106429.3
R7	40 Bedhampton Hill	469759.6	106364.9
R8	14 Portsdown Hill Road	469464.4	106451.0
R9	10 Glebe Park Hill Avenue	469475.2	106412.6
R10	27 Portsdown Hill Road	469435.9	106406.6
R11	41 Portsdown Hill Road	469294.1	106352.1
R12	1 Portsdown Hill Road	469947.8	106569.1
R13	4 Bedhampton Hill	469976.3	106540.3
R14	14 Bedhampton Hill	469934.6	106503.7
R15	14 Bedhampton Hill	469975.4	106505.8
R16	63 Bedhampton Hill	469745.7	106236.7
R17	72b Lower Road	469807.4	106246.4
R18	76 Lower Road	469793.2	106158.1
R19	2a Maylands Road	470010.2	106593.0
R20	55 Belmont Drive	470034.6	106621.9
R21	5 Brookside Road	470065.1	106572.9
R22	39 Belmont Drive	470114.7	106654.4
R23	3 Nursery Road	470148.1	106606.7



4.0 Assessment of Air Quality Impacts - Construction Phase

4.1 Pollutant Sources

Other than negligible emissions from construction vehicles and equipment the main emissions during construction are likely to be dust and particulate matter generated during earth moving (particularly during dry months), or from construction materials. In respect of fires on site it should be noted that suitable management strategies will be in place to prevent burning of any material during the construction phase. The main potential effects of particulates/dust are:

- Visual – dust plume, reduced visibility, coating and soiling of surfaces leading to annoyance, loss of amenity, the need to clean surfaces;
- Physical and /or chemical contamination and corrosion of artefacts;
- Coating of vegetation and soil contamination; and,
- Health effects due to inhalation e.g. asthma or irritation of the eyes.

A number of other factors such as the amount of precipitation and other meteorological conditions will also greatly influence the amount of particulate matter generated.

Construction activities can give rise to short-term elevated dust/PM₁₀ concentrations in neighbouring areas. This may arise from vehicle movements, soiling of the public highway, demolition or wind blown stockpiles.

4.2 Particulate Matter (PM₁₀)

The UK Air Quality Standards seek to control the health implications of respirable particulate matter PM₁₀ (less than 10 micrometers in diameter). However, the majority of particles released from construction will be greater than this in size.

Construction works on site have the potential to elevate localised PM₁₀ concentrations in the area. On this basis, mitigation measures should still be taken to minimise these emissions as part of good site practice.

4.3 Dust

Particles greater than 10µm are likely to settle out relatively quickly and may cause annoyance due to their soiling capability. Research indicates that 70% of dust emissions typically settle within 200m of their source and only 10% remain in the air at 400m away. There are no formal standards or criteria for nuisance caused by deposited particles, however, a deposition rate of 200mg/m²/day is often presented as a

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threshold for serious nuisance though this is usually only applied to long term exposure as people are generally more tolerant of dust for a short or defined period. Significant nuisance is likely when the dust coverage of surfaces is visible in contrast with adjacent clean areas, especially when it happens regularly. Severe dust nuisance occurs when the dust is perceptible without a clean reference surface.

Construction activities have the potential to suspend dust, which could result in annoyance of residents surrounding the site. Measures should be taken to minimise the emissions of dust as part of good site practice. Recommended mitigation measures proportionate to the risk associated with the development and based on best practice guidance are discussed in the following sections.

4.4 Methodology

WYG have adapted Guidance from the IAQM 'Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance' document published in January 2012. In order to determine the significance of effects the construction phase assessment utilises a risk based approach, rather than defining the magnitude of change, as applied in the operational phase assessment.

In total 4 processes are considered, namely demolition, earthworks, construction and trackout. For each of these phases, the significance of the potential dust impacts is derived following the determination of a dust emission class and the distance of activities to the nearest sensitive receptor, therefore assessing worst case impacts. A full explanation of the methodology is contained in Appendix B.

4.5 Assessment Results

Based on the methodology detailed in Appendix B and prior to the implementation of appropriate mitigation measures, the potential impact significance of dust emissions associated with the construction phase of the proposed development is presented in Table 4 below. The assessment is based on the nearest sensitive receptors to each source activity.

Table 4 Impact Significance of Construction Activities without Mitigation

Source	Impact Significance	
	Dust Soiling	PM ₁₀
Demolition	Moderate adverse	Moderate adverse
Earthworks	Moderate adverse	Moderate adverse
Construction	Moderate adverse	Moderate adverse
Trackout	Moderate adverse	Moderate adverse

Appropriate Mitigation Measures are presented in section 8 based on the risk classification of the proposed site. Following the adoption of these measures, the subsequent expected impact significance of the

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construction phase based on IAQM guidance is summarised in Table 5 below.

Table 5 Impact Significance of Construction Activities with Mitigation

Source	Impact Significance	
	Dust Soiling	PM ₁₀
Demolition	Negligible	Negligible
Earthworks	Negligible	Negligible
Construction	Negligible	Negligible
Trackout	Negligible	Negligible



5.0 Assessment of Air Quality

In the context of the proposed development, transportation is identified as the dominant emission source that is likely to cause potential risk of exposure of air pollutants at proposed receptors.

Given that the proposed development is considered to be traffic neutral i.e. generated traffic flows associated with the scheme are predicted to be similar to those of existing use of the site. The operational phase assessment therefore consists of quantified predictions of nitrogen dioxide and particulate matter exposure at the proposed development site, associated with traffic movement along road-links in the vicinity of the proposed development site.

In accordance with the traffic data provided to WYG, the operational phase assessment has been undertaken by using 2012 traffic flows and focused on effects of existing traffic emissions sources on the proposed new residential developments.

5.1 Existing Traffic Flows

Surveyed and projected 2012 traffic data has been provided by Bellamy Roberts LLP

For the purposes of the air quality assessment only roads surrounding the proposed development site have been included in the air quality model. Where unavailable, traffic speeds have been estimated based on site observations and national speed limits. All of the roads within the dispersion model are illustrated in Figure 1.

Emission factors for 2012 have been calculated using Defra's latest EFT version 5.1.2 (released in June 2012). However it should be noted that to represent a robust approach, this assessment does not assume improvement in emission rates associated with road traffic, as such 2010 emission rates were utilised for future year predictions.

Road junctions have been modelled with the assumption of a 50m slow-down phase, prior to the junction line. This slow-down phase has been modelled at a speed of 20km/h. Detailed traffic figures are provided in Table 10, Appendix A.

5.2 Background Concentrations

The use of background concentrations within the modelling process ensures that pollutant sources other than traffic are represented appropriately. Background sources of pollutants include industrial, domestic and rail emissions within the vicinity of the study site.

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Background concentrations as used within the prediction calculations were referenced from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the development site. In April 2012 Defra issued revised 2010 background maps for NO_x, NO₂, PM₁₀ and PM_{2.5} which incorporate updates to the input data used for modelling. The updated mapped background concentrations are summarised in Table 6 below.

Table 6 Predicted Background Concentrations

UK NGR		2010 Predicted Background Concentration (µg/m ³)		
Easting	Northing	NO ₂	NO _x	PM ₁₀
469500	106500	23.18	34.18	16.42
470500	106500	22.14	32.41	16.05
470500	110500	16.81	23.41	14.81

Table 6 indicates that there were no background exceedances of the relevant AQOs within the vicinity of the proposed development during 2010. As a worst-case, mapped background concentrations for 2010 have been used throughout the assessment.

5.3 Model Verification

Model verification involves the comparison of modelled data to monitored data in order to gain the best possible representation of current pollutant concentrations for the assessment years. The verification process is in general accordance with that contained in Annex 3 of the LAQM TG (09) guidance note and uses the most recently available diffusion tube monitoring data to best represent this.

The verification process consists of using the monitoring data and the published background air quality data in the UK National Air Quality Information Archive to calculate the road traffic contribution of nitrogen oxides (NO_x) at the monitoring locations. Outputs from the ADMS Roads model are provided as predicted road traffic contribution NO_x emissions. These are converted into predicted roadside contribution NO₂ exposure at the relevant receptor locations based on the updated approach to deriving NO₂ from NO_x for road traffic sources published in paragraphs 2.22 to 2.27 of Local Air Quality Management LAQM TG(09). The calculation was derived using the NO_x to NO₂ worksheet in the online LAQM tools website hosted by DEFRA.

A model correction of 1.8093 was applied to roadside predicted NO_x concentrations before converting to NO₂. This figure demonstrates that the model was under predicting the road traffic emissions at the monitoring locations, probably due to the effects of congestion and stop-start driving behaviour in the study area and the effects of increased tailpipe emissions as traffic accelerates away from the roundabouts

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and junctions. Table 7 below summarises the final model/monitored data correlation following the application of the relevant adjustment factor.

Table 7 Comparison of Roadside Modelling & Monitoring Results for NO₂

Tube location	NO ₂ µg/m ³		
	Monitored NO ₂	Modelled NO ₂	Difference (%)
Ramblers Way (Tube No. 10)	23.02	23.02	0.00

The final model produced data at all monitoring locations within 25% of the monitoring results, as recommended within LAQM TG (09).

The model is therefore considered to be verified and suitably representative of local emissions and exposures. Reference should be made to Figure 3 for a visual illustration of the model correlation coefficient.

5.4 Summary of Model Inputs

Table 8 Summary of ADMS Roads model Inputs

Parameter	Description	Input Value
Chemistry	A facility within ADMS-Roads to calculate the chemical reactions in the atmosphere between Nitric Oxide (NO), nitrogen dioxide (NO ₂), Ozone (O ₃) and Volatile organic compounds (VOCs).	No atmospheric chemistry parameters included
Meteorology	Representative meteorological data from a local source	Shoreham 2010 , hourly sequential data
Surface Roughness	A setting to define the surface roughness of the model area based upon its location.	1.5m representing a typical surface roughness for large urban areas
Latitude	Allows the location of the model area to be set	United Kingdom = 52°
Monin-Obukhov Length	This allows a measure of the stability of the atmosphere within the model area to be specified depending upon its character.	Mixed Urban/Industrial = 30m .
Elevation of Road	Allows the height of the road link above ground level to be specified.	All road links were set at ground level = 0m .
Road Width	Allows the width of the road link to be specified.	Road width used depended on data obtained from OS map data for the specific road link
Topography	This enables complex terrain data to be included within the model in order to account for turbulence and plume spread effects of topography	No topographical information used
Time Varied Emissions	This enables daily, weekly or monthly variations in emissions to be applied to road sources	Time varied emissions were not used.
Road Type	Allows the effect of different types of roads to be assessed.	Urban Road (not London) settings were used
Road Speeds	Enables individual road speeds to be added for each road link	Based on national speed limits and 20km/h for slowdown sections
Canyon Height	Allows the model to take account turbulent flow patterns occurring inside a street with relatively tall buildings on both sides, known as a "street canyon".	No canyons used within the model
Road Source Emissions	Road source emission rates are calculated from traffic flow data using the Defra toolkit of traffic emission factors.	The EFT Version 5.1.2 dataset was used.
Year	Predicted DfT emissions rates depend on the year of emission.	2010 data for the base year model validation, and for the operational phase assessment



5.5 ADMS Modelling Results

5.5.1 Traffic Assessment

The ADMS Model has predicted concentrations of NO₂ and PM₁₀ at relevant receptor locations adjacent to roads likely to be effected by the development. The model outputs are based on fully verified model results from the ADMS Roads model. The following tables summarise the atmospheric dispersion model predictions of air quality at the relevant receptor locations. Only receptors close to roads where there is predicted to be a change in emissions have been assessed.

Nitrogen Dioxide

Table 9 presents a summary of the predicted annual average nitrogen dioxide and particulate matter concentrations at relevant receptor locations.

Table 9 Predicted 2012 Annual Average Concentrations of NO₂ and PM₁₀ at Modelled Receptor Locations (µg/m³)

Receptor		Annual Average Concentrations (µg/m ³)	
		NO ₂	PM ₁₀
PR1	Proposed Apartment Units 50-61	37.83	17.17
PR2	Proposed Apartment Units 50-61	37.83	18.68
PR3	Proposed Apartment Units 50-61	37.40	18.59
PR4	Proposed Apartment Units 62-71	37.68	18.63
PR5	Proposed Apartment Units 62-71	38.18	18.52
PR6	Proposed Apartment Units 72-78	38.46	18.56
PR7	Proposed Apartment Units 79-85	37.61	18.57
PR8	Proposed Residential Unit No. 10	31.79	17.79
PR9	Proposed Residential Unit No. 7	30.41	17.58
PR10	Proposed Residential Unit No. 2	30.04	17.57
PR11	Proposed Residential Unit No. 21	34.40	18.04
PR12	Proposed Residential Unit No. 25	34.32	17.97
PR13	Proposed Residential Unit No. 29	33.95	17.91
PR14	Proposed Residential Unit No. 30	32.11	17.65
PR15	Proposed Residential Unit No. 37	30.00	17.38
PR16	Proposed Residential Unit No. 44	30.24	17.42
PR17	Proposed Residential Unit No. 40	29.33	17.30
PR18	Proposed Residential Unit No. 15	30.01	17.43
R1	1 Pennant Hills	36.46	18.37
R2	34 Pennant Hills	32.03	17.75
R3	28 Pennant Hills	29.01	17.37
R4	23 Pennant Hills	28.68	17.37
R5	32 Portsdown Hill Road	28.70	17.35

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Receptor		Annual Average Concentrations ($\mu\text{g}/\text{m}^3$)	
		NO ₂	PM ₁₀
R6	38d Portsdown Hill Road	28.37	17.19
R7	40 Bedhampton Hill	29.18	17.30
R8	14 Portsdown Hill Road	37.68	18.54
R9	10 Glebe Park Hill Avenue	38.11	18.72
R10	27 Portsdown Hill Road	34.10	18.12
R11	41 Portsdown Hill Road	28.96	17.37
R12	1 Portsdown Hill Road	29.01	17.39
R13	4 Bedhampton Hill	36.46	18.70
R14	14 Bedhampton Hill	30.57	17.74
R15	14 Bedhampton Hill	34.32	18.34
R16	63 Bedhampton Hill	32.49	17.79
R17	72b Lower Road	32.26	17.94
R18	76 Lower Road	34.55	18.23
Annual Mean Air Quality Objective not to be exceeded		40 $\mu\text{g}/\text{m}^3$	

As indicated in Table 9, the maximum predicted annual average exposure to nitrogen dioxide at any proposed receptor locations, associated with traffic movements, is $38.46\mu\text{g}/\text{m}^3$ at Proposed Apartment Units 72-78 (PR6). The maximum predicted annual average exposure to Particulate Matter at any proposed receptor locations, associated with traffic movements, is $18.68\mu\text{g}/\text{m}^3$ at Proposed Apartment Units 50-61 (PR2).

All modelled receptor locations (existing and proposed) are predicted to meet the national AQOs for both NO₂ and PM₁₀.

It should be noted that this assessment presents a worst case scenario of the proposed development in that it makes a number of worst case assumptions. Firstly, it assumes that there will be no reduction in background air quality concentrations beyond 2010. Secondly, it does not assume improvement in emission rates associated with road traffic, as such 2010 emission rates were utilised for future year predictions.



6.0 Mitigation

6.1 Mitigation of Construction Impacts

With a 'Medium risk' assessment rating as detailed in Table 14, the following mitigation measures are recommended to be adopted and should become part of the approved Construction Environmental Management Plan.

6.1.1 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.

6.1.2 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.

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6.1.3 Demolition Works

- Use water as dust suppressant.
- Cutting equipment to use water as suppressant or suitable local extract ventilation.
- Use enclosed chutes and covered skips.
- Wrap building(s) to be demolished.

6.1.4 Site Activities

- Minimise dust generating activities.
- Use water as dust 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.

6.2 Operational Phase

6.2.1 Traffic

Although an assessment of road traffic exhaust emissions has not predicted any exceedances of the AQOs, implementing traffic management measures will result in fewer vehicle trips and therefore a reduction in associated vehicle emissions. This is likely to result in reductions of the mean roadside concentrations of traffic-related pollutant concentrations.

The following mitigation measures aim to increase the number of residents travelling to and from the site on foot, by cycle and/or by public transport. As such the number of trips to and from the site made by private car, and especially the single occupancy private car, will be reduced. The following measures are considered best practice but should not be regarded as an exhaustive list of potential mitigation options:

- Minimise reliance upon motor vehicle use through a Framework Travel Plan;
- Promote alternative transport options;
- Inclusion of integrated cycle paths into surrounding environments; and,
- Inclusion of pedestrian walkways into surrounding environments.



7.0 Summary and Conclusions

WYG undertook an Air Quality Assessment (AQA) for a proposed residential development at Havant Retail Park, off Portsdown Hill Road, Havant. The AQA was undertaken in accordance with the methodology and parameters previously described within this report. Predicted pollutant concentrations were compared with the relevant AQOs for both nitrogen dioxide and particulate matter.

The significance of the effects of potential emissions from the construction phase has been assessed as 'negligible', following the adoption of appropriate mitigation measures, as recommended in section 6.0.

The maximum predicted annual average exposure to nitrogen dioxide at any proposed receptor locations, associated with traffic movements, is $38.41\mu\text{g}/\text{m}^3$ at Proposed Apartment Units 72-78 (PR6). The maximum predicted annual average exposure to Particulate Matter at any proposed receptor locations, associated with traffic movements, is $18.68\mu\text{g}/\text{m}^3$ at Proposed Apartment Units 50-61 (PR2).

No modelled receptors are predicted to experience NO_2 or PM_{10} concentrations in exceedance of the Annual Mean Air Quality Objective.

It should be noted that this assessment presents a worst case scenario of the proposed development in that it makes a number of worst case assumptions. Firstly, it assumes that there will be no reduction in background air quality concentrations beyond 2010. Secondly, it does not assume improvement in emission rates associated with road traffic, as such 2010 emission rates were utilised for future year predictions.

Following the adoption of the recommended mitigation measures, the development is not considered to be contrary to any of the national, regional or local planning policies.



Units and Abbreviations Used

HBC	Havant Borough Council
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
g.s ⁻¹	Gram per second
C	Temperature (in Celsius)
kPa	Pressure (in kilopascals)
LA	Local Authority
LAPC	Local Authority Pollution Control
LAQM	Local Air Quality Management
m.s ⁻¹	Velocity (in metres per second)
µg/m ³	Concentration (in micrograms per cubic metre)
m ³ .s ⁻¹	Volumetric flow rate (in cubic meters of air per second)
mg.Nm ⁻³	Concentration (in milligrams per cubic metre at standard conditions)
mg.s ⁻¹	Emission rate (in milligrams per second)
NGR	UK National Grid Reference
NO ₂	Nitrogen dioxide
NO	Nitric oxide
NO _x	Total oxides of nitrogen
PM ₁₀	Particulate matter with a mean hydraulic diameter less than 10µm
STP	Standard temperature and pressure
WYG	WYG Environment Planning Transport
%ile	Percentile
%(v/v)	Percentage (volume per volume)



Figures

Figure 1 Air Quality Assessment Area

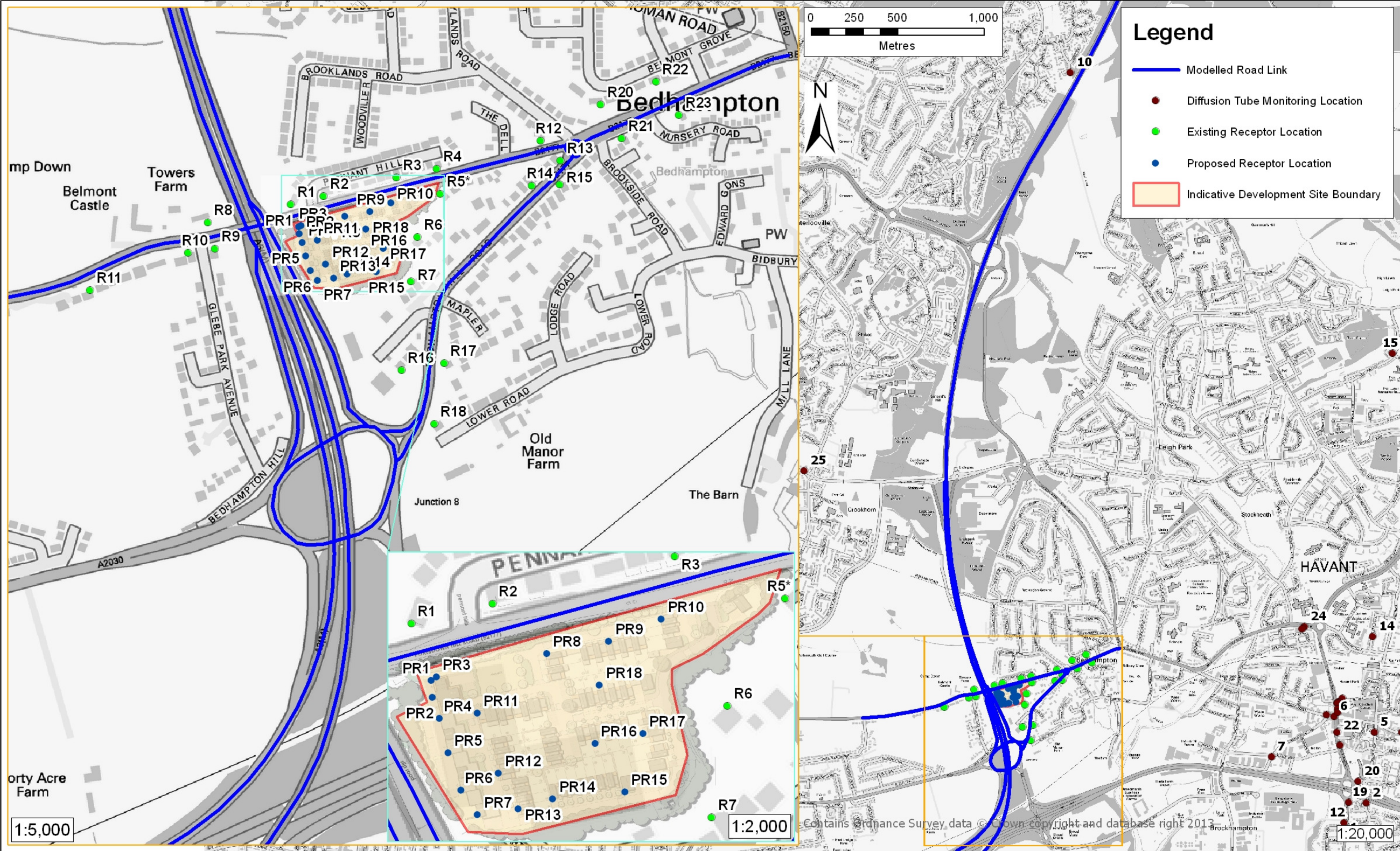


Figure 1 - Air Quality Assessment Area

Havant Retail Park, Portsdown Hill Road, Bedhampton
Air Quality Assessment

Client:
Linden Homes

Project No: A080809

WYG Planning & Environment

part of the WYG group



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Figure 2 Shoreham Meteorological Station Windrose 2010

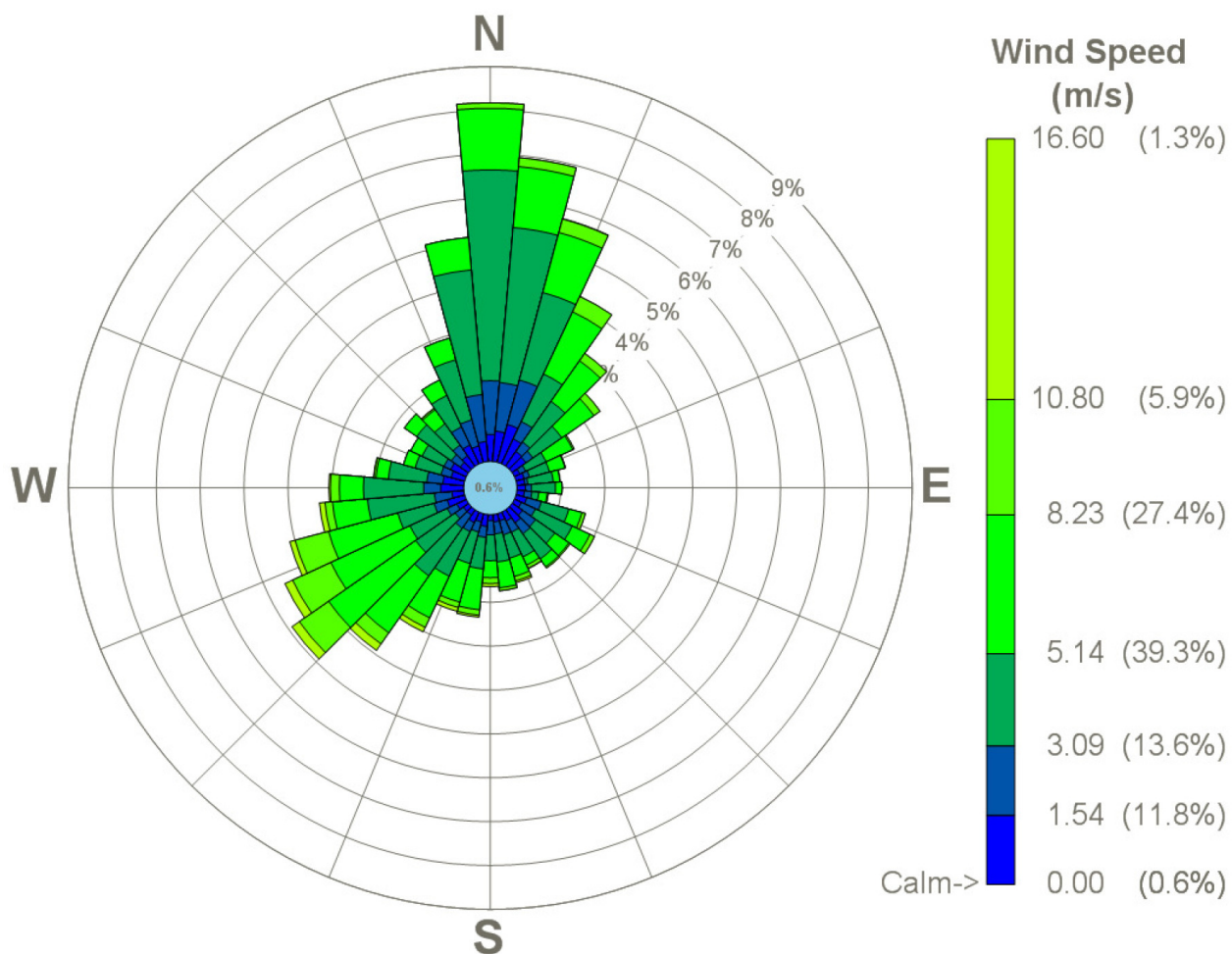
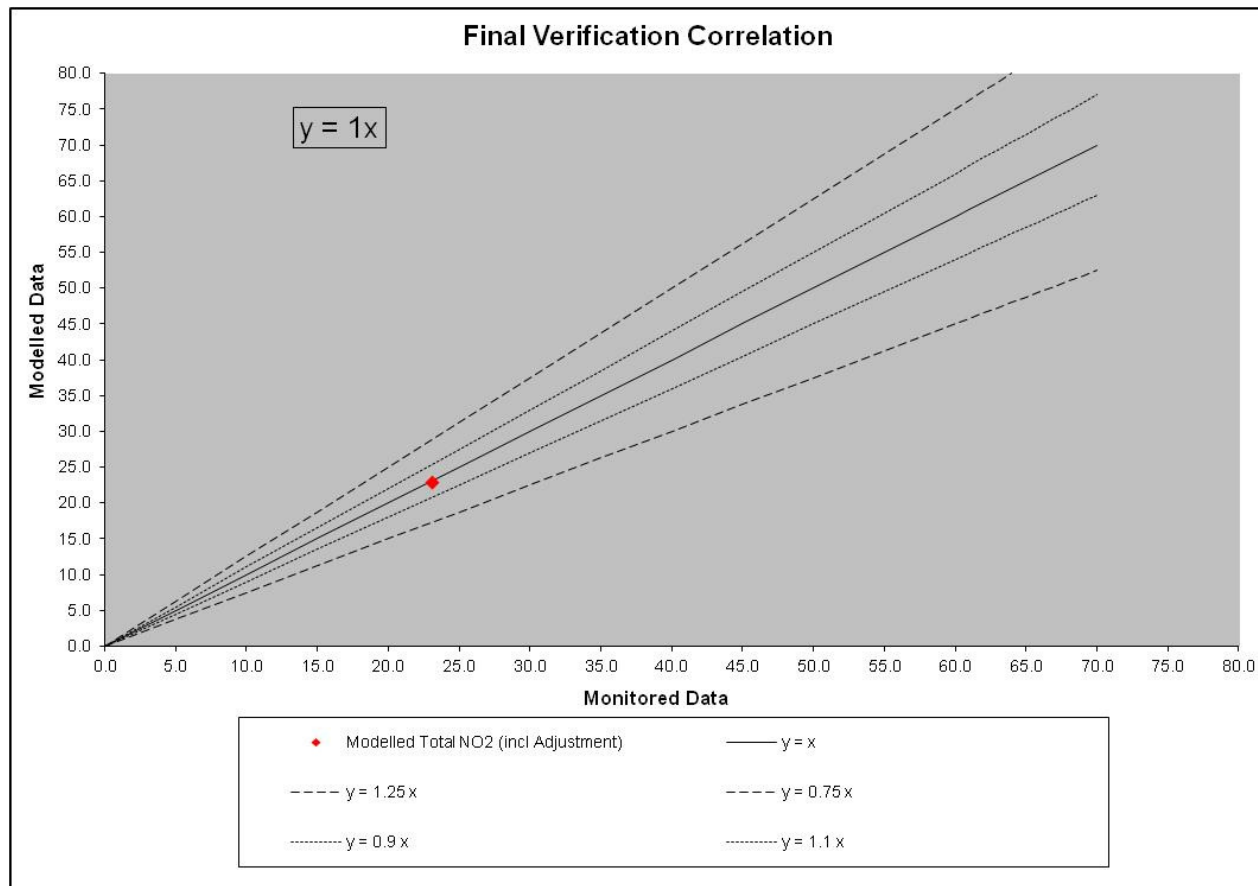




Figure 3 Model Correlation Coefficient



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Appendices



Appendix A - Traffic Data

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Table 10 Traffic Data

Road Name	Traffic Speed km/h	2012	
		AADT	HGV %
A3 North of Junction 3	112	49339	4.72
A3 North of Junction 4	112	65794	4.00
A3 North of Junction 5	112	79605	4.02
A3 South of Junction 5	112	63684	4.02
Bedhampton Hill Road	48	14491	1.70
Portsdown Hill Road	48	9223	0.36
A2030 / A27 Roundabout	20	22381	4.05
Sliproads at Junction 5	48	7961	4.02



Appendix B - Construction Phase Assessment – Methodology

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The following information sets out the adopted approach to the construction phase impact assessment in accordance with the aforementioned IAQM guidance¹.

Assessment Step 1 – Screen the Requirement for a more Detailed Assessment

There are sensitive receptors within 100m of the site boundary and within 100m of routes used by construction vehicles on the public highway, as such, further assessment of potential construction impacts has been undertaken.

Based on available details of the proposed development scenario, the assessment of risk of dust impacts is based on a robust approach. As such actual dust emission classes for each of the specific source category can be lower than those assumed within the assessment.

Assessment Step 2 – Risk of Dust Impacts

A) Demolition

The dust emission class for the demolition phase has been determined based on the below criteria:

- **LARGE:** Total building volume >50 000m³, potentially dusty construction (e.g. concrete), on-site crushing and screening, demolition activities >20m above ground level:
- **MEDIUM:** Total building volume 20 000m³ – 50 000m³, potentially dusty construction material, demolition activities 10-20m above ground level; and
- **SMALL:** Total building volume <20 000m³, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

B) Earthworks

The dust emission class for the planned earthworks has been determined based on the below criteria:

- **LARGE:** Total site area >10 000m², potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), > 10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100 000 tonnes.

¹ Institute of Air Quality Management. 2012. *Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance.*

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- **MEDIUM:** Total site area 2 500m² – 10 000m², moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4m-8m in height, total material moved 20 000 tonnes – 100 000 tonnes; and
- **SMALL:** Total building volume <20 000m³, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

C) Construction

The dust emission class for the demolition phase has been determined based on the below criteria:

- **LARGE:** Total building volume >100 000m³, piling on site concrete batching; sandblasting
- **MEDIUM:** Total building volume 25 000m³ – 100 000m³, potentially dusty construction material (e.g. concrete), piling, on site concrete batching; and
- **SMALL:** Total building volume <25 000m³, construction material with low potential for dust release (e.g. metal cladding or timber).

D) Trackout

The dust emission class for the demolition phase has been determined based on the below criteria:

- **LARGE:** >100 HGV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- **MEDIUM:** 25-100 HGV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m; and
- **SMALL:** <25 HGV (>3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50m.

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Assessment Stage 3 - Defining the Risk Classification

Based on the distance of the sensitive receptors from the proposed construction activities and based on the above emission classes, the risk effects of the proposed development scenario are deduced from the below tables.

Table 11 Risk Category from Demolition Activities

Source	Dust Emission Class		
	Large	Medium	Small
<20	High Risk Site	High Risk Site	Medium Risk Site
20-100	High Risk Site	Medium Risk Site	Low Risk Site
100-200	Medium Risk Site	Low Risk Site	Low Risk Site
200-350	Medium Risk Site	Low Risk Site	Negligible

Table 12 Risk Category from Earthworks and Construction Activities

Source	Dust Emission Class		
	Large	Medium	Small
<20	High Risk Site	High Risk Site	Medium Risk Site
20-50	High Risk Site	Medium Risk Site	Low Risk Site
50-100	Medium Risk Site	Medium Risk Site	Low Risk Site
100-200	Medium Risk Site	Low Risk Site	Negligible
200-350	Low Risk Site	Low Risk Site	Negligible

Table 13 Risk Category from Trackout Activities

Source	Dust Emission Class		
	Large	Medium	Small
<20	High Risk Site	High Risk Site	Medium Risk Site
20-50	Medium Risk Site	Medium Risk Site	Low Risk Site
50-100	Low Risk Site	Low Risk Site	Negligible

Based on the distance of the sensitive receptors from the proposed construction activities the unmitigated risk effects of the proposed development scenario are summarised in the following table.

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Table 14 Summary of Risk Effects Prior to the Implementation of Mitigation Measures

Source	Summary Risk Effects with No Mitigation		
	Dust Soiling	PM ₁₀	Ecological
Very High	Medium Risk Site	Medium Risk Site	Negligible
High	Medium Risk Site	Medium Risk Site	Negligible
Medium	Medium Risk Site	Medium Risk Site	Negligible
Low	Medium Risk Site	Medium Risk Site	Negligible

Assessment Stage 4 - Defining the Impact Significance

Based on the sensitivity of the surrounding area and the risk effects associated with construction activities the significance effects prior and following the implementation of mitigation measures are summarised in the below tables.

Table 15 Significance Effects Prior to the Implementation of Mitigation Measures

Significance of Effects for Each Activity without Mitigation			
Sensitivity of Surrounding area	Risk of site giving rise to dust effects		
	Large	Medium	Small
Very High	Substantial adverse	Moderate adverse	Moderate adverse
High	Moderate adverse	Moderate adverse	Slight adverse
Medium	Moderate adverse	Slight adverse	Negligible
Low	Slight adverse	Negligible	Negligible

Table 16 Significance Effects Following the Implementation of Mitigation Measures

Significance of Effects for Each Activity with Mitigation			
Sensitivity of Surrounding area	Risk of site giving rise to dust effects		
	Large	Medium	Small
Very High	Slight adverse	Slight adverse	Negligible
High	Slight adverse	Negligible	Negligible
Medium	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible

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Based on the risk classification of the proposed construction site, appropriate mitigation measures can be identified and subsequently incorporated into the CEMP. The below Tables summarise the final predicted significance of the potential impacts associated with the site prior to and following the implementation of appropriate mitigation.

Table 17 Significance Effects Prior to the Implementation of Mitigation Measures

Source	Summary Risk Effects with No Mitigation		
	Dust Soiling	PM ₁₀	Ecological
Demolition	Moderate adverse	Moderate adverse	None
Earthworks	Moderate adverse	Moderate adverse	None
Construction	Moderate adverse	Moderate adverse	None
Trackout	Moderate adverse	Moderate adverse	None

Table 18 Significance Effects Following the Implementation of Mitigation Measures

Source	Summary Risk Effects with No Mitigation		
	Dust Soiling	PM ₁₀	Ecological
Demolition	Negligible	Negligible	None
Earthworks	Negligible	Negligible	None
Construction	Negligible	Negligible	None
Trackout	Negligible	Negligible	None