

**Land at North Street / Weldale
Street, Reading**

**Prepared for Lochailort
Thames Quarter Limited**

by

**Stuart Michael Associates
Limited**

August 2018



Coombe House
Coombe Square
Thatcham
Berkshire
RG19 4JF

T: 01635 867711
F: 01635 861715
E: mail@stuartmichael.co.uk
W: www.stuartmichael.co.uk

SMA Ref: 5946/AQ

Issue Status: ISSUE

DOCUMENT CONTROL			
Project	Land at North Street / Weldale Street, Reading		
Job No.	5946		
Document Title	Air Quality Assessment		
File Location	N:\Admin Project\5900 to 5999\5946 - North Street, Reading\Reports\Air Quality\47 Unit Development\5946 - Air Quality Assessment - ISSUE.docx		
Prepared by	William Hicks	Date	August 2018
Reviewed by	Jason Mills	Date	August 2018
Approved by	Stewart Andrews	Date	August 2018
Document Issue	Description / Changes	Revised by	Date
ISSUE	Issued to Client for submission	WAH	31/08/2018



COPYRIGHT

The copyright for this document rests with Stuart Michael Associates Limited. Copyright for documents and other published sources of information prepared by others and used in the document may rest with others.

The contents, in whole or in part, of this document are restricted for use by the client and Stuart Michael Associates Limited in connection with the project in accordance with the terms of engagement. Stuart Michael Associates Limited accepts no liability or responsibility for use of this document for purposes other than those originally intended. Third parties relying on the contents of the document do so at their own risk.

No part of the contents of this document may be copied from any digital viewing system maintained to provide access for public scrutiny or any other source without written permission from the Company Secretary of Stuart Michael Associates Limited.

© Stuart Michael Associates Limited 2018

Stuart Michael Associates Ltd. Registered in England and Wales. Registration Number: 3739154

Registered Office: Coombe House, Coombe Square, Thatcham, Berkshire RG19 4JF.

Telephone: 01635 867711 Facsimile: 01635 861715.



C O N T E N T S

S E C T I O N S

		PAGE
1.0	INTRODUCTION	1
2.0	LEGISLATION AND PLANNING POLICY CONTEXT	6
3.0	METHODOLOGY AND ASSESSMENT CRITERIA	12
4.0	BASELINE CONDITIONS	21
5.0	AIR QUALITY ASSESSMENT	25
6.0	MITIGATION	32
7.0	SUMMARY AND CONCLUSIONS	35

F I G U R E S

Figure 1.1	Site Location Plan
Figure 3.1	Sensitivity to Dust Soiling Effects on People and Property
Figure 3.2	Sensitivity of the Area to Human Health Impacts
Figure 4.1	Reading Diffusion Tube Location Plan
Figure 4.2	Receptor Location Plan
Figure 5.1	Development Site NO₂ concentrations at 1.5m

A P P E N D I C I E S

Appendix 1	Site Layout
Appendix 2	Reading AQMA
Appendix 3	National Air Quality Objectives (NAQO)
Appendix 4	Heathrow Wind Rose – 2017



ACRONYMS AND ABBREVIATIONS

ADMS-Roads	Atmospheric Dispersion Modelling System (ADMS) Air Quality Management System Version 4.1.1
ATC	Automated Traffic Count
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
DEV	Development generated traffic
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
g/km/s	grams per kilometre per second
ha	Hectares - a unit of measure equal to 2.471 acres or 10,000 m ²
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
MCC	Manual Classified Traffic Count
ms ⁻¹	wind speed in meters per second
NAQO	National Air Quality Objectives (2002)
NSCA	National Society for Clean Air
NO ₂	Nitrogen Dioxide
NO _x	Oxides of Nitrogen
NTM	National Transport Model
PM ₁₀	Particulate matter with an aerodynamic diameter less than 10 microns
RBC	Reading Borough Council
SDPD	Sites and Detailed Policies Document
SMA	Stuart Michael Associates Limited
TEMPO	Trip End Model Presentation Program
µgm ⁻³	Micrograms per cubic meter



1.0 INTRODUCTION

- 1.1 Stuart Michael Associates (SMA) has been appointed by Lochailort Thames Quarter Limited (the 'Applicant') to prepare an Air Quality Assessment (AQA) in support of an Outline Planning Application for the proposed development of a 47 unit housing development at North Street, Reading. Refer to **Figure 1.1** for the site location plan and **Appendix 1** for the proposed site layout.
- 1.2 The area is administered by Reading Borough Council (RBC). The site is located on the corner of North Street and Weldale Street. Immediately north of the site is Reading ambulance station and Great Knollys Street. To the west are existing residential properties. To the east is Reading town centre and train station. Existing vehicle access to the site is from North Street.

Site Description

- 1.3 The proposed development is located within RBC's Air Quality Management Area (AQMA). Refer to **Appendix 2** for the location of the AQMA. All the major roads and a large area of Reading Town Centre were declared an AQMA in 2009, after a "Further Assessment" in 2008 found that annual mean nitrogen dioxide levels were predicted to exceed the National Air Quality Objective (NAQO) levels in 2015. Refer to **Appendix 3** for the NAQO.
- 1.4 The site is vacant other than ad-hoc usage as a private car park. It was formerly occupied by a temporary primary school, and before that by Social Services Offices (which have long since been demolished). The roads adjacent to the site have very low traffic levels as they are only used for access to local facilities and residential dwellings. Weldale Street and Great Knollys Street are both cul-de-sac.
- 1.5 Approximately 100m to the southeast of the proposed development site, there is an Iceland and Wickes retail store and associated car parking. This site has received planning permission for redevelopment for residential-use. This development comprises 429 flats as part of a high-rise development accessed from Weldale Street. The Transport Assessment undertaken for the aforementioned development indicated that local traffic levels are predicted to decrease in the near vicinity of the site as a result of this development (Transport Assessment, Phil Jones Associates Ltd, February 2017, paragraph 5.2, page 10).



Pre-Application Consultation

- 1.6 Pre-application consultation was undertaken with Elizabeth Senyah, Environmental Health Officer (EHO) at RBC on 27th August 2017. The following advice was provided regarding air quality impacts on development:

Air Quality - Increased exposure

- 1.7 “The proposed development is located within an air quality management area that we have identified with monitoring as being a pollution hot-spot (likely to breach the EU limit value for NO₂) and introduces new exposure / receptors. An assessment and/or mitigation measures should be provided as part of the application.
- 1.8 The applicant will need to demonstrate sufficient mitigation measures are implemented to protect the residents from the effects of poor air quality.
- 1.9 Where the development involves converting an existing building and allowing a buffer zone is not an option then it may be that other mitigation can be applied. In the first instance this would be to implement measures to reduce the level at the facade of the property by creating a barrier between the property and the carriageway, such as close boarded fencing or planting vegetation.
- 1.10 If this is not possible then locating habitable rooms away from the source of pollution or the use of mechanical ventilation with the inlet on the clean side of the property may be acceptable. This list of potential measures is by no means an exhaustive list.
- 1.11 Mitigation against increased exposure:
- *Mechanical ventilation – inlets from the ‘clean’ side of the development, long term maintenance needs to be addressed*
 - *Buffer zones – consider increasing distance of the building façade from very busy roads*
 - *Habitable rooms – consider placing stairwells, corridors and bathrooms on the façade fronting pollution source*
 - *Mixed use – locate any sensitive uses on higher floors, allowing commercial use on lower elevations*
 - *Balconies – consider avoiding use in areas of exceedance, especially on ground and first floor level*



- *Non-opening front windows – this should only be considered in certain circumstances, needs to be balanced against loss of freedom for future occupants.*

1.12 Reading Borough Council's Air Quality Policy DM19 requires that developments have regard to the need to improve air quality and reduce the effects of poor air quality through design, mitigation and where required planning obligations to be used to help improve local air quality.

Air Quality - Increased emissions

1.13 Reading has declared a significant area of the borough as an Air Quality Management Area (AQMA) for the exceedance of both the hourly and annual mean objectives for nitrogen dioxide. In addition to this recent epidemiologic studies have shown that there is no safe level for the exposure to particulate matter PM₁₀.

1.14 The proposed development incorporates 6 car parking spaces within an air quality management area and has the potential to increase emissions. An assessment and/or mitigation measures should be provided as part of the application.

1.15 Mitigation against increased emissions:

- *Travel Plans – a travel plan is a set of measures aimed at reducing single occupancy car use, it is important that the effectiveness of the plan is considered*
- *Mitigation through design, improved air flow around development, alternative plant*
- *Parking – consider reducing number of parking spaces, graduated permit schemes based on euro standards, allocated parking for car clubs / low emission vehicles*
- *Provision of electric charging bays or low emission fuelling points*
- *Development / promotion of car clubs*
- *Provision of cycling facilities / residents cycles*
- *Improvements to local public transport*



- 1.16 It may be appropriate in some circumstances for the developer to fund mitigating measures elsewhere to offset any increase in local pollutant emissions as a consequence of the proposed development. This may be achieved through the use of a s.106 agreement, which may in some circumstances involve the direct funding of a specific scheme or measure, however, it is likely that in most cases to be in the form of a contribution to the costs of the monitoring network and / or air quality action plan.
- 1.17 Reading Borough Council's Air Quality Policy DM19 requires that developments have regard to the need to improve air quality and reduce the effects of poor air quality through design, mitigation and where required planning obligations to be used to help improve local air quality."

Assessment Methodology

- 1.18 The report addresses the effects of air pollutant emissions from road traffic using the adjacent roads. Also considered are the emissions associated with the construction of the Proposed Development.
- 1.19 The report has been split into two parts; the first part assesses the impact of the development on surrounding sensitive receptors and the second part assesses the constraints on the development (i.e. how the existing environment will impact on the development).
- 1.20 Road traffic flows on the local highway network have been obtained from RBC, permanent automatic traffic counters (ATC), and temporary ATCs. Where necessary, the collected traffic flows have been growthed to the assessment years using TEMPRO software and the National Transport Model (NTM).
- 1.21 The dispersion modelling software ADMS-Roads (Version 4.1.1) has been used to determine the concentrations of pollutants at the development site and assess the likely changes in the concentrations of pollutants. Background concentrations of pollutants have been obtained from the Department for Environment Food and Rural Affairs (Defra) website.
- 1.22 Construction dust impacts on local receptors have been assessed using the method detailed in the Institute of Air Quality Management (IAQM) publication "Guidance on the assessment of dust from demolition and construction" (2014).



Report Outline

- 1.23 The report assess the overall levels of oxides of nitrogen (NO_x), nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of less than 10 microns (PM_{10}) within the development site and at four sensitive receptor locations. The base year for the development is 2018 and the future year of assessment is 2023, which is five years after submission of the planning application. Verification has been undertaken for 2016.



2.0 LEGISLATION AND PLANNING POLICY CONTEXT

Introduction

- 2.1 Poor air quality is the largest environmental risk to public health. Over recent years, UK air quality has improved significantly as a result of concerted action. Total UK emissions of nitrogen oxides (NO_x) fell by almost 70% between 1970 and 2015 and by over 19% between 2010 and 2015 (DERFA / DfT; Improving air quality in the UK: tackling nitrogen dioxide in our towns and cities – Draft UK Air Quality Plan for tackling nitrogen dioxide – May 2017).
- 2.2 In the UK at the present time, emissions from road transport account for a substantial proportion of national air pollutant emissions. Road transport currently contributes almost 22% of national carbon dioxide (CO₂) emissions even though emissions have fallen by 6.3% between 2000 and 2014. (Department for Transport Statistics: Road Traffic Estimates: Great Britain 2016). Total pollutant emissions from cars peaked in 1990/91 and declined to 2009. *“Since 2002, the average emissions from new cars have fallen by 31%”* (Department for Transport (DfT), Vehicle licensing Statistics: Annual 2016).
- 2.3 Private car ownership has grown from 24.4 million in 2000 to 30.9 million at the end of 2016. Of the vehicles using the highway network, cars accounted for 82.8%, motorcycles 3.3%, light goods vehicles (<3.5t) 10.2%, HGV's (>3.5t) 1.3%, buses and coaches 0.4% and “other vehicles” 1.9% of all motor vehicle traffic at the end of 2016 (DfT Statistics - Vehicle Licensing Statistics: Table VEH0101 - 2016). In 2016, 84% of newly registered vehicles fell into one of the lowest five Vehicle Excise Duty (VED) Bands (A to E, up to 140 hkm⁻¹) with 60% in Band C or lower and 17% in Band A. By the end of 2016, 47% of cars fall into Band E or lower. UK emissions of NO_x from road transport fell by 17% between 2010 and 2015
- 2.4 The percentage of different fuel type usage for private cars has significantly changed since the mid-1990s. At the end of 2016 there were 12.1 million diesel cars, accounting for 39% of the total, up from 10% in 1996. Alternative fuel vehicles which include gas, electricity, or a combination such as gas bi-fuel and hybrid electric were up to 388,000 at the end of 2016. Of the 388,000 vehicles, 95,879 were classed as Ultra-Low Emission Vehicles (ULEVs) where tailpipe emissions of CO₂ are less than 75 gkm⁻¹ or fully electric powered.



- 2.5 It should be noted that during 2016, 41,819 new ULEVs were registered for the first time, which is a 40% increase when compared with the previous year (29,965 ULEVs). This amounted to 1.3% of all new vehicle registrations in 2016, up from 0.9% in 2015 and 0.5% in 2014 (DfT Statistics - Vehicle Licensing Statistics: Table VEH0170 and Annual 2016).
- 2.6 Most of this increase has been due to vehicles eligible for plug-in car and van grants. New registrations in 2016 included 36,782 cars and 1,025 vans of models that were eligible for these grants, 30% up on 2015.

National Air Quality Strategy

- 2.7 In 1997 the United Kingdom National Air Quality Strategy (NAQS) was published and for the first time in history this document set out an analysis of the magnitude and potential health and environmental problems associated with, amongst other things, air pollutant emissions resulting from road traffic.
- 2.8 It proposed a schedule of air quality objectives which were to be met in the years up to 2005. In setting these objectives, health and socio-economic cost-benefit factors were taken into account, together with consideration of the practical and pragmatic aspects of whether targets would be achievable. Whilst it was identified in the NAQS that the objectives for benzene, 1,3-butadiene, lead (Pb) and carbon monoxide (CO) could be achieved as a result of improvement measures already put in place, complying with targets for NO₂ and PM₁₀ would be more difficult.
- 2.9 Considering the additional measures that would have to be introduced to counter these apparent shortfalls, the Government voiced the following thought:
- “Changes in planning and transport policies (are needed) which would reduce the need to travel and reliance on the car”.

With regard to the necessity for encouraging a shift away from private car usage, the Strategy commented, in terms of the new package approach to transport funding:

“As a general rule, traffic demand management and restraint measures should be included and this, together with proposals to promote and enhance other modes of transport, should aim to achieve modal shifts away from the private car”.



- 2.10 The Environment Act 1995 sections 82-84 requires that Local Authorities shall carry out reviews of air quality within their administrative areas and, where it is assessed that the air quality objectives may not be complied with in the future, an Air Quality Management Area (AQMA) must be declared. The Local Authority must then formulate an Action Plan, setting out the measures that will be employed to achieve compliance with the objectives.
- 2.11 A review of the UK Air Quality Strategy was undertaken in 1998 and a consultation document was published in January 1999 which outlined proposals for amending the Strategy. In August 1999, in response to the consultation, the Government then published a draft Air Quality Strategy for England, Scotland, Wales and Northern Ireland. The Air Quality Regulations (England) 2000 were enacted in April 2000, and the Air Quality (England) (Amendment) Regulations 2002 gives legal force to the air quality standards set out in the Strategy. A new strategy was released in July 2007 with various amendments to the air quality objectives. The proposals, in brief, consisted of recommendations to adopt the provisions of the EU Air Quality Daughter Directives. The National Air Quality Objectives (NAQO's) included in the Regulations are set out in Appendix 3.
- 2.12 Given the significant influence that motor vehicle exhausts exert on air quality in the UK and the apparent links between elevated levels of certain air pollutants and premature mortality, it is clear that current and emerging Government policy is geared towards several essential objectives, which are:
- continued action to reduce pollutant emissions from vehicles across the EU, which can be exemplified by the plethora of Directives concerning limitation of motor vehicle emissions since the 1970's and specific targeted initiatives such as the Auto-Oil Study programme;
 - concerted action at a national level to reduce private car trips in urban and inter-urban uses and encourage use of alternative forms of transportation;
 - action at a local level to manage transportation and air quality in order to reduce the number of car trips in urban areas specifically and to aim for compliance with the NAQS by the appointed dates; and



- to ensure that Local Authorities in the execution of their development control responsibilities take account of the consequent air quality impacts.

2.13 It is evident that continued growth in private car ownership and usage will result in further deterioration of air quality in urban areas and increasing emissions of greenhouse gases. Whilst current technological improvements will extend the reduction in emissions, additional measures will be required in order to prevent re-growth of emissions, both to meet ambient air quality targets in urban areas and to offer an alternative to the car for urban journeys. Consequently, where new development can be located in relatively close proximity to public transport and local services, a contribution to the UK's target of reducing emissions will have been made.

2.14 Levels of lead (Pb) and sulphur dioxide (SO₂) are also controlled by the NAQO. Lead levels have reduced significantly since its reduced use as a fuel additive, and the abolition of four-star petrol in January 2000 means that the amount of Pb in petrol is reduced to a negligible level. SO₂ is predominantly associated with emissions from industrial processes and when assessing the effects of traffic, neither SO₂ nor Pb need be assessed.

Local Council Policy

2.15 The current local policy for Reading Borough Council is the Local Development Framework (LDF) which includes the Core Strategy, Reading Central Area Action Plan, and, Sites and Detailed Policies Documents (SDPD) which are under review with the aim of drawing up a Local Plan for the Borough. Following the declaration of the AQMA in 2008 an Air Quality Action Plan (AQAP) was implemented in 2009 with the aim of tackling the problem of poor air quality in Reading.

2.16 Within the Core Strategy, Policy CS34: Pollution and Water Quality deals specifically with pollution and water quality with regard to development and states:

“Development will only be permitted where it would not be damaging to the environment through air, land, noise or light pollution; where it would preserve or ideally enhance ground and surface water quality; and where existing water resources, sewerage and wastewater treatment infrastructure are adequate to support the proposed development.



Proposals for development that are sensitive to the effects of air, noise or light pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.

Development will be permitted on land affected by contamination where it can be demonstrated, to the satisfaction of the LPA, that the contamination can be satisfactorily remediated so that it is suitable for the proposed end use.”

- 2.17 The Reading Central Area Action Plan is one of RBC’s Development Plan Documents (DPD) and should be read in conjunction with other LDF documents. Policy RC9: Living in the Centre presents criteria which proposed development in the centre of Reading should be assessed against. The policy covers a number of criteria and with regard to air quality states that:

“Proposals for residential development within the central area will be assessed against the following criteria:

ii. Proposals for new residential development within the central area will be required to demonstrate how the issue of potential noise disturbance from neighbouring land uses and other sources, and air quality implications of residential development, have been considered and if necessary, mitigated. New residential development should not be located next to existing town centre uses where those uses would give rise to unacceptable levels of noise and disturbance to the occupiers of the new scheme, unless this can be mitigated.”

- 2.18 The SDPD Section 9.2 Air Quality identifies that air quality is a key issues within Reading and Policy DM19: Air Quality identifies what development should have regard to the need to improve air quality. DM19 states that:

“Development should have regard to the need to improve air quality and reduce the effects of poor air quality.

i. Development that would detrimentally affect air quality will not be permitted unless the effect is to be mitigated. The following criteria should be taken into account:

- Whether the proposal, including when combined with the cumulative effect of other developments already permitted, would significantly reduce air quality;



- Whether the development is within, or accessed via, an Air Quality Management Area; and
- Whether it can be demonstrated that a local reduction in air quality would be offset by an overall improvement in air quality, for instance through reduction in the need to travel.

ii. Where a development would introduce sensitive uses (such as residential, schools and nurseries, hospitals, care facilities) into, or intensify such uses within, an Air Quality Management Area, detrimental effects on that use will be mitigated. Mitigation measures should be detailed in any planning application.

iii. Where required, planning obligations will be used to secure contributions to measures to tackle poor air quality or for air quality monitoring.”

2.19 In 2008 the six AQMAs were revoked and a single AQMA which covers all the major roads, the railway line and a large area of the centre of Reading was declared (refer to Appendix 2 for the Reading AQMA plan). An Air Quality Action Plan (AQAP) was produced in 2009 with the aim tackling poor air quality in Reading Borough AQMA. The AQAP should be read in conjunction with the SDPD (DM19: Air Quality).



3.0 METHODOLOGY AND ASSESSMENT CRITERIA

Assessment of the Prevailing Air Quality

3.1 This section summarises the methodology used to consider whether there are “Significant” air pollution impacts on sensitive receptors or constraints on development. In order to determine the extent to which air quality issues will affect the sensitive receptors, the study has considered the following:

- Any air quality measurements carried out in Reading Borough (which are in the public domain);
- The Review and Assessment of air quality carried out by RBC for the area, as submitted to the Department for the Environment, Food and Rural Affairs (Defra);
- Predictions of air pollutant concentrations adjacent to the site and within the Reading AQMA.
- The predictions have been carried out utilising the ADMS-Roads (version 4.1.1) dispersion modelling program.

Assessment Criteria

3.2 The NAQO levels are derived from air quality standards set to protect health. The objectives address social and economic factors as well as the health standards.

3.3 For the purposes of this development proposal, the NAQO will form the basis of the air quality assessment. The NAQO levels are based on an assessment of the effects of each pollutant on public health. Therefore, they are a good indicator in assessing whether the air quality in the vicinity of a road is likely to be detrimental to human health. In determining whether air pollutant levels may constrain development, the results of the study have been compared against the acceptability criteria.

3.4 The effects of dust generation from construction have been undertaken following the methodology presented in the Institute of Air Quality Management (IAQM) publication “Guidance on the assessment of dust from demolition and construction” (2014).

3.5 In determining whether air pollutant levels may constrain development, the results of the study have been compared against the acceptability criteria.



Impact Magnitude and Impact Descriptors (Significance) – Air Quality Assessments

Construction Phase

- 3.6 During the construction phase, there will be a number of activities undertaken that have the potential to generate and/or re-suspend dust and PM₁₀. At the time of assessment the exact activities to be undertaken during construction are unknown. However, in order to evaluate the magnitude and extent of potential adverse impacts likely to result from the proposed development, the following construction activities have been assumed:
- site clearance and preparation;
 - storage of materials;
 - laying of hard surfaces;
 - construction of buildings;
 - vehicle movements to and from the Site.
- 3.7 The magnitude of the potential impacts of a construction site on air quality is mainly determined by its size, the range of activities undertaken across the site, proximity to sensitive receptors, complexity of terrain and any barriers between sources and receptors.
- 3.8 A qualitative assessment of the potential impacts during construction has been undertaken using information in guidance documents produced by IAQM.
- 3.9 According to this guidance; a human receptor refers to any location where a person may experience the annoyance effects of airborne dust or dust soiling, or exposure to PM₁₀ over a time period relevant to the air quality objectives. In terms of annoyance effects, this will most commonly relate to residential dwellings and schools.
- 3.10 Activities on construction sites can be divided into four types to reflect their different potential impacts, with the potential for dust emissions to be assessed only for each activity taking place:
- demolition;
 - earthworks;
 - construction; and
 - trackout.



3.11 The assessment methodology considers three separate dust effects:

- annoyance due to soiling;
- harm to ecological receptors; and
- the risk of health effects due to a significant increase in exposure to PM₁₀.

3.12 Account is also to be taken of the distance of the receptors that may experience these effects. The assessment procedure assumes no mitigation measures are applied except those required by legislation.

3.13 The potential dust emission magnitude for the proposed Development Site is determined for the four construction activities using the criteria presented in IAQM guidelines. The magnitude is based on the scale of the anticipated works and classified as “Small”, “Medium” or “Large”.

3.14 The “Sensitivity of an Area” to dust soiling effects on people and property is determined by using the criteria presented in **Table 3.1**. The “Sensitivity of an Area” to human health impacts is presented in **Table 3.2**. The “Sensitivity of an Area” and to ecological impacts is presented in **Table 3.3**.

Table 3.1: Sensitivity of the area to dust soiling effects on people and property

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



Table 3.2 : Sensitivity of the area to human health impacts

Receptor Sensitivity	Annual Mean PM ₁₀ conc.	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µgm ⁻³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µgm ⁻³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µgm ⁻³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µgm ⁻³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 3.3 : Sensitivity of the area to ecological impacts

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

3.15 **Figure 3.1** and **Figure 3.2** demonstrate that there are a small number of residential properties to the west and south of the site, the ambulance station to the north of the site, and commercial premises to the east of the site that may be impacted by construction activities at the site.



- 3.16 As the potential dust emissions magnitude and the sensitivity of the area have been determined the results can be combined to define the risks of impact using the criteria in the following tables.

Table 3.4: Risk of Dust Impacts – Demolition (For info only)

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 3.5: Risk of Dust Impacts – Earthworks and Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 3.6: Risk of Dust Impacts – Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	Medium Risk	Low Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

- 3.17 The proposed development's site specific results and significance of these tables are discussed in Section 5 of this Report.

Operational Phase

- 3.18 The impact of local traffic growth, development generated traffic and other potential sources of air pollution have been assessed for the magnitude of change and for the extent to which change in air quality from existing to future levels would be significant.
- 3.19 Descriptors for the magnitude of change in annual mean concentrations of NO₂ and PM₁₀ and the number of days with PM₁₀ concentrations greater than 50 µgm⁻³ are presented in **Table 3.7**.



Table 3.7: Descriptors for the magnitude in changes in annual mean concentrations of NO₂ and PM₁₀ and the number of days with PM₁₀ concentrations greater than 50 µgm⁻³

Magnitude of Change	Annual Mean NO₂/PM₁₀	Days PM₁₀ >50 µgm⁻³
Large	Increase/decrease >4 µgm ⁻³	Increase/decrease >4 days
Medium	Increase/decrease 2 - 4 µgm ⁻³	Increase/decrease 2 - 4 days
Small	Increase/decrease 0.4 - 2 µgm ⁻³	Increase/decrease 1 - 2 days
Imperceptible	Increase/decrease <0.4 µgm ⁻³	Increase/decrease <1 day

3.20 Following on from the determination of the magnitudes of the impact of change of NO₂ and PM₁₀ levels, the assessment of the significance of the impact with reference to the NAQO Levels can be undertaken. Descriptors of the changes to annual mean concentrations of NO₂ and PM₁₀ and the number of days with PM₁₀ concentrations greater than 50 µgm⁻³ are presented in Table 3.8.

Table 3.8: Impact descriptors for changes to annual mean concentrations of NO₂ and PM₁₀ and the number of days with PM₁₀ concentrations greater than 50 µgm⁻³

<i>Absolute Concentration in Relation to Objective/Limit Value</i>	Change in Concentration /Number of Days		
	<i>Small</i>	<i>Medium</i>	<i>Large</i>
Increase with Scheme			
Above Objective/Limit Value With Scheme (>40 µgm ⁻³ />35 days)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value With Scheme (36-40 µgm ⁻³ />32-35 days)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Scheme (30-36 µgm ⁻³ />26-32 days)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value With Scheme (<30 µgm ⁻³ /<26 days)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value Without Scheme (>40 µgm ⁻³ />35 days)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value Without Scheme (36-40 µgm ⁻³ />32-35 days)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value Without Scheme (30-36 µgm ⁻³ />26-32 days)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value Without Scheme (<30 µgm ⁻³ /<26 days)	Negligible	Negligible	Slight Beneficial
Note – an “Imperceptible” change would be described as “Negligible”			



- 3.21 Table 3.7 and Table 3.8 detail the magnitude and “Significance” of changes in NO₂ and PM₁₀ levels. The tables have been extracted from the Environmental Protection UK (formerly National Society for Clean Air (NSCA)) publication “*Development Control: Planning for Air Quality (2010 Update) – Table 5 and Appendix 3*”.

Traffic Data

Road Traffic

- 3.22 The future concentrations of NO_x, NO₂ and PM₁₀ at representative sensitive receptors and at the locations of four diffusion tubes and the continuous air quality monitor have been predicted using the ADMS - Roads (Version 4.1.1) dispersion model based on forecast traffic flows for the local road network.
- 3.23 Two “Base” (Do Nothing) and one “Future” (Do Something) scenarios have been assessed. The base scenarios are 2018, 2023 + Committed Development and the future scenario is 2023 + Committed Development + Development.
- 3.24 Traffic data was obtained from the permanent ATCs on A329 Caversham Road and Chatham Street (Department for Transport website) and temporary ATCs which were setup on North Street, Great Knollys Street, and Weldale Street by Advanced Transport Research Limited.
- 3.25 The collected traffic flows have been growthed from 2018 to the assessment years using TEMPRO and NTM. Committed development generated traffic has been added to the base year traffic flows to provide a “Future” year scenario.
- 3.26 The “Base” scenario vehicle flows on the local highway network used in the assessment are detailed in **Table 3.9**.



Table 3.9: Traffic flow data (no development generated traffic)

Link	Base	
	AADT	%HGV
North Street (NB)	637	11
North Street (SB)	148	9
Knolly Street (WB)	557	35
Knolly Street (EB)	1051	19
Weldale Street (WB)	1079	8
Weldale Street (EB)	201	7
A329 Caversham	36115	3
Chatham Street	16255	3

- 3.27 The local highway network has been modelled as distinctive links where vehicle speeds change, width of roads change and at roundabout junctions. Also included are changes in vehicle speed due to pedestrian crossings and traffic lights.

Background Concentrations of Air Pollutants

- 3.28 Background concentrations of air pollutants for the dispersion modelling were obtained from the UK National Air Quality Information Archive (Defra website), in accordance with Local Air Quality Management Technical Guidance TG(16). Data sets for 2015-based background maps for years 2015-2030 have been published by Defra. **Table 3.10** identifies the background concentrations of NO_x, NO₂, PM₁₀ and PM_{2.5} used in the ADMS-Roads model. 2016 background data has been used for verification.
- 3.29 The background concentrations of NO_x are source apportioned enabling removal of different sources of NO_x to avoid double counting. Road traffic sources for the “Primary ‘A’ Roads” have been removed from the background concentrations of NO_x. Once removed, the resulting NO₂ concentrations need to be recalculated. This has been undertaken using the “NO₂ Background Sector Tool – for Source Apportioned Background NO_x”.

Table 3.10 : Background pollutant concentrations for 2018 and 2023

Grid Reference	2018				2023			
	NO _x	NO ₂	PM ₁₀	PM _{2.5}	NO _x	NO ₂	PM ₁₀	PM _{2.5}
470500, 173500	22.29	15.85	14.74	9.13	18.40	13.35	14.20	8.73
471500, 174500	30.72	20.68	15.03	9.72	26.18	18.05	14.64	9.36





Table 4.1: Measured Annual Mean NO₂ Concentrations (µg/m³)

Site ID / Location		Within AQMA?	Annual mean concentrations (µg/m ³)			
			2013	2014	2015	2016
RD1	A329 Caversham Rd	Y	43	41	38	39
DT35	Picture House	Y	34	34	30	32
DT36	Sackville Street	Y	41	43	40	37
DT37	Vachel Street	Y	36	38	33	35
DT42	33 Caversham Road	Y	49	51	48	43

- 4.4 From Table 4.1 it can be seen that for 2016 concentrations of NO₂ were below the NAQO level of 40 µg/m³ at the above DTs except at DT42 (33 Caversham Road), where concentrations were above the NAQO level for NO₂ for the past four years. This DT is adjacent to a typically heavily congested road where pollutants are subject to street canyon type dispersion. It should be noted that concentrations have been decreasing at this DT since 2014.
- 4.5 Concentrations of PM₁₀ are recorded at RD1 using Beta-Attenuation Mass (BAM) analysers and concentrations for 2016 were 20 µg/m³ in 2016. Concentrations are at par with the proposed NAQO level of 20 µg/m³, and they are well below the current NAQO level of 40 µg/m³ for PM₁₀.

Dispersion Modelling – ADMS-Roads

- 4.6 The existing and future concentrations of pollutants within the assessment area for all scenarios have been modelled using the Atmospheric Dispersion Modelling System software ADMS-Roads (Version 4.1.1). The software is PC based and models the release of pollutants from road and industrial sources into the atmosphere.
- 4.7 ADMS-Roads is designed to allow the modelling of simple scenarios such as single carriageway roads up to complex scenarios such multiple lane roads and junctions. Allowance is made in the model for initial release of pollutants which are affected by vehicle wake, traffic induced turbulence and street canyons. Boundary layer structure based on the Monin-Obukhov length and the boundary layer height are incorporated in the model which allows for a realistic representation of the changing characteristics of dispersion with height.
- 4.8 Multiple road traffic sources were used in the model to represent the changing concentration of traffic, the different speeds of traffic and the changing road geometry.



- 4.9 Meteorological data for 2017 was obtained from the MET Office. A representative observation station for the development site is Heathrow Airport. The MET data has been used for the verification of the model, base modelling and future years. A wind rose for 2017 is presented in **Appendix 4**.
- 4.10 Background pollutant concentrations for the kilometre squares covering the assessment area were obtained from the Defra website and the concentrations for 2018 and 2023 are presented in Table 3.10.
- 4.11 Specific receptors were modelled within the development site and at four specific receptors locations adjacent to the site. All scenarios were modelled at 1.5 metres above ground level.
- 4.12 Copies of the model inputs are available on request.

Model Verification

- 4.13 Model verification has been undertaken with reference to the guidance provided in LAQM.TG16. The process requires the comparison of the monitored roadside contribution of NO₂ with the modelled roadside contribution of NO₂.
- 4.14 Within the assessment area there are four diffusion tubes (refer to previous paragraphs). ADMS-Roads has been used to calculate NO_x, NO₂ concentrations for 2016 which have been verified against the recorded NO₂ levels at two DTs. The results from the monitoring and the ADMS-Roads modelling are presented in **Table 4.2**.

Table 4.2: Comparison of the monitored (DT) and modelled (ADMS) concentrations of NO₂

Site ID	Monitor Type	Site Type	Site Description	Background NO ₂	Monitored NO ₂	Modelled NO ₂	Difference - [(monitored - modelled)/monitored] x100 (%)
DT35	DT	R	Urban	21	32	35	+10.10
DT36	DT	R	Urban	21	37	30	-19.37
DT37	DT	R	Urban	21	35	31	-11.59
DT42	DT	R	Urban	21	43	34	-24.75

- 4.15 Table 4.2 illustrates that the dispersion modelling is over-predicting at DT35 by 10% and under-predicting the NO₂ concentrations at DT 36, 37 and 42.



- 4.16 The LAQM TG16 guidance requires that the modelled outputs should not systematically over or under predict when compared with measured data, and the majority of modelled results should be within 25% (preferably 10%) of monitored concentrations. Based on the aforementioned requirements, and as only monthly and annual mean concentrations are available, for this assessment a correction factor has not been applied to the modelled road contribution.

Pollutant Concentrations

- 4.17 To characterise the air pollutant concentrations adjacent to the roads that would be affected by the proposed development traffic, predictions have been made at sensitive receptors within and near to the site for the base year 2018 using ADMS-Roads dispersion modelling. R1 is located adjacent to North Street and within the site boundary, R2 is located adjacent to Weldale Street at the Iceland site, R3 is located at Regents Court (residential) which is adjacent to the junction of Great Knollys Street and Caversham Road and R4 is located at the Ambulance Station.
- 4.18 The locations of the receptors are illustrated on **Figure 4.2** and the results of the predictions are presented in **Table 4.3**.

Table 4.3: Predicted air quality concentrations at sensitive receptors 2018

Receptor Number and Name		NO _x	NO ₂	PM ₁₀	
		Annual mean μgm^{-3}	Annual mean μgm^{-3}	Annual mean μgm^{-3}	Days >50 μgm^{-3}
R1	Development Site	24.43	17.93	14.90	0.00
R2	Iceland Store	27.43	18.99	15.10	0.00
R3	Regent Court	30.74	19.82	15.27	0.00
R4	Ambulance St.	24.28	17.78	14.89	0.00
NAQO	-	-	40	40	35

- 4.19 If the pollutant concentrations in Table 4.3 are compared to the NAQO, it can be seen that concentrations of NO₂ are predicted to be well below the NAQO level of 40 μgm^{-3} . The predicted concentrations of PM₁₀ are well below the NAQO level of 40 μgm^{-3} and the number of days when the concentration of PM₁₀ is greater than 50 μgm^{-3} is well below the Air Quality Objective level of 35 days.



5.0 AIR QUALITY ASSESSMENT

- 5.1 The assessment has been split into two parts, the potential “Impacts” of development generated traffic and construction activities and the “Constraints” on the development.
- 5.2 The “Impact” section of the assessment assesses whether development generated traffic flows on the highway network are likely to result in a significant change in annual mean concentration of NO₂ and PM₁₀ at sensitive off-site receptors. Also assessed are the potential dust impacts and PM₁₀ changes on sensitive receptors.
- 5.3 The “Constraints” part of the assessment compares the predicted concentration of NO₂ and PM₁₀ within the development site against NAQO levels and assesses whether predicted levels within the site are above the objective levels.

Impacts

Dust Assessment: Predicted Construction Impacts

- 5.4 The main sources of dust and PM₁₀ during construction activities are:
- Haulage routes, vehicles and construction traffic;
 - Materials handling, storage, stockpiling, potential spillage and disposal;
 - Exhaust emissions from site plant;
 - Site preparation;
 - Construction and fabrication processes; and
 - Internal and external finishing and refurbishment.
- 5.5 The majority of the releases are likely to occur during the typical “working-week”. The construction impact assessment has been split into two sections. The first deals with the potential impacts from dust soiling and changes in PM₁₀ concentrations due to on-site works and the second deals with the effect of emissions from construction traffic.

Dust soiling and changes in PM₁₀ concentrations

- 5.6 The site will require earthworks, construction and trackout of vehicles associated with all phases of the Site. The resulting dust emission magnitudes are:



- Earthworks – **Medium** - Total site area between 2,500 m² and 10,000 m², moderately dusty soil type, 5-10 heavy earth moving vehicles active at any one time, total material moved 20,000 - 100,000 tonnes);
- Construction – **Medium** (Total building volume is 25,000 – 100,000 m³, potentially dusty construction material, on site concrete batching);
- Trackout – **Low to Medium** (10-50 HGV outward movements in any one day, moderately dusty surface material).

5.7 Using the information presented in Section 3 and the criteria presented in Table 3.1, Table 3.2 and Table 3.3, the sensitivity of the construction for the proposed development can be defined. The results of defining the sensitivity of the area are presented in **Table 5.1**.

Table 5.1: Outcome of Defining the Sensitivity of an Area

Potential Impact	Sensitivity of the Surrounding Area			
	<i>Demolition</i>	<i>Earthworks</i>	<i>Construction</i>	<i>Trackout</i>
<i>Dust Soiling</i>	N/A	High	High	Medium
<i>Human Health</i>	N/A	Medium	Medium	Low
<i>Ecological</i>	N/A	Negligible	Negligible	Negligible

5.8 From Table 5.1 it can be seen that the predicted sensitivity of the surrounding area to dust soiling is “high” during the earthworks and construction phases and “medium” during the trackout phase. The sensitivity of the surrounding area to changes in PM₁₀ affecting human health is “medium” during earthworks and construction and “low” during the trackout phase. As there are no ecological receptors within 50m of the development, the predicted sensitivity impact is “negligible”.

5.9 The dust emission magnitude determined in Paragraph 5.6 is combined with the sensitivity of the area summarised in Table 5.1 to determine the risk of impacts with no mitigation applied. The risk of impacts are summarised in **Table 5.2**.



Table 5.2: Summary Dust Risk Table to Define Site-Specific Mitigation

Potential Impact	Risk			
	<i>Demolition</i>	<i>Earthworks</i>	<i>Construction</i>	<i>Trackout</i>
<i>Dust Soiling</i>	N/A	Medium Risk	Medium Risk	Low Risk
<i>Human Health</i>	N/A	Medium Risk	Medium Risk	Negligible
<i>Ecological</i>	N/A	Negligible	Negligible	Negligible

- 5.10 During the earthworks and construction phases of development, there is a medium risk of annoyance caused by dust soiling and a medium risk of health effects due to increase exposure in PM₁₀.
- 5.11 Throughout the trackout processes, there is a low to negligible risk of dust soiling and human health effects due to an increase exposure in PM₁₀.
- 5.12 For those cases where the risk category is negligible (i.e. ecological), no specific mitigation measures is required beyond specific legislation.

Predicted Operational Impacts

- 5.13 The air quality impact of the proposed development on the surrounding area has been assessed by considering the changes in traffic flows which will occur on the existing highway network with the development in place.
- 5.14 Potential impacts from the proposed development would occur following the completion of the proposed development in 2023. Therefore, the year of assessment is 2023 “do nothing” and “do something”. For this development a Transport Assessment (TA) has been undertaken and part of the assessment was the collection and analysis of road traffic data from automated traffic counts (ATC), and the proposed development.

Traffic Generation –2023 with development

- 5.15 Road traffic data has been collected using permanent ATCs on A329 Caversham Road and the Chatham Street. The “Base” traffic flows have been growthed using TEMPRO and NTM, which takes into account traffic from Committed Development projects. Development generated traffic has then been added to the 2023 traffic flows. A precautionary, worst-case assessment has been undertaken with maximum predicted daily development generated traffic (71 daily trips) added to each individual link. A summary is presented in **Table 5.3.**



Table 5.3: Changes in traffic flow “with” and “without” the development in 2023

Link	2023 “do nothing”		2023 “do something”	
	AADT	%HGV	AADT	%HGV
North Street (NB)	669	11	739	10
North Street (SB)	155	9	226	6
Knolly Street (WB)	585	35	655	31
Knolly Street (EB)	1104	19	1174	18
Weldale Street (WB)	1133	7	1203	7
Weldale Street (EB)	211	3	281	2
A329 Caversham	37921	3	37991	3
Chatham Street	17068	3	17138	3

Background Concentrations – 2023

- 5.16 From Table 4.1, it can be seen that there has not been a clear reduction trend in measured concentrations of NO₂ in the past five years at most of the DTs. Therefore, the background concentrations in NO_x, NO₂ and PM₁₀ for 2018 have been used for the future 2023 assessment of NO_x, NO₂ and PM₁₀.

ADMS-Roads Assessment – 2023 with development

- 5.17 Sensitive receptors adjacent to the development site and where there is predicted to be an impact from the development have been assessed for the two scenarios, “do nothing” and “do something”. The results from the assessment are presented in **Table 5.4** and **Table 5.5**.

Table 5.4: Predicted air quality concentrations at sensitive receptors in 2023 “do nothing”

Receptor Number and Name		NO _x	NO ₂	PM ₁₀	
		Annual mean µgm ⁻³	Annual mean µgm ⁻³	Annual mean µgm ⁻³	Days >50 µgm ⁻³
R1	Development Site	23.50	17.51	14.89	0.00
R2	Iceland Store	25.22	18.09	15.08	0.00
R3	Regent Court	26.99	18.50	15.23	0.00
R4	Ambulance St.	23.39	17.39	14.87	0.00
NAQO	-	-	40	40	35



Table 5.5: Predicted air quality concentrations at sensitive receptors in 2023 “do something”

Receptor Number and Name		NO _x	NO ₂	PM ₁₀	
		Annual mean μgm^{-3}	Annual mean μgm^{-3}	Annual mean μgm^{-3}	Days >50 μgm^{-3}
R1	Site	23.52	17.51	14.89	0.00
R2	Iceland Store	25.25	18.10	15.08	0.00
R3	Regent Court	27.01	18.51	15.24	0.00
R4	Ambulance St.	23.40	17.39	14.88	0.00
NAQO	-	-	40	40	35

5.18 Presented in **Table 5.6** are the predicted change in concentrations of NO₂ and PM₁₀ and the change in the number of days where concentrations of PM₁₀ are greater than 50 μgm^{-3} .

Table 5.6: Predicted change in air quality concentrations at sensitive receptors in 2023 “do something”

Receptor Number and Name		NO _x	NO ₂	PM ₁₀	
		Change in annual mean μgm^{-3} (%)	Change in annual mean μgm^{-3} (%)	Change in annual mean μgm^{-3} (%)	Change in days >50 μgm^{-3} (%)
R1	Site	0.02 (0.04)	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)
R2	Iceland Store	0.02 (0.08)	0.01 (0.06)	0.00 (0.00)	0.00 (0.00)
R3	Regent Court	0.02 (0.07)	0.01 (0.05)	0.00 (0.02)	0.00 (0.00)
R4	Ambulance St.	0.01 (0.04)	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)

5.19 From Table 5.6 it can be seen that there is predicted to be 0.01 less in NO₂ and PM₁₀ concentrations at the assessed receptor locations.

Magnitude of Change – 2023 with development

5.20 Comparing the results in Table 5.6 with the magnitude of change in Table 3.7 it can be seen that all the receptors are predicted to experience a change in annual mean NO₂ concentrations which is “Imperceptible” (<0.4 μgm^{-3}).

5.21 It can also be seen that all the receptors are predicted to experience an increase in annual mean PM₁₀ concentrations which is “Imperceptible” (<0.4 μgm^{-3}) and an “Imperceptible” (<1 day) increase in the number of days where PM₁₀ levels are greater than 50 μgm^{-3} .



“Significance” of Change – 2023 with development

- 5.22 The “Significance” of the predicted changes in NO₂ and PM₁₀ annual mean concentrations are presented in **Table 5.7**.

Table 5.7: NO₂ – Significance of change in annual mean concentrations following the completion of the proposed development in 2023

Receptor Number and Name		NO ₂		
		Change in annual mean (µgm ⁻³)	Magnitude of change	“Significance” of change
R1	Site	0.00	No Change	Negligible
R2	Iceland Store	0.01	Imperceptible	Negligible
R3	Regent Court	0.01	Imperceptible	Negligible
R4	Ambulance St.	0.00	No Change	Negligible

- 5.23 With reference to the overall concentration of NO₂ presented in Table 5.5 being below the NAQO level of 40 µgm⁻³ and the magnitude of change being “imperceptible” the “Significance” of change in NO₂ concentrations is considered “Negligible”.

Table 5.8: PM₁₀ – Significance of change in annual mean concentrations following the completion of the proposed development in 2023

Receptor Number and Name		PM ₁₀		
		Change in annual mean (µgm ⁻³)	Magnitude of change	“Significance” of change
R1	Site	0.00	No Change	Negligible
R2	Iceland Store	0.00	No Change	Negligible
R3	Regent Court	0.01	Imperceptible	Negligible
R4	Ambulance St.	0.01	Imperceptible	Negligible

- 5.24 With reference to the overall concentrations of PM₁₀ presented in Table 5.5 being well below the objective level of 40 µgm⁻³ and the magnitude of change presented in Table 5.8 being “Imperceptible”, the “Significance” of change in PM₁₀ concentration is considered to be “Negligible”.



Constraints

- 5.25 The concentrations of NO₂ and PM₁₀ have been modelled within the development site using ADMS-Roads. Sources include the adjacent highway network and background concentrations. The same parameters used in the model for the verification of the model have been used in the modelling of the concentrations in the site. Concentrations have been modelled 1.5 metres above ground level to represent predicted concentrations at head height
- 5.26 The results from the ADMS-Roads model are presented in **Figure 5.1** as contour plots. Concentrations of NO₂ are approximately 18 µgm⁻³ across the development site. The proposed development is therefore predicted to benefit from suitable air quality.
- 5.27 In summary, the proposed development is in a location which benefits from good air quality despite being located in the Reading AQMA.



6.0 MITIGATION

Construction Phase

- 6.1 Monitoring during the construction phase should be considered in the management of operations to ensure that the nuisance thresholds are not exceeded at nearby sensitive locations. However, it is important to note that such limits are subjective (as “nuisance” caused by dust does not currently have a statutory limit applied to it).
- 6.2 Monitoring of dust could be achieved using a variety of sampling techniques, for example deposit (“Frisbee”) gauges, glass slides or high-volume air samplers located around the site perimeter and at the sensitive locations up to 400 metres from the site boundary.
- 6.3 In addition, there are a number of Best Practice mitigation measures that can be used by contractors to ensure that the impacts experienced in close proximity to the construction site are minimal. Sample mitigation:
- 6.4 Effective site planning:
- Erect solid barriers to site boundary;
 - Dust generating activities to be located away from sensitive receptors;
 - All site personnel will be fully trained;
 - There will be a trained and responsible manager on site during working times to maintain a logbook and carry out site inspections
 - There will be no run off of mud or water from the site;
 - Relevant legislation and guidance will be adhered to; and
- 6.5 Construction Traffic
- All vehicles to switch off engines (no idling);
 - On road vehicles will comply to set emission standards;
 - Effective vehicle cleaning and specific wheel-washing on leaving site;
 - All loads entering site must be covered;
 - All non-road mobile machinery (NRMM) should use ultra-low sulphur diesel where available; and



6.6 Site Activities

- Minimise dust generating activities where possible;
- Use water as a dust suppressant where applicable;
- Stockpiles will be covered, enclosed, seeded or kept them sheeted; and
- If applicable, any concrete crushers/batchers will have the required permits.

6.7 It is recommended that liaison with Reading Borough Council Environmental Health Department be maintained throughout the construction process. In addition, the main contractor should nominate a representative (possibly the site manager) to act as a point of contact with the Council, the construction team and the local community to ensure that any air quality related issues that occur during the construction period can be dealt with efficiently, effectively and promptly.

6.8 All other site sub-contractors should also nominate or appoint a suitable team member responsible for liaison with the lead contractor's representative and to ensure that sub-contractor construction activities are managed effectively.

6.9 Details of the proposed methodology for achieving this and procedures to follow should be set out in a Construction Environmental Management Plan (CEMP). This would be held on-site and would include relevant contact names, details, lines of communication and mitigation action plans. The document should be available to all site personnel who should be made aware of its existence and provide an undertaking that they will adhere to the guidance provided therein.

6.10 The mitigation of PM₁₀ releases due to material disturbance will be achieved in the same manner as the control of dust releases. By achieving effective control of sources of dust release, PM₁₀ releases can be minimized.

6.11 The most effective control of particulate releases from site plant will be achieved by ensuring that it is maintained in good working order, and is of the appropriate capacity and specification for the job being carried out. It should also be located away from the site perimeter, thereby maximizing the distance between source and receptor.



- 6.12 There may be occasions where breakdown of site plant could cause short-term releases of excess particulate matter (smoke) and odour. Short-term releases may also occur during start up (of diesel engines and other plant). Regular visual checks and routine maintenance should be applied in accordance with the plant specification, to ensure that these releases are minimised. Faulty site plant should be decommissioned until repairs have been carried out and have been tested and found to be operating satisfactorily.
- 6.13 Detailed mitigation measures to control construction traffic should be discussed with officers from Reading Borough Council, in order to establish the most suitable access routes for the site traffic and service vehicles. The most effective mitigation will be achieved by ensuring that construction traffic vehicles are kept clean and sheeted when on public highways (through the use of wheel washers) and avoid using sensitive roads. Timing of large-scale vehicle movements to avoid peak hours on the local road network would also be beneficial. Clear signposting to the site access for construction traffic should also be provided and direct traffic along routes agreed with the Council.
- 6.14 Early morning delivery vehicles, which may arrive prior to the site opening, should be prevented from waiting on the approach roads to the site. If site deliveries arrive prior to the site opening, they should wait at a suitable location, and if possible, turn the engine off.
- 6.15 With the implementation of the appropriate mitigation measures detailed above, but not restricted to the information detailed above, the residual effects will normally be “Not Significant”.

Mitigation: Operational Phase

- 6.16 “Negligible” increases in NO₂ concentrations and PM₁₀ concentrations are predicted due to development generated traffic following the completion of the development. A reduced number of parking spaces has been proposed for the development which will help mitigate the impact on the AQMA.



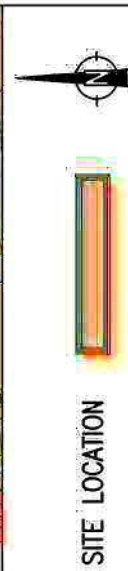
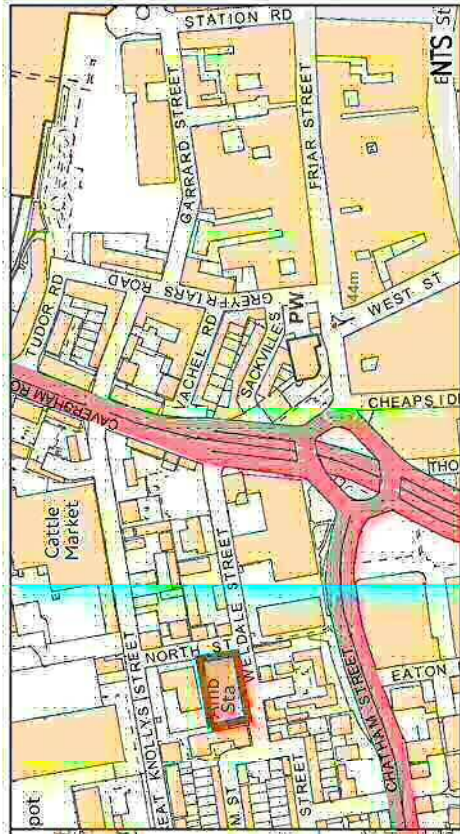
7.0 SUMMARY AND CONCLUSIONS

- 7.1 Stuart Michael Associates has been engaged by Lochailort Thames Quarter Limited to undertake an air quality assessment in support of an Outline Planning Application for the proposed development site at North Street, Reading.
- 7.2 The assessment has been undertaken to determine the impact on concentrations of NO₂ and PM₁₀ at sensitive receptors as a result of development generated traffic. Annual average concentrations have been compared to the National Air Quality Objectives and the magnitude and significance of change has also been assessed using national guidelines.
- 7.3 Constraints on development have been assessed using background concentrations, existing and future emissions from road traffic, and representative meteorological data for the proposed development site.
- 7.4 Also assessed are the likely impacts from the construction of the development. The impact assessment has been undertaken using the method detailed in the Institute of Air Quality Management (IAQM) publication "Guidance on the assessment of dust from demolition and construction" (2014).
- 7.5 Background concentrations for the future year assessments (2023) have been kept the same as the base year (2018) assessment. The reason for using the base year background concentrations is due to recorded local concentrations of NO₂ not decreasing as predicted over the past five years, and a worst case scenario / precautionary approach has therefore been modelled. The ADMS-Roads model was verified using NO₂ concentrations at four DT sites.
- 7.6 Base concentrations have been calculated for 2018 and two scenarios have been assessed for the future year 2023. The first is a "Do Nothing" scenario with committed development generated traffic but no development generated traffic and the second scenario is "Do Something" with committed development generated traffic and development generated traffic. The two scenarios have been assessed to gauge the magnitude of change in concentrations NO₂ and PM₁₀ and the significance of those changes.
- 7.7 Road traffic data has been obtained from permanent and temporary ATC sites within the assessment area. Future traffic flows have been determined by adding Committed Development to the base year 2018 to obtain the future year 2023. Development generated traffic has been obtained from the Transport Assessment.



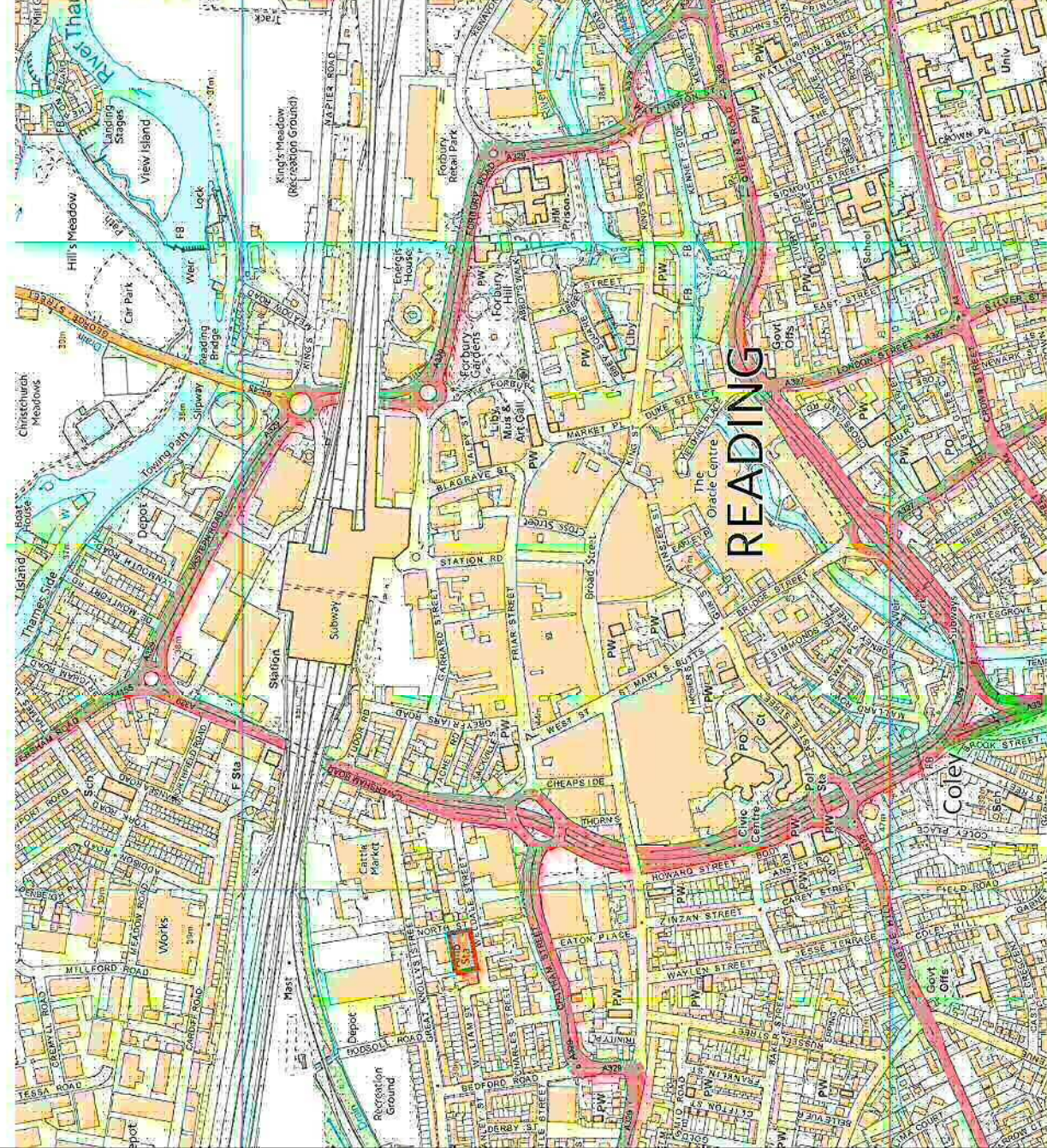
- 7.8 The concentrations of NO₂ in 2023 are predicted to be well below the objective level of 40 µgm⁻³ at the sensitive receptors. The magnitude of change in annual mean concentrations at all the receptors due to development generated traffic is predicted to be “*imperceptible*”. Therefore the significance of change is considered “*negligible*”.
- 7.9 Concentrations of PM₁₀ are predicted to be below the objective level of 40 µgm⁻³ at the receptor locations and the magnitude of change due to development generated traffic is “*imperceptible*”. Therefore, the significance of change is considered “*negligible*”.
- 7.10 The potential impacts of construction dust have been assessed using IAQM guidance on the potential impacts of construction dust. During the earthworks and construction phases of development, there is a medium risk of annoyance caused by dust soiling and a medium risk of health effects due to increase exposure in PM₁₀. Throughout the trackout processes, there is a “*low*” to “*negligible*” risk of dust soiling and human health effects due to an increase exposure in PM₁₀.
- 7.11 Within the development site, air pollutant concentrations are predicted to be well below the NAQO and EU Limit Values for NO₂ and PM₁₀.
- 7.12
- Taking the aforementioned into account, it can be concluded that air quality concentrations are acceptable for future residents of the proposed development at North Street. Moreover, the impact of development on local sensitive receptors is predicted to be negligible during both construction and operational phases. No air quality mitigation is required.

FIGURES



SITE LOCATION

Reproduced from Ordnance Survey Mapping with the permission of the Controller of HMSO under licence AL 545015
© Crown copyright



DATE	JAN '18	DRAWN	COR	CHECKED	SWA	ISSUE CHECKBOX
DRAWING No.	FIGURE 1.1	REV		SCALE	1:10,000	@ A4

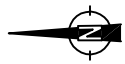
JOB TITLE	LAND AT NORTH STREET READING
DRAWING TITLE	SITE LOCATION PLAN

LOCHALORT READING INVESTMENTS

STUART MICHAEL ASSOCIATES
CONSULTING ENGINEERS

Stuart Michael Associates Ltd
Coombe House, Coombe Square, Thatcham, Berkshire RG19 4JF
T: 01635 867 711
F: 01635 861 715
e: mail@stuartmichael.co.uk
w: www.stuartmichael.co.uk

This drawing is the copyright of Stuart Michael Associates Limited. It may not be reproduced or amended without the written approval of Stuart Michael Associates



Annual mean NO₂ Concentrations at 1.5m



µgm⁻³



Metres



Stuart Michael Associates Ltd
Coombe House, Coombe Square, Thatcham, Berkshire RG19 4JF
T: 01635 867 711 e: mail@stuartmichael.co.uk
F: 01635 861 715 w: www.stuartmichael.co.uk

LOCHAILORT READING LIMITED

JOB TITLE
LAND AT NORTH STREET
READING

DRAWING TITLE
ANNUAL MEAN NO₂ CONCENTRATIONS

Rev	Description	Drn	Chk	Date
REVISIONS				
Preliminary	Approval	Tender	Const.	
DRAWING STATUS				
DATE	AUGUST 2018	DRAWN	WAH	CHECKED
			SWA	ISSUE CHECKBOX
DRAWING No.	FIGURE 5.1	REV	SCALE	NTS
				@ A3

© This drawing is the copyright of Stuart Michael Associates Limited. It may not be reproduced or amended without the written approval of Stuart Michael Associates

APPENDICES

APPENDIX 1



Reading Ambulance
Service

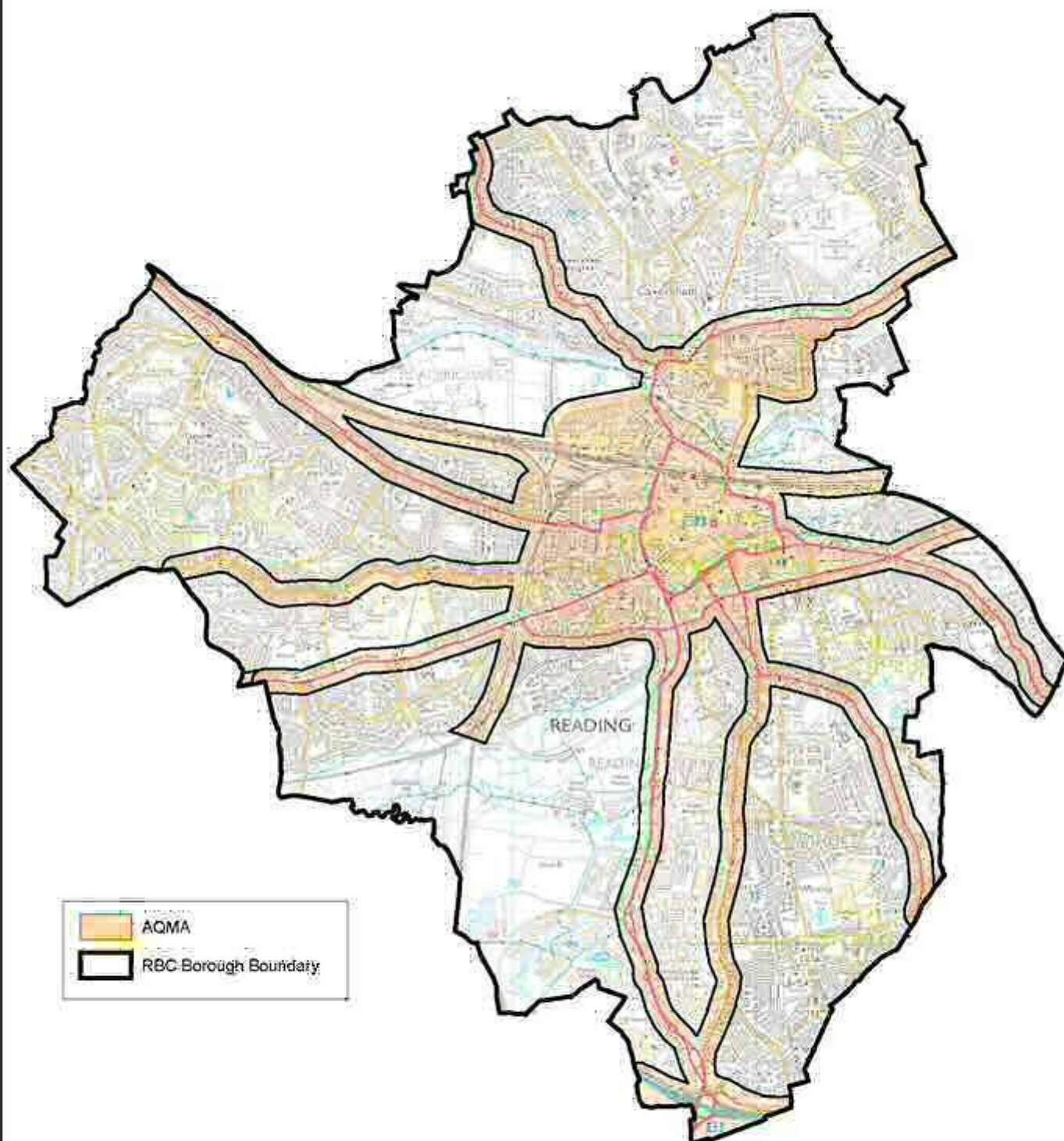
NORTH STREET



Position of Pre-App
perspective view

WELDALE STREET

APPENDIX 2



Title: Reading Air Quality Management Area

Dwg.No.:

Date: 29/04/2009 Scale at A3: 1:32000

Produced by: GIS & Mapping Services Ref: G/AQMA A3/WQR



This map is based upon Ordnance Survey material with the permission of Her Majesty's Stationary Office © Crown Copyright. Unauthorised reproduction is prohibited. Other Copyright and may include civil proceedings. Reading Borough Council, Account no. 10010072, 2009.

APPENDIX 3

National air quality objectives and European Directive limit and target values for the protection of human health						
Pollutant	Applies	Objective	Concentration measured as ₁₀	Date to be achieved by (and maintained thereafter)	European Obligations	Date to be achieved (by and maintained thereafter)
Particles (PM ₁₀)	UK	50 µg/m ³ not to be exceeded more than 35 times a year	24 hour mean	31 December 2004	50 µg/m ³ not to be exceeded more than 35 times a year	1 January 2005
	UK	40 µg/m ³	annual mean	31 December 2004	40 µg/m ³	1 January 2005
	Indicative 2010 objectives for PM ₁₀ (from the 2000 strategy and Addendum) have been replaced by an exposure reduction approach for PM _{2.5} (except in Scotland – see below)					
	Scotland	50 µg/m ³ not to be exceeded more than 7 times a year	24 hour mean	31 December 2010	50 µg/m ³ not to be exceeded more than 35 times a year	1 January 2005
Particles (PM _{2.5}) Exposure Reduction	Scotland	18 µg/m ³	annual mean	31 December 2010	40 µg/m ³	1 January 2005
	UK (except Scotland)	25 µg/m ³	annual mean	2020	Target value - 25 µg/m ³	2010
	Scotland	10 µg/m ³		31 December 2020	Limit value - 25 µg/m ³	1 January 2015
	UK urban areas	Target of 15% reduction in concentrations at urban background		Between 2010 and 2020	Target of 20% reduction in concentrations at urban background.	Between 2010 and 2020

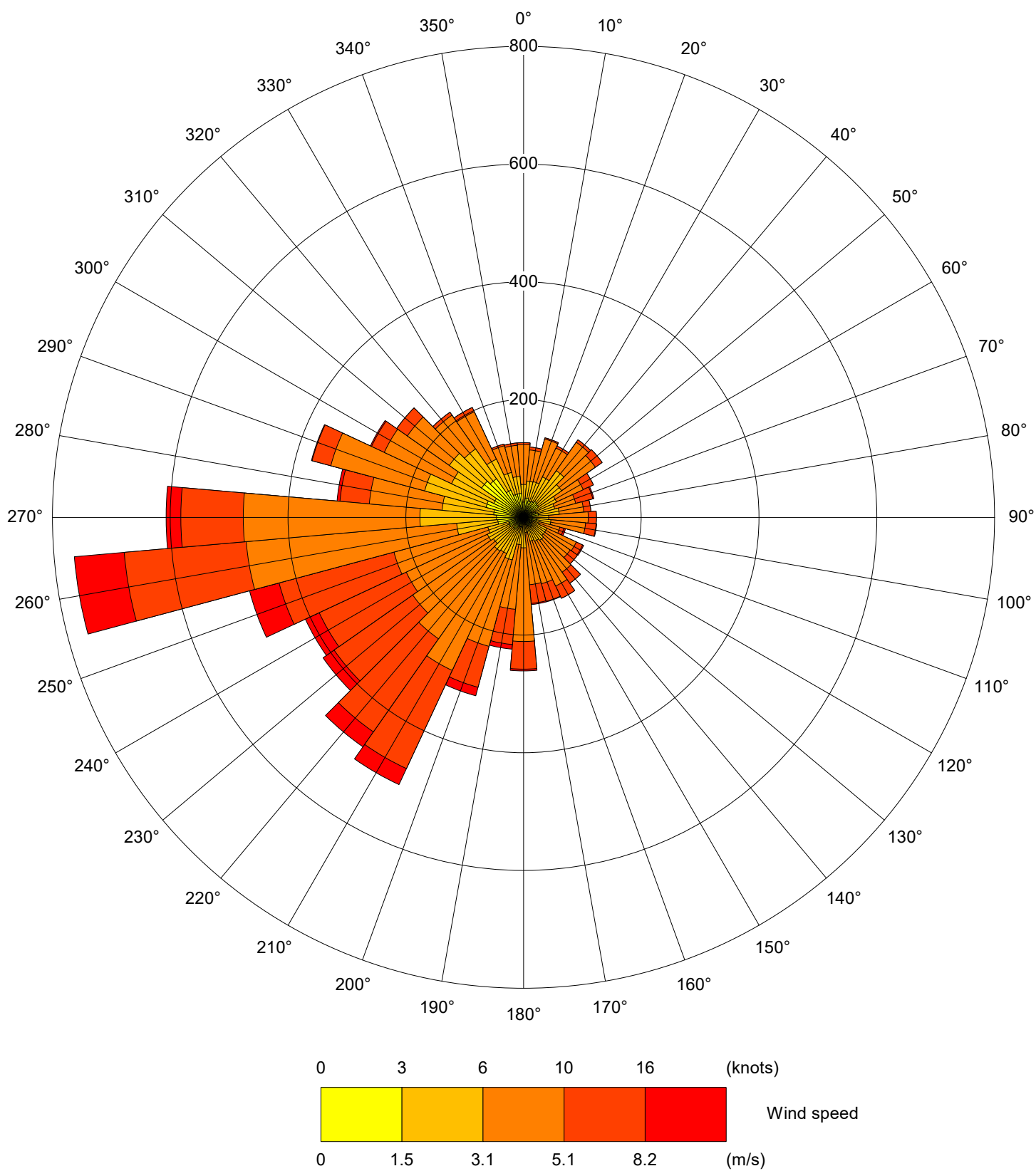
National air quality objectives and European Directive limit and target values for the protection of human health							
Pollutant	Applies	Objective	Concentration measured as ¹	Date to be achieved by (and maintained thereafter)	European Obligations	Date to be achieved by (and maintained thereafter)	
Nitrogen dioxide	UK	200 µg/m ³ not to be exceeded more than 18 times a year	1 hour mean	31 December 2005	200 µg/m ³ not to be exceeded more than 18 times a year	1 January 2010	
	UK	40 µg/m ³	annual mean	31 December 2005	40 µg/m ³	1 January 2010	
Ozone	UK	100 µg/m ³ not to be exceeded more than 10 times a year	8 hour mean	31 December 2005	Target of 120 µg/m ³ not to be exceeded by more than 25 times a year averaged over 3 years	31 December 2010	
Sulphur dioxide	UK	266 µg/m ³ not to be exceeded more than 35 times a year	15 minute mean	31 December 2005	-	-	
	UK	350 µg/m ³ not to be exceeded more than 24 times a year	1 hour mean	31 December 2004	350 µg/m ³ not to be exceeded more than 24 times a year	1 January 2005	
	UK	125 µg/m ³ not to be exceeded more than 3 times a year	24 hour mean	31 December 2004	125 µg/m ³ not to be exceeded more than 3 times a year	1 January 2005	
Polycyclic Aromatic Hydrocarbons	UK	0.25 ng/m ³ B[a]P	as annual average	31 December 2012	1.0 ng/m ³	31 December 2012	

National air quality objectives and European Directive limit and target values for the protection of human health						
Pollutant	Applies	Objective	Concentration measured as ¹	Date to be achieved by (and maintained thereafter)	European Obligations	Date to be achieved by (and maintained thereafter)
Benzene	UK	16.25 µg/m ³	running annual mean	31 December 2003	-	-
	England and Wales	5 µg/m ³	annual average	31 December 2010	5 µg/m ³	1 January 2010
	Scotland, Northern Ireland	3.25 µg/m ³	running annual mean	31 December 2010	-	-
1,3-butadiene	UK	2.25 µg/m ³	running annual mean	31 December 2003	-	-
Carbon monoxide	UK	10 mg/m ³	maximum daily running 8 hour mean/in Scotland as running 8 hour mean	31 December 2003	10 mg/m ³	1 January 2005
Lead	UK	0.5 µg/m ³	annual mean	31 December 2004	0.5 µg/m ³	1 January 2005
		0.25 µg/m ³	annual mean	31 December 2008	-	-

National air quality objectives and European Directive limit and target values for the protection of vegetation and ecosystems						
Pollutant	Applies	Objective	Concentration measured as ¹	Date to be achieved by (and maintained thereafter)	European Obligations	Date to be achieved by (and maintained thereafter)
Nitrogen oxides	UK	30 µg/m ³	annual mean	31 December 2000	30 µg/m ³	19 July 2001
Sulphur dioxide	UK	20 µg/m ³	annual mean	31 December 2000	20 µg/m ³	19 July 2001
	UK	20 µg/m ³	winter average	31 December 2000	20 µg/m ³	19 July 2001
Ozone: protection of vegetation and ecosystems	UK	Target value of 18,000 µg/m ³ based on AOT40 to be calculated from 1 hour values from May to July, and to be achieved, so far as possible, by 2010	Average over 5 years	1 January 2010	Target value of 18,000 µg/m ³ based on AOT40 to be calculated from 1 hour values from May to July, and to be achieved, so far as possible, by 2010	1 January 2010

APPENDIX 4

Appendix 4 - Heathrow Airport Windrose (Land at North Street, Reading)





Coombe House
Coombe Square
Thatcham
Berkshire
RG19 4JF

T: 01635 867711
F: 01635 861715
E: mail@stuartmichael.co.uk
W: www.stuartmichael.co.uk