Cove Communities

Proposed Development at Medmerry Park, Chichester

Air Quality Assessment

Report No: 445199-01 (00)

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RSK GENERAL NOTES

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Author	Dr Aastha Dhingra Senior Air Quality Consultant	**Technical reviewer**	William Franklin Associate Director
Signature	[redacted]	Signature	[redacted]
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Abbreviations

AADT	Annual Average Daily Traffic
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Standard
ASR	Annual Status Report
CDC	Chichester District Council
CHP	Combined Heat and Power
CO_2	Carbon Dioxide
CO	Carbon Monoxide
DEFRA	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
EC	European Commission
EPUK	Environmental Protection UK
EU	European Union
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle
NAQS	National Air Quality Strategy
NPPF	National Planning Policy Framework
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
O_3	Ozone
$PM_{2.5}$	Particulate matter of size fraction approximating to <2.5µm diameter
PM_{10}	Particulate matter of size fraction approximating to <10µm diameter
RSK	RSK Environment Limited
VOC	Volatile Organic Compounds

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1 INTRODUCTION

1.1 Background

RSK Environment Ltd (RSK) was commissioned to prepare an assessment of the potential air quality impacts associated with redevelopment at Medmerry Park, Chichester. Figure 1.1 shows the site location.

Medmerry Park Holiday Village (Medmerry Park) comprises an existing holiday village of 308 holiday bungalows, supporting leisure and recreation facilities including the Medmerry Arms (an on-site public house/restaurant), an outdoor swimming pool, children's play area, mini-golf park, and tennis courts along with various landscaped areas. The holiday village is to be refurbished, however the same number of units (308 holiday bungalows) are proposed.

The site comprises approximately 33.3 hectares, approximately centred at 481927, 095812. The site is within the administrative area of Chichester District Council (CDC).

This report presents the findings of an assessment of existing/baseline air quality conditions, potential air quality impacts during the construction/refurbishment phase of the proposed development and anticipated impacts on local air quality resulting from increased road traffic emissions associated with the development once operational.

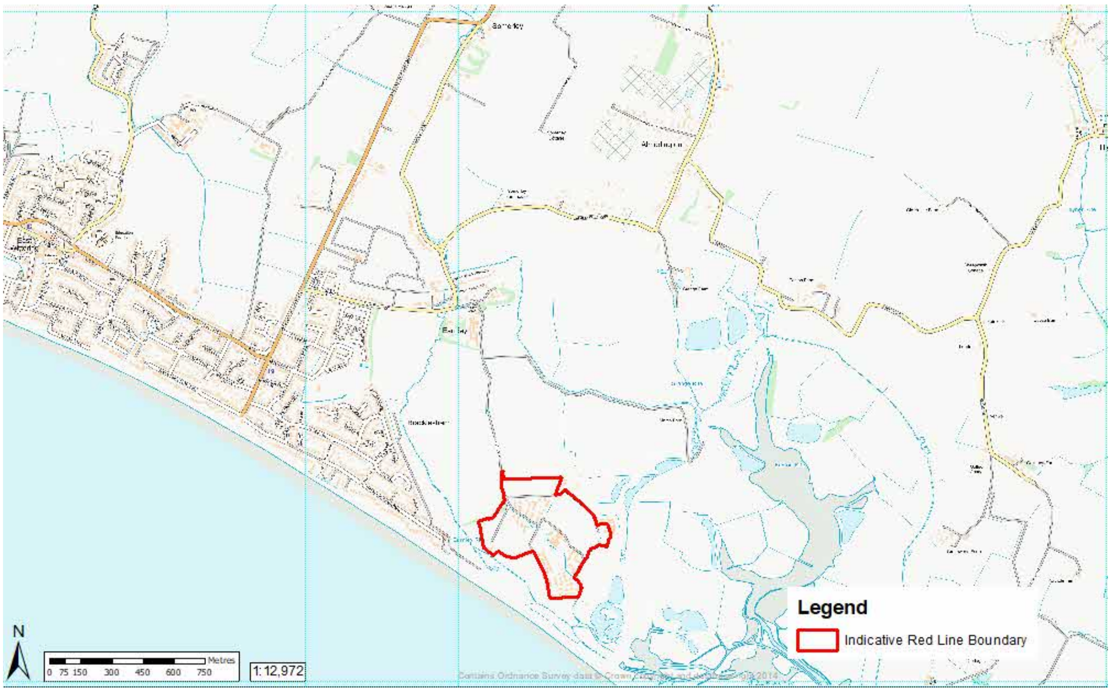

Figure 1.1: Proposed Development Site Location

2 LEGISLATION, PLANNING POLICY & GUIDANCE

2.1 Key Legislation

2.1.1 Air Quality Strategy

UK air quality policy is published under the umbrella of the Environment Act 1995, Part IV and specifically Section 80, the National Air Quality Strategy. The latest *Air Quality Strategy for England, Scotland, Wales and Northern Ireland – Working Together for Clean Air*, published in July 2007 sets air quality standards and objectives for ten key air pollutants to be achieved between 2003 and 2020.

The Clean Air Strategy 2019 supersedes the policies outlined in the 2007 strategy. This latest strategy aims to have a more joined-up approach, outlining actions the Government plans to take to reduce emissions from transport, homes, agriculture and industry. However, the air quality objectives remain as previously detailed within the 2007 strategy.

2.1.2 Air Quality Standards

The air quality standards (AQSs) in the United Kingdom are derived from European Commission (EC) directives and are adopted into English law via the Air Quality (England) Regulations 2000 and Air Quality (England) Amendment Regulations 2002. The Air Quality Limit Values Regulations 2003 and subsequent amendments implement the Air Quality Framework Directive into English Law. Directive 2008/50/EC was translated into UK law in 2010 via the Air Quality Standards Regulations 2010.

The ecological levels are based on WHO and CLRTAP (Convention on Long-range Transboundary Air Pollution) guidance.

The relevant[1] AQS to England and Wales to protect human health are summarised in Table 2.1.

Table 2.1: Air Quality Standards (AQS) Relevant to the Proposed Development

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit ($\mu g/m^3$)
Nitrogen dioxide (NO_2)	1 calendar year	-	40
	1 hour	18	200
Fine particles (PM_{10})	1 calendar year	-	40
	24 hours	35	50
Fine particles ($PM_{2.5}$)	1 year	-	20

[1] Relevance, in this case, is defined by the scope of the assessment.

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit ($\mu g/m^3$)
Nitrogen oxide (NO_X) for ecological receptors	1 year	-	30

2.1.3 The Environment Act, 1995

These objectives are to be used in the review and assessment of air quality by local authorities under Section 82 of the Environment Act (1995). If exceedances are measured or predicted through the review and assessment process, the local authority must declare an Air Quality Management Area (AQMA) under Section 83 of the act and produce an Air Quality Action Plan (AQAP) to outline how air quality is to be improved.

2.1.4 The Environment Act, 2021

The Environment Act (2021) amends the Environment Act (1995) to reinforce the local air quality management (LAQM) framework in order to encourage cooperation at the local level and broaden the range of organisations that play a role in improving local air quality. The Environment Act (2021) introduces a commitment to create a legally binding duty on government to reduce the concentrations of fine particulate matter ($PM_{2.5}$) in ambient air.

The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023

The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 introduce a reduced annual average Air Quality Objective for $PM_{2.5}$ of 10 µg/m^3 by 2040 (a reduction from the current Air Quality objective of 20 µg/m^3) with an interim target of 12 µg/m^3 by January 2028, and introduce a target for a 35% reduction in average population exposure by 2040, with an interim target of a 22% reduction by January 2028, both compared to a 2018 baseline.

2.2 Planning Policy

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

2.2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was revised and published in July 2021, superseding the previous NPPF with immediate effect. The NPPF includes a presumption in favour of sustainable development.

Section 15 of the NPPF deals with Conserving and Enhancing the Natural Environment, and states that the intention is that the planning system should prevent '*development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability*' and goes on to state that '*new development* [should be] *appropriate for its location' and 'the effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account*.'

With specific regard to air quality, the NPPF states that: *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."*

2.2.2 Local Planning Policy

Chichester Local Plan (Regulation 19)

CDC's Local Plan is currently at 'Regulation 19' consultation stage. The policies for managing developments are laid out in the Local Plan for which includes CDC policies relating to air quality.

Policy NE20 Pollution includes the following:

"Development proposals must be designed to protect, and where possible, improve upon the amenities of existing and future residents, occupiers of buildings and the environment generally.

Development proposals will need to address the criteria contained in, but not limited to, the policies concerning water quality; flood risk and water management; nutrient mitigation; lighting; air quality; noise; and contaminated land.

Where development is likely to generate significant adverse impacts by reason of pollution, the council will require that the impacts are minimised and/or mitigated to an acceptable level within appropriate local/national standards, guidance, legislation and/or objectives."

Policy NE22 Air Quality states the following:

> *"Development proposals will be permitted where it can be demonstrated that all the following criteria have been addressed:*
>
> > *1. Development is located and designed to minimise traffic generation and congestion through access to sustainable transport modes, including maximising provision of pedestrian and cycle networks;*

2. Development that creates or results in pollution including particulates, dust, smoke, pollutant gases or odour is designed to minimise and mitigate impact on the amenities of users of the site and surrounding environment including wildlife habitats to an appropriate level;

3. Where development is close to an existing use that has potential to impact on the amenity of the proposed development through dust, particulates, pollutant gases and/or odour then an air quality assessment will be required to identify the potential impact on the area and detail the mitigation measures required;

4. Where development is likely to have a negative impact on an Air Quality Management Area, or other areas of poor air quality, then an air quality assessment will be required. The air quality assessment will need to identify the potential impact on the area and detail the mitigation measures required to avoid, reduce and where appropriate, offset the identified impact.

The council will consider development proposals against the requirements and standards contained in legislation and current local and national guidance."

Policy T1 Transport Infrastructure states:

"Integrated transport measures will be developed to mitigate the impact of planned development on the highways network, improve highway safety and air quality, promote more sustainable travel patterns and encourage increased use of sustainable modes of travel, such as public transport, cycling and walking. The council will work with National Highways, West Sussex County Council, other transport and service providers (including through the Traffic and Infrastructure Management Group) and developers to provide a better integrated transport network and to improve accessibility to key services and facilities. All development is expected to demonstrate how it will support four key objectives to create an integrated transport network which will alleviate pressure on the road network, improve highway safety, encourage sustainable travel behaviours and help improve air quality, by:

Avoiding or reducing the need to travel by car;

Enabling access to sustainable means of travel, including public transport, walking and cycling;

Managing travel demand; and

Mitigating the impacts of travel by car.

All parties, including applicants, are expected to support these objectives by:

1. Ensuring that new development is well located and designed to avoid or minimise the need for travel, encourages the use of sustainable modes of travel as an alternative to the private car and provides or contributes towards new or improved transport infrastructure;

2. Working with relevant providers to improve accessibility to key services and facilities and to ensure that new facilities are easily accessible by sustainable modes of travel;

3. Targeting investment to provide local travel options as an alternative to the car, focusing on the delivery of improved integrated bus and train *services, and improved pedestrian and cycling networks, including the public rights of way network, based on the routes and projects identified in the Local Transport Plan, Local Cycling and Walking Infrastructure Plan (LCWIP) and the Infrastructure Delivery Plan;…*

…5. Phasing the delivery of new development to align with the provision of new transport infrastructure and the outcomes of monitoring travel demand. It may also be necessary to proactively phase development to take into account the monitoring and effectiveness of travel plans to encourage sustainable travel behaviour.;

6. Using demand management measures, such as travel plans, to manage travel demand and minimise the need for new or improved transport infrastructure as part of the monitor and manage process.

7. Delivering a coordinated package of infrastructure improvements to junctions on the A27 Chichester Bypass along with other small-scale junction improvements within the city and elsewhere, as identified through the monitor and manage process. These will increase road capacity, reduce traffic congestion, improve safety and air quality, and improve access to Chichester city from surrounding areas.

Opportunities to secure funding to implement this package of improvements (in relation to criterion 7) will be maximised by working proactively with government agencies including National Highways and Homes England, other public sector organisations and private investors. Developer contributions from new development will also be sought from all new housing development that is not yet subject to planning permission, in accordance with the per dwelling contribution as set out in paragraphs 8.20 to 8.21. The Community Infrastructure Levy may be used to contribute towards the cost of improvements to the local transport network. New development may also be required to deliver or contribute towards specific transport improvements directly related to the development"

2.3 Best Practice Guidance

2.3.1 Guidance on the Assessment of Dust from Demolition and Construction

The Institute of Air Quality Management (IAQM) published a guidance document (Holman *et al*., 2014) on the assessment of construction phase impacts (herein the 'IAQM construction dust guidance'). The guidance was issued to provide advice to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM_{10} concentrations and effects on sensitive ecological receptors) and to identify mitigation measure appropriate to the level of risk identified.

2.3.2 Local Air Quality Management Review and Assessment Technical Guidance

The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their air quality review and assessment work. This guidance, referred to in this document as the Local Air Quality Management Technical Guidance (Defra, 2021 ('LAQM TG.21').

2.3.3 Land-Use Planning & Development Control: Planning for Air Quality

Environmental Protection UK's (EPUK) and the IAQM jointly published a revised version of the guidance note 'Land-Use Planning & Development Control: Planning for Air Quality' in 2017 (herein the 'EPUK-IAQM guidance') to facilitate consideration of air quality within local development control processes. It provides a framework for air quality considerations, promoting a consistent approach to the treatment of air quality issues within development control decisions.

The guidance suggests approaches for to air quality assessment and for assessing the significance of effects. The guidance note is widely accepted as an appropriate reference method for this purpose.

3 ASSESSMENT SCOPE

3.1 Overall Approach

The approach taken for assessing the potential air quality impacts of the proposed development may be summarised as follows:

- Baseline characterisation of local air quality;
- Qualitative impact assessment of the construction phase of the development using the 2014 IAQM guidance;
- Quantitative assessment of air quality during the operational phase of the proposed development with reference to the EPUK-IAQM 2017 guidance;
- Recommendation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

3.2 Baseline Characterisation

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources.

A desk-based study has been undertaken including a review of monitoring data available from CDC and estimated background data from the LAQM Support website maintained by Defra. Consideration has also been given to potential sources of air pollution and the presence of AQMA.

3.3 Construction Phase Assessment

3.3.1 Construction Dust and Particulate Matter

Construction works for the proposed development have the potential to lead to the release of fugitive dust and particulate matter. An assessment of the likely significant effects of construction phase dust and particulate matter at sensitive receptors has therefore been undertaken following the IAQM's construction dust guidance.

Three separate dust impacts were considered:

- Disamenity to dust soiling;
- The risk of health effects due to an increase in exposure to PM_{10}; and
- Harm to ecological receptors.

In order to assess the potential impacts of construction, activities are divided into four types:

- Demolition;
- Earthworks;
- Construction; and

Trackout[2].

The risk of dust and PM_{10} arising to cause disamenity and/or health or ecological impacts was based on an assessment of likely emissions magnitude and the sensitivity of the surrounding environment. The risk category may be different for each of the four 'construction' activities.

Appendix B sets out the construction dust assessment methodology in detail as per the IAQM construction dust guidance. Once the level of risk has been determined, then site specific mitigation proportionate to the level of risk can be identified (as detailed in Section 6).

The Magic Map application available online by Defra was used to identify statutory ecological receptors near the proposed development site area.

3.3.2 Emissions to Air from Construction Traffic and Plant

Exhaust emissions from construction phase vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the proposed development site and in the vicinity of the proposed development site itself. Detailed information on the plant associated with the construction phase is not available at this stage, therefore a qualitative, screening level impact assessment has been undertaken.

The EPUK-IAQM 2017 guidance suggests indicative criteria for when an air quality assessment is required; if none of the criteria are exceeded, it is considered unlikely that there will be any significant impacts on air quality.

The project transport consultants (ITP) have advised that the screening criteria (a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere, and/or a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere) will not be exceeded during construction phase. Therefore a significant impact is unlikely and further assessment of construction phase traffic emissions should not be required.

3.4 Operational Phase Impact Assessment

3.4.1 Traffic Emissions

NO_2, PM_{10} and $PM_{2.5}$ are generally regarded as the most significant air pollutants released by vehicular combustion processes (as they tend to be more likely to be close to exceeding statutory limits in an urban environment), or subsequently generated by vehicle emissions in the atmosphere through chemical reactions.

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[2] Trackout is defined as the transport of dust and dirt from the construction / demolition sites onto public road network, where it may be deposited and then re-suspended by vehicles using the network.

The proposed development will retain the same number of holiday bungalows as currently exist, therefore is not considered to generate additional traffic emissions in the local area.

However, the potential for exhaust emissions to affect air quality at the proposed holiday bungalows and receptors was assessed using dispersion modelling. The following subsections provide further information regarding proposed methodology and dispersion model input for the air quality impact assessment.

3.4.2 Modelling Software

ADMS-Roads is an advanced dispersion model developed by the UK consultancy CERC (Cambridge Environmental Research Consultants). ADMS-Roads is widely used and validated within the UK and Europe. The model allows for the skewed nature of turbulence within the atmospheric boundary layer. ADMS-Roads is capable of processing hourly sequential meteorological data, whilst taking the turbulence caused by vehicles into account in calculating the dispersion profiles of emitted pollutants. ADMS-Roads enables the user to predict concentrations of pollutants of concern at multiple receptor locations.

ADMS-Roads (Version 5.0.0.1) has been used for assessing potential road traffic emission air quality impacts resulting from the operational phase of the proposed development, and the potential exposure of future residents at the proposed development site to poor air quality.

3.4.3 Modelling Scenarios

The transport consultants have confirmed that no traffic will be added due to the proposed development, therefore baseline and future baseline scenarios have been assessed.

The operational phase assessment has been undertaken with an operational opening year of 2025 for a worst-case assessment. The assessment scenarios are therefore:

- 2019 Baseline = Existing Baseline Conditions (2019);
- 2025 Future Year Baseline = Baseline Conditions + Committed Development Flows (through local growth factor).

The 2019 traffic data has been used for baseline scenario for worst case assessment as the traffic generation was not affected due to the impacts of Covid.

3.4.4 Traffic Data

Traffic data used in the air quality assessment were provided by the appointed project transport consultant, ITP World. The traffic data used in the air quality dispersion modelling are presented in Appendix C.

The road network and monitoring locations included in the dispersion model is presented in Figure 3.1 and Figure 3.2. Guidance in LAQM TG.22 and professional judgement was used to estimate speeds for use within the assessment, including reduced speeds at junctions.

It is assumed the average vehicle speeds on the local road network in an opening year of 2025 will be broadly the same as the ones in 2019. A 50 m 20 km/hr ‘slow-down’ phase is included on each link at every junction and roundabout within the assessment. All of the roads within the dispersion model are illustrated in Figure A1, Appendix A. Detailed traffic figures are provided in Appendix C.

Figure 3.1: The Roads Included in the Dispersion Modelling Assessment from Development

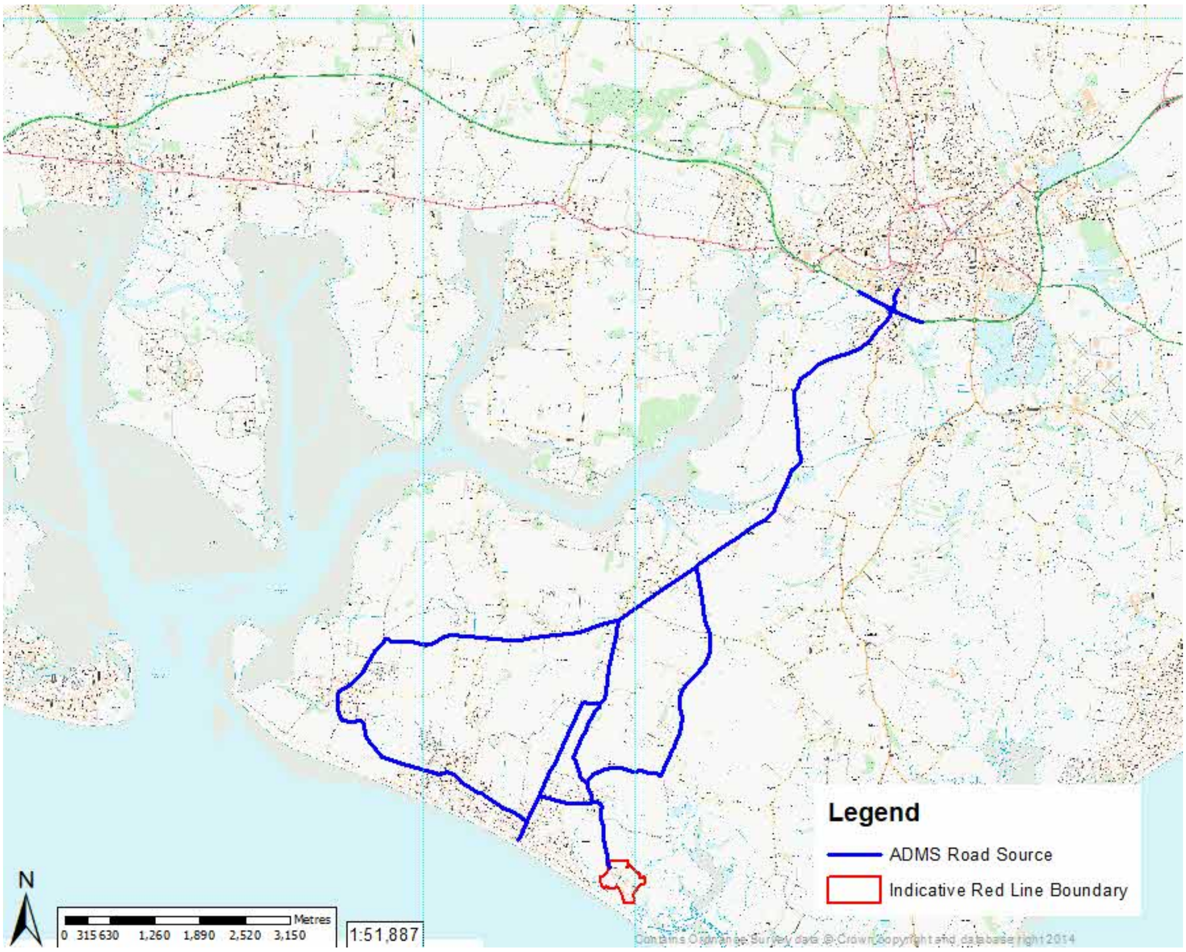
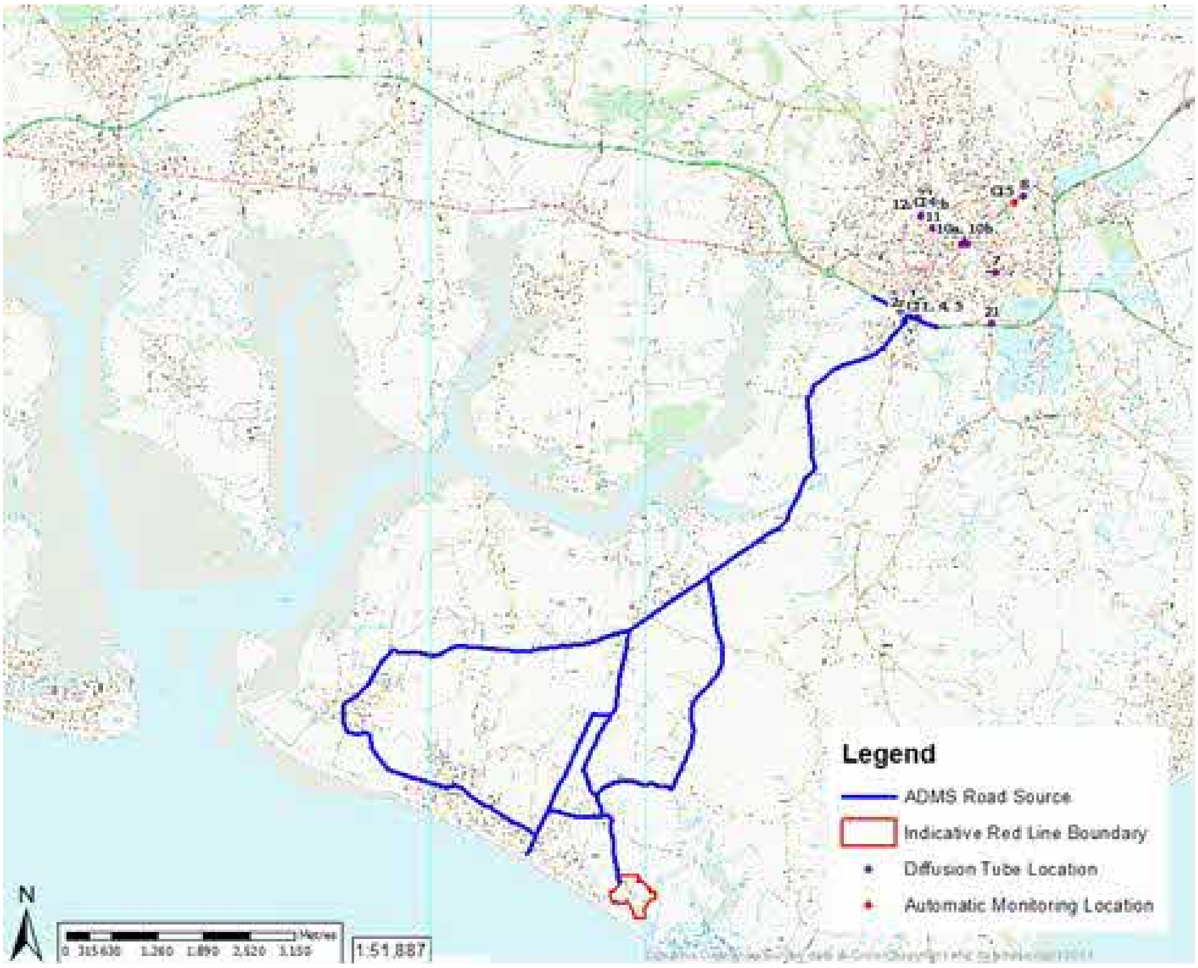


Figure 3.2: The Roads and Monitoring Locations Included in the Dispersion Modelling Assessment for Verification



3.4.5 Traffic Emission Factors

Version 11.0 of the emissions factor toolkit (EFT), published by Defra, was used to derive vehicle emissions factors (i.e. the amount of pollution emitted from the vehicle fleet, in g/km/s) for nitrogen oxide (NO_x), PM_{10} and $PM_{2.5}$. Within the EFT, emission factors are available for 2018 through to 2050 for England (not London), and 2018 to 2030 for Wales, Scotland, Northern Ireland and London.

EFT version 11.0 takes into account the most recent evidence relating to factors such as advances in vehicle and exhaust technology and changes in composition of the vehicle fleet. The emission factors consequently reduce over time. Emission factors for 2019 were used to estimate vehicle emissions for Scenario 1 (S1) modelling scenario and 2025 emission factors were used for Scenario 2 (S2) modelling scenario.

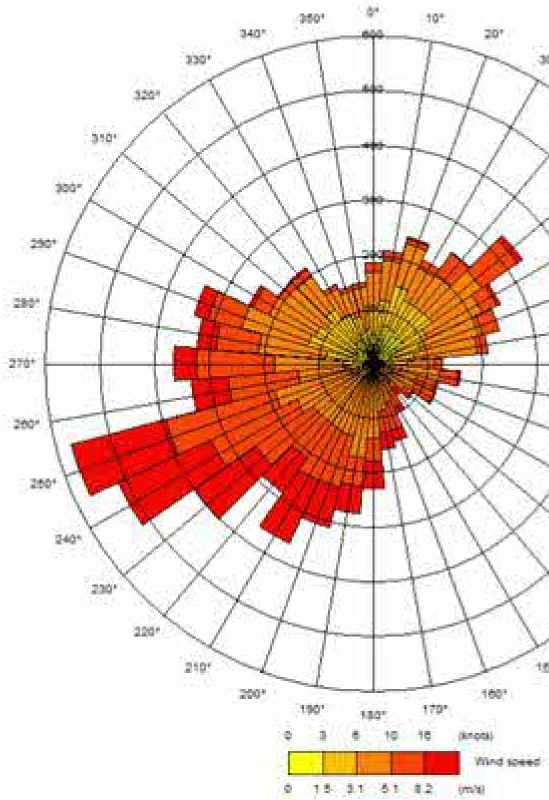
3.4.6 Time-Varying Profile

Vehicle movements vary with time. Diurnal profiles for the roads included within the model were not available and instead the UK National Profile 2019 published by the Department for Transport (DfT) was applied to all of the assessed roads. The diurnal profile is presented in Appendix C. A value of 1 on the y-axis is equivalent to the hourly average flow over 24 hours.

3.4.7 Meteorological Data

2019 hourly sequential meteorological data from the Thorney Island meteorological station was employed in the dispersion model. This meteorological station is located approximately 8.8km to the north-west of the study area and is considered to be representative of the development site condition. The windrose derived from the 2019 dataset is presented in Figure 3.3. The predominant wind direction was from the south-west.

Figure 3.3: Windrose from the Thorney Island Meteorological Station in 2019



3.4.8 Sensitive Receptor Locations

Pollutant concentrations were predicted at a number of human receptors at the proposed site and along the roads included in the study area. A height of 1.5m was used for human receptors to represent the approximate average breathing height of an adult. Details of all specific human receptors included in the modelling study (and hence the air quality impacts assessed) are summarised in Table 3.1. The locations of all assessed receptors are shown in Figure 3.1.

Table 3.1 Diffusion Tubes and Receptors Included in the Dispersion Modelling Assessment

Receptor ID	Receptor Location	Grid Reference		Height (m)
		X	Y	
Diffusion tubes used for verification				
2a, 2b	Kings Ave/SouthbankJct	485772.00	103847.00	3.0
6	Claremont Court	485694.88	103731.45	2.9
1	Cabin	485776.00	103961.00	3.0
Automatic monitoring station used for verification				
CI1	Stockbridge	485881.00	103791.00	3.0
Existing receptors				
R1	Residential Receptor at Drove Lane	481641.50	096890.16	1.5
R2	Residential Receptor at Drove Lane	481632.28	096823.59	1.5
R3	Residential Receptor at Clappers lane	481532.22	096951.07	1.5
R4	Residential Receptor at Bookers Lane	481532.62	097037.32	1.5
R5	Residential Receptor Clappers lane	481063.72	096964.48	1.5
R6	Residential Receptor Bookers Lane	481334.56	097309.18	1.5
R7	Residential Receptor at Almodington	481771.53	097415.02	1.5
R8	Residential Receptor at Almodington	482886.12	098634.78	1.5
R9	Residential at Receptor Sidlesham Ln	483033.12	099853.37	1.5
R10	Residential Receptor at Birdham Rd	485252.44	103290.58	1.5
R11	Residential Receptor at Upton Road	485695.75	103781.91	1.5
R12	Residential Receptor at A27	485600.81	103871.95	1.5
R13	Residential Receptor at Kings avenue	485774.19	103847.15	1.5

Receptor ID	Receptor Location	Grid Reference		Height (m)
R14	Residential Receptor at A27	485865.75	103726.08	1.5
R15	Residential Receptor at B2179	481730.03	099409.66	1.5
R16	Residential Receptor at B2179	479872.12	099224.85	1.5
R17	Residential Receptor at Rookwood	478576.84	099125.36	1.5
R18	Residential Receptor at MIddlefield	477972.34	098411.18	1.5
R19	Residential Receptor at cakeham Rd	478186.62	098081.11	1.5
R20	Residential Receptor at Northern Cr	479614.94	097303.45	1.5
R21	Residential Receptor Bracklesham Ln	480696.75	096888.55	1.5
R22	Residential Receptor Bracklesham Ln	481395.41	098293.76	1.5
R23	Residential Receptor at Birdham road	481641.50	096890.16	1.5
Proposed receptors				
PR1	Proposed receptor Medmerry Holiday Park	481838.16	096091.45	1.5
PR2	Proposed receptor Medmerry Holiday Park	482003.53	096018.69	1.5
PR3	Proposed receptor Medmerry Holiday Park	482199.31	095878.46	1.5
PR4	Proposed receptor Medmerry Holiday Park	482167.81	095743.27	1.5
PR5	Proposed receptor Medmerry Holiday Park	482087.62	095620.66	1.5
PR6	Proposed receptor Medmerry Holiday Park	481982.84	095516.95	1.5
PR7	Proposed receptor Medmerry Holiday Park	481913.00	095715.91	1.5
PR8	Proposed receptor Medmerry Holiday Park	481729.91	095739.73	1.5
PR9	Proposed receptor Medmerry Holiday Park	481698.16	095895.30	1.5
Ecological receptors				
E1	Chichester and Langstone Harbours	477628.00	098329.10	0
E2	Bracklesham Bay	480460.56	096304.53	0
E3	Bracklesham Bay	481947.22	095574.42	0
E4	Bracklesham Bay	481624.41	095590.83	0

3.4.9 Background Air Quality Data Used in the Modelling

Given that there are currently no nearby representative background monitoring locations for NO_2, PM10 and $PM_{2.5}$, background concentrations for NO_2, PM_{10} and $PM_{2.5}$ were obtained from the 2018-based background maps on the Defra LAQM Support website, which provides estimated annual average background concentrations of PM_{10} and $PM_{2.5}$ on a 1 km^2 grid basis. The Defra LAQM background concentration maps assume that background concentrations will improve (i.e. reduce) over time, in line with predicted reduction in vehicle emissions as well as reduction in emissions from other sources. For a conservative approach, Defra background data for 2019 has been used for all modelled scenarios. The background concentrations included in the dispersion modelling assessment are presented in Table 3.2.

Table 3.2 Estimated 2019 Background Concentrations Included in the Assessment

Receptor	*2019 Annual Average (µg/m³)*			*Source*
	NO_2	*PM_{10}*	*$PM_{2.5}$*	
Existing receptors				
R1	8.56	13.15	8.50	NO_2, PM_{10} & $PM_{2.5}$ – 2019 estimated data from Defra 2018 based Background maps
R2	8.56	13.15	8.50	
R3	8.56	13.15	8.50	
R4	8.51	12.81	8.32	
R5	8.56	13.15	8.50	
R6	8.51	12.81	8.32	
R7	8.51	12.81	8.32	
R8	8.20	12.76	8.26	
R9	8.18	12.83	8.27	
R10	12.14	14.67	9.73	
R11	12.14	14.67	9.73	
R12	12.14	14.67	9.73	
R13	12.14	14.67	9.73	
R14	12.14	14.67	9.73	
R15	8.54	13.04	8.41	
R16	8.66	12.99	8.32	
R17	8.79	12.86	8.30	
R18	8.92	11.90	8.08	
R19	9.03	12.46	8.32	
R20	9.59	12.62	8.57	
R21	9.23	12.72	8.67	
R22	8.44	13.01	8.35	
R23	9.25	14.48	9.05	
Proposed receptors				

PR1	8.56	13.15	8.50	NO_2, PM_{10} & $PM_{2.5}$ – 2019 estimated data from Defra 2018 based Background maps
PR2	8.08	13.57	8.39	
PR3	7.95	12.32	8.03	
PR4	7.95	12.32	8.03	
PR5	7.95	12.32	8.03	
PR6	8.19	11.75	7.94	
PR7	8.19	11.75	7.94	
PR8	8.19	11.75	7.94	
PR9	8.19	11.75	7.94	

Table 3.3 Estimated 2019 Background Concentrations Included in the Assessment for Ecological receptors

Receptor	2019 Annual Average (µg/m^3)				Source
	NO_x	NO_2	PM_{10}	$PM_{2.5}$	
E1	10.91	8.92	11.90	8.08	NOx from APIS, NO_2, PM_{10} & $PM_{2.5}$ – 2019 estimated data from Defra 2018 based Background maps
E2	11.25	9.23	12.72	8.67	
E3	10.07	8.19	11.75	7.94	
E4	10.07	8.19	11.75	7.94	

3.4.10 Other Model Input Parameters

In order to represent the nature of the study area and surrounding area, a surface roughness of 0.5 was used in the model. The Minimum Monin-Obukhov length (related to atmospheric stability) was assumed to be 30m (Mixed Urban). Settings were adjusted at the meteorological data site; a surface roughness of 0.5 and a Minimum Monin-Obukhov length of 10m were used.

3.4.11 Model Verification and Results Processing

The ADMS-Roads dispersion model has been widely validated for this type of assessment and is considered to be fit for purpose. Model validation undertaken by the software developer will not have included validation in the vicinity of the study area considered in this assessment. To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process of verification attempts to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results, and was carried out following the methodology specified in LAQM.TG.22.

No NO_2 diffusion tubes or automatic monitoring stations were within close vicinity (within 2km) of the proposed development site. Particulate matter monitoring data is also not available in the vicinity of the proposed site.

There are 20 diffusion tube locations within CDC and four automatic monitoring stations. No monitoring stations are within 2km of the study area, however there are four diffusion tubes located in Stockbridge, approximately 9.0km north of the development, of which, three are classed as roadside monitoring locations.

These locations are near busy roads and a roundabout and therefore can be considered as a ‘worst case’. Therefore, 2019 monitored annual mean NO_2 concentrations from Kings Ave/SouthbankJct, Claremont Court and Stockbridge Road South have been used to verify the predicted road NO_x concentrations.

Full details of the verification calculations are presented within Appendix D.

An adjustment factor of 2.18 was obtained as part of the verification process for NO_2. The adjustment factor was applied to the modelled road-NO_x component before estimation of annual mean NO_2 concentrations using the NO_x: NO_2 calculator (version 8.1) available from the Defra website.

Only one monitoring station is located in the study area that measures concentrations of PM_{10} and $PM_{2.5}$. TG(22) states that care needs to be taken when applying model adjustment based on one monitoring site only as the adjustment may not be representative of other locations. However, upon undertaking verification for PM_{10} using the nearest automatic monitoring station CI1, the adjustment factor was calculated as **1.96** which is less than the adjustment factor for NO_2.

Consequently, the predicted road-PM_{10} and road-$PM_{2.5}$ contributions were adjusted using the factor calculated for road-NOx, before adding the appropriate background concentrations. This approach is consistent with guidance given in LAQM.TG.22.

LAQM TG.22 advises that an exceedance of the 1 hour mean NO_2 objective is unlikely to occur where the annual mean concentration is below 60µg/m^3, where road transport is the main source of pollution. This concentration has been used to screen whether the hourly mean objective is likely to be achieved.

Once processed, the predicted concentrations (full results presented in Section 5) were compared against the current statutory limit values and objectives for NO_2, PM_{10} and $PM_{2.5}$ set out in Table 2.1.

The modelling input parameters for the dispersion modelling assessment are presented in Table 3.3.

Table 3.3 Summary of Inputs to the Dispersion Model

Parameter	Brief description	Input into Model
Emission year	Predicted emission rates depend on the year of emission being used	2019 for S1, 2025 for S2

Road source emissions	Road source emission rates calculated from traffic flow data using an emission factor toolkit from AQC or Defra EFT	EFT V11.0
Time varied emissions	Diurnal variations of emissions applied to road sources	2019 national diurnal profile
Road elevation	Elevation of road above ground level	No elevated roads and no terrain file used (due to relatively flat nature of study area)
Road width	Width of road (m)	Road widths determined based on approximate measurement of roads (internet mapping)
Road type	Selection of different types of road to be assessed, inputted into the emission factor toolkit calculations	'Urban (not London)' & 'Rural (not London)' settings
Road speeds	Speed of the road effects the vehicle emissions to air	Standard speed limits used and professional judgement with slowing at junctions or bends
Meteorology	Representative hourly sequential meteorological data	Thorney Island meteorological station 2019
Latitude	Allows the location of the model area to be determined	50.7^{o}
Surface roughness	This defines the surface roughness of the model area	0.5 m at development and 0.5 at meteorological site
Monin-Obukhov length	A boundary layer parameter required to precisely describe the atmospheric stability conditions and to predict dispersion of pollutants released from road traffic	30m and 10m at the development and meteorological site respectively

3.4.12 Air Quality Impact on Ecological Sites

Air quality impacts associated with the proposed re-development may have the potential to affect receptors of ecological sensitivity within the vicinity of the site. The IAQM guidance on 'Air Quality Impacts on Designated Nature Conservation Sites'

(2020) lists the types of designated nature sites which require air quality assessment, if within 2 km of the proposed development, as follows.

Sites of Special Scientific Interest (SSSIs);
Special Areas of Conservation (SACs);
Special Protection Areas (SPAs);
Ramsar Sites;
Areas of Special Scientific Interest (ASSIs);
National Nature Reserves (NNRs);
Local Nature Reserves (LNRs);
Local Wildlife Sites (LWSs); and,
Areas of Ancient Woodland (AW).

The Conservation of Habitats and Species Regulations (2019) additionally requires competent authorities to review planning applications and consents that have the potential to impact on European designated sites (e.g. Special Protection Areas,'SPA').

A study was undertaken to identify any statutory designated sites of ecological or nature conservation importance within the extents of the dispersion modelling assessment. This was completed using the Multi-Agency Geographic Information for the Countryside (MAGIC) web-based interactive mapping service, which draws together information on key environmental schemes and designations. A search within a 2 km radius of the site boundary identified Bracklesham SSSI, however Chichester and Langstone Harbours SPA has also been considered for a robust assessment as shown in Table 3.4.

Table 3.4: Ecological Sensitive Receptor Locations

Site ID	Site	Designation	UK NGR (m)		Distance from Site (km)	Distance from Nearest Affected Road (m)
			X	Y		
E1	Chichester and Langstone Harbours	SPA	477628.0	98329.1	4.9	N/A
E2	Bracklesham Bay	SSSI	480460.6	96304.5	1.5	N/A
E3	Bracklesham Bay	SSSI	481947.2	95574.4	0.2	N/A
E4	Bracklesham Bay	SSSI	481624.4	95590.8	0.4	N/A

The IAQM Guidance recommends assessment of impacts on ecological receptors which are located within 200 m of the affected road network, however the proposed development is not adding any traffic, therefore there is no 'affected' road network, and impacts on ecological receptors can be 'scoped out'. However, we have presented the NOx concentrations at these receptors for a robust assessment.

3.5 Uncertainties and Assumptions

The following uncertainties and assumptions have been made in the air quality assessment:

In the absence of measured NO_2, PM_{10} and $PM_{2.5}$ at the proposed development location, estimated background data from the Defra LAQM website were used in the assessment. In reality, baseline air quality levels vary with time and location but in the absence of on-site baseline monitoring data, the assumption that the baseline concentrations obtained from the above-mentioned data source is applicable to the site location, is considered appropriate;

Emissions from the average vehicle fleet using the local road network cannot be known, and therefore it is assumed those generated by the EFT provide an accurate representation of emissions generated by vehicles which currently and will use the modelled roads.

There will be uncertainties introduced because the modelling has simplified real-world processes into a series of algorithms. For example, it has been assumed that wind conditions measured at Camborne meteorological station in 2019 were representative of wind conditions at the site. Furthermore, it has been assumed that the subsequent dispersion of emitted pollutants will conform to a Gaussian distribution over flat terrain in order to simplify the real-world dilution and dispersion conditions;

An important step in the assessment is verifying the dispersion model against measured data. The model verification was based on the comparison of model results based on 2019 traffic data with 2019 measured roadside NO_2 diffusion tube data. As no PM_{10} or $PM_{2.5}$ monitoring data were available near the site area, the adjustment factors used for the predicted roadside NO_x concentrations have been applied to the predicted PM_{10} and $PM_{2.5}$ concentrations, as per guidance in LAQM.TG.22.

The national diurnal profile published by the Department for Transport for 2019, has been assumed to be applicable for the roads assessed.

There is an element of uncertainty in all measured and modelled data. All values presented in this report are best possible estimates.

4 BASELINE AIR QUALITY CHARACTERISATION

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources. Baseline air quality data employed in this study have been obtained from monitoring stations s maintained by CDC and from the LAQM Support website operated by the Department for Environment, Food and Rural Affairs (Defra).

4.1 Emissions Sources and Key Air Pollutants

The site is classed as a rural location within the Chichester district. It is bounded predominantly by agricultural land to the east, north and west. Medmerry Park Beach Front is situated to the south of site and the town, Bracklesham Bay, to the west. Therefore, the application site is located in an area where the main source of air pollution is likely to be road traffic emissions. The principal pollutants relevant to this assessment are considered to be NO_2, PM_{10} and $PM_{2.5}$, generally regarded as the most significant air pollutants released by vehicular combustion processes, or subsequently generated by vehicle emissions in the atmosphere through chemical reactions.

4.2 Presence of AQMAs

CDC currently has two declared Air Quality Management Areas (AQMAs), the nearest is the Chichester St Pancras AQMA, which is approximately 10 km north of the proposed development, hence the proposed development site is not located within or near an AQMA.

4.3 Local Authority Air Quality Monitoring Data

According to CDC's 2022 Air Quality Annual Status Report (ASR), there were four automatic monitoring station and a network of 20 NO_2 diffusion tubes in 2021.

No NO_2 diffusion tubes or automatic monitoring stations were within close vicinity (within 2km) of the proposed development site. Particulate matter monitoring data is also not available in the vicinity of the proposed site. Table 4.1 presents the annual average measured NO_2 concentrations at monitoring locations nearest to the proposed development site.

Table 4.2 presents the annual average measured NO_2 and PM_{10} concentrations at monitoring location nearest to the proposed development site.

Table 4.1 Annual Average Measured NO_2 Concentrations at Monitoring Sites nearest to the Proposed Development Site

Site ID	Site Name	Site Type	Approx distance from proposed development (km)	Annual Average NO_2 ($\mu g/m^3$)				
				2017	2018	2019	2020	2021
1	Kings Ave/Southban kJct	Roadside	9.0	29.0	27.0	25.0	20.8	22.9
2a, 2b	Claremont Court	Roadside	8.9	39.0	33.0	33.0	27.2	29.2
3, 4, 5	Cabin	Suburban	8.9	33.0	29.0	28.0	24.4	24.1
6	Stockbridge Road South	Roadside	8.8	36.0	34.0	33.0	27.9	31.6

Table 4.2 Annual Average Measured NO_2 & PM_{10} Concentrations at Automatic Monitoring Sites nearest to the Proposed Development Site

Site ID	Site Name	Site Type	Approx distance from proposed development (km)	Annual Average NO_2 & PM_{10} ($\mu g/m^3$)				
				2017	2018	2019	2020	2021
CI1	Stockbridge	Suburban	8.9	33	29	28	23	24
				19	18	19	18	20

No exceedances of the NO_2, PM_{10} or $PM_{2.5}$ AQSs are monitored at any of the local authority monitoring sites.

4.4 LAQM Background Data

In addition to the local monitoring data, estimated background air quality data available from the Local Air Quality Management (LAQM) website operated by Defra, may also be used to establish likely background air quality conditions at the proposed development site.

This website provides estimated annual average background concentrations of NO_2, PM_{10} and $PM_{2.5}$ on a 1km^2 grid basis. Table 4.3 identifies estimated annual average background concentrations for the grid square containing the proposed development site for the years 2023 to 2025.

No exceedances of the NO_2, PM_{10} or $PM_{2.5}$ AQSs are predicted. As background concentrations are predicted to fall with time, background concentrations in future years would not be expected to exceed their respective AQSs.

Table 4.3: Estimated Background Annual Average NO_2, PM_{10} and $PM_{2.5}$ Concentrations at Proposed Development Site (from 2018 base map)

Assessment Year	Estimated Annual Average Pollutant Concentrations Derived from the LAQM Website (µg/m³)		
	Annual Average NO_2	Annual Average PM_{10}	Annual Average $PM_{2.5}$
2023	7.4	11.0	7.4
2024	7.1	10.9	7.2
2025	6.9	10.7	7.1
Air Quality Objective	**40**	**40**	**20**

Note: Presented concentrations for 1 km² grid centred on 481500, 095500; approximate centre of development site is 481927, 095812.

5 ASSESSMENT OF IMPACTS

5.1 Construction Phase

Atmospheric emissions from construction activities will depend on a combination of the potential for emissions (the type of activity and prevailing conditions) and the effectiveness of control measures. In general terms, there are two sources of emissions that will need to be controlled to minimise the potential for adverse environmental effects:

- Exhaust emissions from site plant, equipment and vehicles; and
- Fugitive dust emissions from site activities.

5.1.1 Exhaust Emissions from Plant and Vehicles

The operation of vehicles and equipment powered by internal combustion engines results in the emission of exhaust gases containing the pollutants NO_x, PM_{10}, volatile organic compounds (VOCs) and carbon monoxide (CO). The quantities emitted depend on factors such as engine type, service history, pattern of usage and fuel composition.

Construction traffic will comprise haulage/construction vehicles and vehicles used for workers' trips to and from the application site. The greatest impact on air quality due to emission from construction phase vehicles will be in areas adjacent to the application site access and nearby road network..

The transport consultants ITP estimate that there will be one two-way HGV movement on average per day, which is considered unlikely to cause a significant impact on local air quality, in accordance with the IAQM guidance.

The operation of site equipment and machinery will result in emissions to atmosphere of exhaust gases, but with suitable controls and site management these emissions are unlikely to be significant (as per LAQM.TG(22)).

5.1.2 Fugitive Dust Emissions

Fugitive dust emissions arising from construction activities are likely to be variable in nature and will depend upon the type and extent of the activity, soil type and moisture content, road surface conditions and weather conditions. Periods of dry weather combined with higher than average wind speeds have the potential to generate more dust.

The construction activities anticipated as part of the proposed development that are often the most significant potential sources of fugitive dust emissions are:

- Earthworks comprising of levelling, construction of foundations, haulage, tipping, stockpiling, landscaping and tree removal;
- Construction of proposed development and hard landscaped areas; and,

Trackout, involving the movement of vehicles over surfaces where muddy materials have been transferred off-site (for example, on to public highways).

Fugitive dust arising from construction and demolition activities is mainly of a particle size greater than the PM_{10} fraction (that which can potentially impact upon human health). However, it is noted that demolition and construction activities may contribute to local PM_{10} concentrations. Appropriate dust control measures can be highly effective for controlling emissions from potentially dust generating activities identified above, and adverse effects can be greatly reduced or eliminated.

See Appendix A for further explanation of the tendency of dust to remain airborne.

5.1.3 Potential Dust Emission Magnitude

With reference to the IAQM guidance criteria outlined in Appendix A, the dust emissions magnitudes for demolition, earthworks, construction and trackout activities are summarised in Tables 5.1, 5.2, 5.3 and 5.4. Risk categories for the four construction activities are summarised in Table 5.4.

'Reasonable worst-case' assumptions have been made, where information is not currently available, for a conservative assessment.

Table 5.1: Summary of Dust Emissions Magnitude of Demolition Activities (Before mitigation)

Demolition Criteria	Dust Emissions Class	Evaluation of the Effects
Total volume of buildings to be demolished	Medium	20,000 – 50,000m^3
On-site crushing and screening	Small	Unlikely to be proposed
The height of demolition above ground	Medium	10-20m
Work Times	Large	Dry season
Overall Rating	**Medium**	Conservative rating based on professional judgement

Table 5.2: Summary of Dust Emissions Magnitude of Earthworks Activities (Before mitigation)

Earthworks Criteria	Dust Emissions Class	Evaluation of the Effects
Total site area	Large	>10,000 m^2
Soil type of the site	Medium	Clayey and silty
Earth moving vehicles at any one time	Medium	5-10 vehicles
Height of bunds	Medium	4-10 m
Total material moved	Small	<20,000 tonnes
Work Times	Large	Dry season
Overall Rating	**Medium**	Conservative rating based on professional judgement

Table 5.3: Summary of Dust Emissions Magnitude of Construction Activities (Before mitigation)

Construction Criteria	Dust Emissions Class	Evaluation of the Effects
Total building volume	Medium	25,000-100,000 m^3
On-site concrete batching or sandblasting proposed	Small	No
Dust potential of construction materials	Medium	Yes
Overall Rating	**Medium**	Conservative rating based on professional judgement

Table 5.4: Summary of Dust Emissions Magnitude of Trackout Activities (Before mitigation)

Trackout Criteria	Dust Emissions Class	Evaluation of the Effects
Number of HDV>3.5t per day	Small	<10
Length of unpaved road	Large	>100m
Overall Rating	**Medium**	Conservative rating based on professional judgement

Table 5.4: Summary of Dust Emission Magnitude of the Site (Before mitigation)

Construction Activities	Dust Emissions Class
Demolition	Medium
Earthworks	Medium
Construction	Medium
Trackout	Medium

5.1.4 Sensitivity of the Area

As per the IAQM Guidance, the sensitivity of the area takes into account a number of factors, including:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and
- Site specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Consideration is given to human and ecological receptors, distances are calculated from the construction site boundary and the trackout route proposed. Where necessary, for example, if the trackout route is not yet known, a conservative view on the likely route has been taken.

Figures 5.1 and 5.2 show maps indicating the earthworks/construction and trackout buffers, respectively, for identifying the sensitivity of the area. Table 5.5 presents the determined sensitivity of the area. Construction activities are relevant up to 350m from the proposed development site boundary whereas trackout activities are only considered relevant up to 50m from the edge of the road, as per the IAQM guidance. Only 20m and 50m buffers have been included for trackout for this reason.

A review of the Defra Magic Maps website (https://magic.defra.gov.uk/MagicMap.aspx), suggests that Bracklesham Bay SSSI is located within 20m of the southern boundary of the site, therefore, potential dust impacts on ecological receptors have been considered in this assessment as per the IAQM 2014 guidance.

Figure 5.5.1: Demolition/Earthworks/Construction Activities Buffer Map

Figure 5.2: Trackout Activities Buffer Map

© OpenStreetMap contributors, available under the Open Database Licence

Table 5.5: Sensitivity of the area

Potential Impact		Sensitivity of the surrounding area			
		Demolition	Earthworks	Construction	Trackout
Dust soiling	Receptor sensitivity	Medium	Medium	Medium	Medium
	Number of receptors	>1	>1	>1	>1
	Distance from the source	<20m	<20m	<20m	<20m
	Sensitivity of the area	**Medium**	**Medium**	**Medium**	**Medium**
Human health	Receptor sensitivity	Medium	Medium	Medium	Medium
	Annual mean PM_{10} concentration	<24µg/m³	<24µg/m³	<24µg/m³	<24µg/m³
	Number of receptors	1-10	1-10	1-10	1-10
	Distance from the source	<20m	<20m	<20m	<20m
	Sensitivity of the area	**Low**	**Low**	**Low**	**Low**
Ecological	Receptor sensitivity*	Medium	Medium	Medium	Medium
	Distance from the source	<20m	<20m	<20m	<20m

Potential Impact		Sensitivity of the surrounding area			
		Demolition	Earthworks	Construction	Trackout
	Sensitivity of the area	Medium	Medium	Medium	Medium
*The development site is located adjacent to Bracklesham Bay SSSI, which considered to have a medium sensitivity to dust deposition.					

5.1.5 Risk of Impacts

The dust emission magnitude is combined with the sensitivity of the area to determine the risk of impacts of construction activities before mitigation; these are evaluated based on risk categories of each activity in Appendix A. The risk of dust impacts from construction activities is identified in Table 5.6.

Site specific mitigation measures to reduce construction phase impacts are defined based on this assessment in Section 6.

Table 5.6: Summary of the Dust Risk from Construction Activities

Potential Impact	Dust Risk Impact			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Medium Risk	Medium Risk	Medium Risk	Low Risk
Human health	Low Risk	Low Risk	Low Risk	Low Risk
Ecological	Medium Risk	Medium Risk	Medium Risk	Low Risk

5.2 Operational Phase

5.2.1 Emissions to Air from Operational Phase

No significant combustion plant such as combined heat and power (CHP) or biomass boilers are proposed as part of the scheme, however boiler plant may be required for heating the swimming pool. No details of this boiler plant were available at the time of writing this report, therefore if significant combustion plant is specified in future, further assessment may be required.

The project transport consultant, ITP World has confirmed that no change in road traffic due to the proposed development is predicted, because the proposed number of holiday bungalows is the same as the existing number of units. Therefore, the change in LDVs and HDVs traffic flow as AADT is expected to be zero.

The operational phase assessment therefore consists of quantitative predictions of the concentrations of NO_2, PM_{10} and $PM_{2.5}$ in the operational phase of the development using ADMS Roads.

5.2.2 Dispersion Modelling Results

Detailed dispersion modelling has been undertaken with the use of the ADMS-Roads dispersion model software, following guidance in LAQM.TG.22. The modelled concentrations have been verified and results processed as detailed in Appendix D.

5.2.2.1 Nitrogen Dioxide (NO_2)

The AQS objective for annual mean NO_2 concentrations is 40µg/m^3. The model predicts that concentrations of NO_2 will meet the annual mean NO_2 objective at all assessment receptors including proposed receptors in the operational year.

Table 5.7 shows a summary of the predicted annual mean NO_2 concentrations in the baseline and future baseline scenarios at the assessed receptor locations.

LAQM.TG.22 notes that 'exceedances of the 1-hour mean objective for NO_2 are only likely to occur where annual mean concentrations are 60µg/m^3 or above'. In the opening year of 2026, annual mean NO_2 concentrations (see Table 5.7) are not predicted to exceed 60µg/m^3 at any receptors. Therefore, it is not anticipated that the hourly mean NO_2 objective would be exceeded at the site prior to or when the proposed development becomes operational.

Table 5.7: Predicted Annual Mean NO_2 Concentrations in Baseline and Future Baseline Scenarios

Receptor ID	Annual Mean NO_2 Concentration	
	S1 Baseline Scenario (2019)	S2 Future Baseline Scenario (2025)
	NO_2 Concentration (µg/m^3)	NO_2 Concentration (µg/m^3)
R1 Residential at Drove Lane	9.0	8.8
R2 Residential at Drove Lane	8.9	8.7
R3 Residential at Clappers lane	9.6	9.1
R4 Residential at Bookers Lane	9.1	8.8
R5 Residential Clappers lane	9.3	8.9
R6 Residential Bookers Lane	9.1	8.8
R7 Residential at Almodington	9.2	8.9
R8 Residential at Almodington	8.9	8.6
R9 Residential at Sidlesham Ln	9.0	8.6
R10 Residential at Birdham Rd	17.0	14.9
R11 Residential at Upton Road	27.2	20.4
R12 Residential at A27	24.4	18.8
R13 Residential at Kings avenue	43.6	29.6
R14 Residential at A27	18.4	15.5
R15 Residential at B2179	9.8	9.2
R16 Residential at B2179	9.7	9.2
R17 Resdiential at Rookwood	10.2	9.5
R18 Residential at MIddlefield	10.4	9.7
R19 Residential at cakeham Rd	9.9	9.5
R20 Residential at Northern Cr	11.2	10.4
R21 Residential Bracklesham Ln	10.7	10.0
R22 Residential Bracklesham Ln	10.7	9.6
R23 Residential at Birdham road	12.7	11.2
PR1 Proposed Receptor	8.7	8.6
PR2 Proposed Receptor	8.1	8.1
PR3 Proposed Receptor	8.0	8.0
PR4 Proposed Receptor	8.0	8.0
PR5 Proposed receptor	8.0	8.0
PR6 Proposed Receptor	8.2	8.2
PR7 Proposed Receptor	8.2	8.2
PR8 Proposed Receptor	8.2	8.2
PR9 Proposed Receptor	8.3	8.2

5.2.2.2 *Particular Matter (PM_{10})*

Table 5.8 shows a summary of the predicted annual mean PM_{10} concentrations in the baseline and future baseline scenarios at the assessed receptor locations.

Predicted annual mean concentrations of PM_{10} are all below the objective of 40µg/m^3 for all modelled scenarios.

The proposed development is not predicted to cause any exceedances of the annual mean PM_{10} objective.

LAQM TG.22 indicates that the number of annual exceedances of the 24-hour mean PM_{10} AQS can be estimated using the following formula: *-18.5 + 0.00145 × annual mean*^{3} *+ (206/annual mean).* Table 5.10 presents results for the 24-hour mean PM_{10} concentrations as number of day greater than 50µg/m^3 for S2. The objective for 24-hour mean PM_{10} concentrations is 50µg/m^3 to be exceeded no more than 35 times a year. The number of days exceeding 50µg/m^3 predicted is a maximum of 2 days/annum, which is well below the objective.

The results indicate that in the opening year of 2025, no exceedances of annual mean PM_{10} concentrations are predicted at any of the existing and proposed receptors.

Table 5.8: Predicted Annual Mean PM_{10} Concentrations in Baseline and Future Baseline Scenarios

Receptor ID	Annual Mean PM_{10} Concentration	
	S1 Baseline Scenario (2019)	S2 Future Baseline Scenario (2025)
	PM_{10} Concentration (µg/m^3)	PM_{10}Concentration (µg/m^3)
R1 Residential at Drove Lane	13.2	13.2
R2 Residential at Drove Lane	13.2	13.2
R3 Residential at Clappers lane	13.3	13.3
R4 Residential at Bookers Lane	12.9	12.9
R5 Residential Clappers lane	13.3	13.3
R6 Residential Bookers Lane	12.9	12.9
R7 Residential at Almodington	12.9	12.9
R8 Residential at Almodington	12.9	12.9
R9 Residential at Sidlesham Ln	13.0	13.0
R10 Residential at Birdham Rd	15.7	15.7
R11 Residential at Upton Road	16.9	16.8
R12 Residential at A27	16.7	16.6
R13 Residential at Kings avenue	19.5	19.3
R14 Residential at A27	15.7	15.6
R15 Residential at B2179	13.3	13.3
R16 Residential at B2179	13.2	13.2
R17 Resdiential at Rookwood	13.1	13.1
R18 Residential at MIddlefield	12.2	12.2
R19 Residential at cakeham Rd	12.6	12.6
R20 Residential at Northern Cr	12.9	12.9
R21 Residential Bracklesham Ln	13.0	12.9
R22 Residential Bracklesham Ln	13.3	13.3
R23 Residential at Birdham road	15.2	15.2
PR1 Proposed Receptor	13.2	13.2
PR2 Proposed Receptor	13.6	13.6
PR3 Proposed Receptor	12.3	12.3
PR4 Proposed Receptor	12.3	12.3
PR5 Proposed receptor	12.3	12.3
PR6 Proposed Receptor	11.8	11.8
PR7 Proposed Receptor	11.8	11.8
PR8 Proposed Receptor	11.8	11.8
PR9 Proposed Receptor	11.8	11.8

Table 5.9: Predicted Exceedances of Annual Mean PM_{10} Concentrations in Baseline and Future Baseline Scenarios

Receptor ID	24-Hour Mean PM_{10}* (number of days >50µg/m^3)	
	S1 Baseline Scenario (2019)	S2 Future Baseline Scenario (2025)
R1 Residential at Drove Lane	0	0
R2 Residential at Drove Lane	0	0
R3 Residential at Clappers lane	0	0
R4 Residential at Bookers Lane	1	1
R5 Residential Clappers lane	0	0
R6 Residential Bookers Lane	1	1
R7 Residential at Almodington	1	1
R8 Residential at Almodington	1	1
R9 Residential at Sidlesham Ln	1	1
R10 Residential at Birdham Rd	0	0
R11 Residential at Upton Road	1	1
R12 Residential at A27	1	0
R13 Residential at Kings avenue	2	2
R14 Residential at A27	0	0
R15 Residential at B2179	0	0
R16 Residential at B2179	0	0
R17 Resdiential at Rookwood	0	0
R18 Residential at MIddlefield	1	1
R19 Residential at cakeham Rd	1	1
R20 Residential at Northern Cr	1	1
R21 Residential Bracklesham Ln	1	1
R22 Residential Bracklesham Ln	0	0
R23 Residential at Birdham road	0	0
PR1 Proposed Receptor	0	0
PR2 Proposed Receptor	0	0
PR3 Proposed Receptor	1	1
PR4 Proposed Receptor	1	1
PR5 Proposed receptor	1	1
PR6 Proposed Receptor	1	1
PR7 Proposed Receptor	1	1
PR8 Proposed Receptor	1	1
PR9 Proposed Receptor	1	1

5.2.2.3 Particular Matter ($PM_{2.5}$)

Table 5.10 shows the summary of the predicted annual mean $PM_{2.5}$ concentrations in the baseline and future baseline scenarios at the assessed receptor locations.

Predicted annual mean concentrations of $PM_{2.5}$ are all below the AQS objective of 20µg/m^3 for all modelled scenarios. A marginal exceedance of the 2028 interim target for $PM_{2.5}$ is predicted in 2025 at one existing receptor, R13, however this is not related to the proposed development. However, this is conservative assessment and assumes 2019 background concentration, but if we consider 2025 background concentration, then the R13 is also expected to meet the interim target for $PM_{2.5}$.

Table 5.10: Predicted Annual Mean $PM_{2,5}$ Concentrations in Baseline and Future Baseline Scenarios

Receptor ID	Annual Mean $PM_{2.5}$ Concentration	
	S1 Baseline Scenario (2019)	S2 Future Baseline Scenario (2025)
	$PM_{2.5}$ Concentration (µg/m^3)	$PM_{2.5}$ Concentration (µg/m^3)
R1 Residential at Drove Lane	8.5	8.5
R2 Residential at Drove Lane	8.5	8.5
R3 Residential at Clappers lane	8.6	8.6
R4 Residential at Bookers Lane	8.4	8.4
R5 Residential Clappers lane	8.6	8.6
R6 Residential Bookers Lane	8.4	8.4
R7 Residential at Almodington	8.4	8.4
R8 Residential at Almodington	8.3	8.3
R9 Residential at Sidlesham Ln	8.4	8.3
R10 Residential at Birdham Rd	10.3	10.3
R11 Residential at Upton Road	11.1	11.0
R12 Residential at A27	10.9	10.8
R13 Residential at Kings avenue	12.6	12.4
R14 Residential at A27	10.3	10.3
R15 Residential at B2179	8.6	8.6
R16 Residential at B2179	8.5	8.4
R17 Resdiential at Rookwood	8.5	8.4
R18 Residential at MIddlefield	8.2	8.2
R19 Residential at cakeham Rd	8.4	8.4
R20 Residential at Northern Cr	8.7	8.7
R21 Residential Bracklesham Ln	8.8	8.8
R22 Residential Bracklesham Ln	8.6	8.5
R23 Residential at Birdham road	9.5	9.4
PR1 Proposed Receptor	8.5	8.5
PR2 Proposed Receptor	8.4	8.4
PR3 Proposed Receptor	8.0	8.0
PR4 Proposed Receptor	8.0	8.0
PR5 Proposed receptor	8.0	8.0
PR6 Proposed Receptor	7.9	7.9
PR7 Proposed Receptor	7.9	7.9
PR8 Proposed Receptor	7.9	7.9
PR9 Proposed Receptor	7.9	7.9

5.2.3 Ecological Receptors – Dispersion Modelling Results

5.2.3.1 Nitrogen Oxide

Table 5.11 presents a summary of the predicted NO_X concentrations at relevant receptor locations under the baseline and future baseline scenarios.

Background concentrations at each of the ecologically sensitive sites were determined obtained from the APIS website.

Table 5.11: Predicted Annual Average Concentrations of NO_X at Ecological Receptor Locations

Ecological Receptor		Predicted Maximum Annual Mean Concentration (µg/m³)		
		S1 Baseline Scenario (2019)	S2 Future Baseline Scenario (2025)	Background
E1	Chichester and Langstone Harbours	11.0	11.0	10.9
E2	Bracklesham Bay	11.6	11.4	11.3
E3	Bracklesham Bay	10.2	10.1	10.1
E4	Bracklesham Bay	10.2	10.1	10.1
Annual Mean AQO/Critical Level (CL)		**30 µg/m³**		

As indicated in Table 5.11, the maximum predicted exposure to NO_X at any ecological receptor during the operation of the proposed development, is 11.4 µg/m³ at Bracklesham Bay (SSSI) (E2) which is well below the objective/ critical level of 30 µg/m³.

5.2.4 Summary

The 2025 assessment of the potential air quality impacts at the existing receptors and proposed development, has determined that the maximum predicted annual average exposure to NO_2 at any existing receptor is at R13 (residential receptor at King's avenue) proposed receptor at the ground floor is 29.6 µg/m³.

The proposed holiday bungalows are predicted to experience concentrations well below the annual average Objective for NO_2.

The predicted long-term NO_2 concentrations at all proposed receptors are well below 60 µg/m³ in all scenarios, therefore, it is unlikely there will be any exceedances for the short-term NO_2 Objective, as outlined in LAQM TG(22) technical guidance.

There are no predicted exceedances of the NO_2, PM_{10} or $PM_{2.5}$ Objectives at any proposed receptors/holiday bungalows, therefore the site is suitable for the proposed use and no further mitigation to that proposed in the road transport assessment/ report is required.

The maximum predicted annual mean NO_X concentration at any ecological receptor during the operation of the proposed development, is 11.4 µg/m^3 at Bracklesham Bay (SSSI) (E2) which is well below the objective/ critical level.

6 MITIGATION MEASURES

6.1 Construction Phase Mitigation

The dust emitting activities outlined in Section 5.1 can be effectively controlled by appropriate dust control measures and any adverse effects can be greatly reduced or eliminated.

It is recommended that a dust management plan (DMP, which may be as part of a Construction Environmental Management Plan (CEMP)) for the construction phase should be prepared and agreed with the Local Authority to ensure that the potential for adverse environmental effects on local receptors is minimised. The DMP should include *inter alia* measures for controlling dust and general pollution from site construction operations and include details of any monitoring scheme, if appropriate. Controls should be applied throughout the construction period to ensure that emissions are mitigated.

The dust risk categories identified have been used to recommend appropriate mitigation methods, as listed below.

The road traffic effects of the proposed development during the construction phase will be limited to a relatively short period and will be along traffic routes employed by haulage/construction vehicles and workers. Any effects on air quality will be temporary i.e. during the construction and demolition period only.

Mitigation measures recommended in the IAQM construction dust guidance are divided into 'general measures', applicable to all sites and measures specific to earthworks, construction and trackout. Depending on the level of risk assigned to each site, different mitigation is recommended.

For those mitigation measures that are general, the highest risk assessed has been applied. In this case, the '**medium risk**' site mitigation measures have been applied, as determined by the dust risk assessment in Section 4. Two categories of mitigation measure are described in the IAQM construction dust guidance – 'highly recommended' and 'desirable', which are indicated according to the dust risk level identified in **Error! Reference source not found.**1. Desirable measures are presented in *italics*.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commence on site.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary.
- Display the head or regional office contact information.

Dust Management

Develop a Dust/Air Quality Management Plan (this document).

Site Management

Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.

Make the complaints log available to the local authority when asked.

Record any exceptional incidents that cause dust and/or air emissions, either on or off the site, and the action taken to resolve the situation in the log book.

Monitoring

Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.

Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.

Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences.

Preparing and Maintaining the Site

Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.

Erect solid screens or barriers around dusty activities or site boundary that are at least as high as any stockpiles on site.

Fully enclosure site or specific operations where there is a high potential for dust production and the site is active for an extensive period.

Avoid site runoff of water or mud.

Keep site fencing, barriers and scaffolding clean using wet methods.

Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.

Cover, seed or fence stockpiles to prevent wind whipping.

Operating vehicle/machinery and sustainable travel

Ensure all vehicle switch off engines when stationary – no idling vehicles.

Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.

Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul routes and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).

Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

Operations

Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.

Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-portable water where possible and appropriate.

Use enclosed chutes, conveyors and covered skips.

Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste management

Avoid bonfires and burning of waste materials.

Specific to Demolition

Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).

Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.

Avoid explosive blasting, using appropriate manual or mechanical alternatives.

Bag and remove any biological debris or damp down such material before demolition.

Specific to Earthworks

Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.

Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.

Only remove the cover in small areas during work and not all at once.

Specific to Construction

Avoid scabbling (roughening of concrete surfaces) if possible.

Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.

For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriate to prevent dust.

Specific to Trackout

Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.

Avoid dry sweeping of large areas.

Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.

Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.

Record all inspections of haul routes and any subsequent action in a site log book.

Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.

Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.

Access gates to be located at least 10m from receptors where possible.

6.2 Operational Phase Mitigation

All modelled existing and proposed residential receptors are predicted to be below the annual average Air Quality Objectives for NO_2, PM_{10} and $PM_{2.5}$ during the operational year. Therefore, no further mitigation to that proposed in the road transport report/ assessment is required for the proposed development.

However best practice measures could be used to further minimise the effects of the development on local air quality where feasible. Such measures could include:

- The preparation of a travel plan to encourage employees to use sustainable transport (public, cycling and walking); and
- Provision of electric vehicle charge points;

7 CONCLUSIONS

An air quality assessment for the proposed redevelopment of Medmerry Holiday Park has been prepared with reference to existing air quality in the area and relevant air quality legislation, policy and guidance.

Construction Phase

Without mitigation, the impact of dust emissions associated with the construction phase could present a 'medium risk' at the worst affected receptors without mitigation.

However, appropriate mitigation measures are proposed based on the IAQM Guidance on the Assessment of Dust from Demolition, Earthworks, Construction and Trackout.

It is anticipated that with these appropriate mitigation measures in place, the risk of adverse effects due to dust emissions from the construction phase will not be significant.

Operational Assessment

The redevelopment will retain the existing number of holiday bungalows, therefore the traffic consultants predict that there will be no change in vehicle movements as a result of the Proposed Development.

However, the potential for exhaust emissions to affect air quality at the proposed holiday bungalows and receptors was assessed using dispersion modelling. The model predicts that in operational year 2025, the maximum predicted annual average concentration of NO_2 at any existing or proposed receptor will be 29.63 µg/m^3, at R13 (residential receptor at King's avenue). All modelled proposed residential receptors are predicted to be well below the annual average Objective for NO_2.

The predicted long-term NO_2 concentrations at all existing and proposed receptors are well below 60 µg/m^3 in all scenarios, therefore, it is unlikely there will be any exceedances for the short-term NO_2 Objective, as outlined in LAQM TG(22) technical guidance.

There are no predicted exceedances of the NO_2, PM_{10} or $PM_{2.5}$ Objectives at any proposed or existing sensitive receptors, except a marginal exceedance of the 2028 interim target for $PM_{2.5}$ is predicted in 2025 at one existing receptor. This is related to existing road traffic levels and is not related to the proposed development.

The redevelopment will not lead to exposure to poor air quality and no further mitigation to that proposed in the road transport assessment is required for the proposed development.

The maximum predicted exposure to NO_X at any ecological receptor during the operation of the proposed development, is 11.4 µg/m^3 as an annual mean at Bracklesham Bay (SSSI) (E2) which is well below the objective of 30 µg/m^3. No exceedance of NO_X Air Quality Objective/ Critical Level is predicted at any ecological receptor during operational phase of the proposed development.

In conclusion, the development is not considered to be contrary to any of the national or local planning policies regarding air quality.

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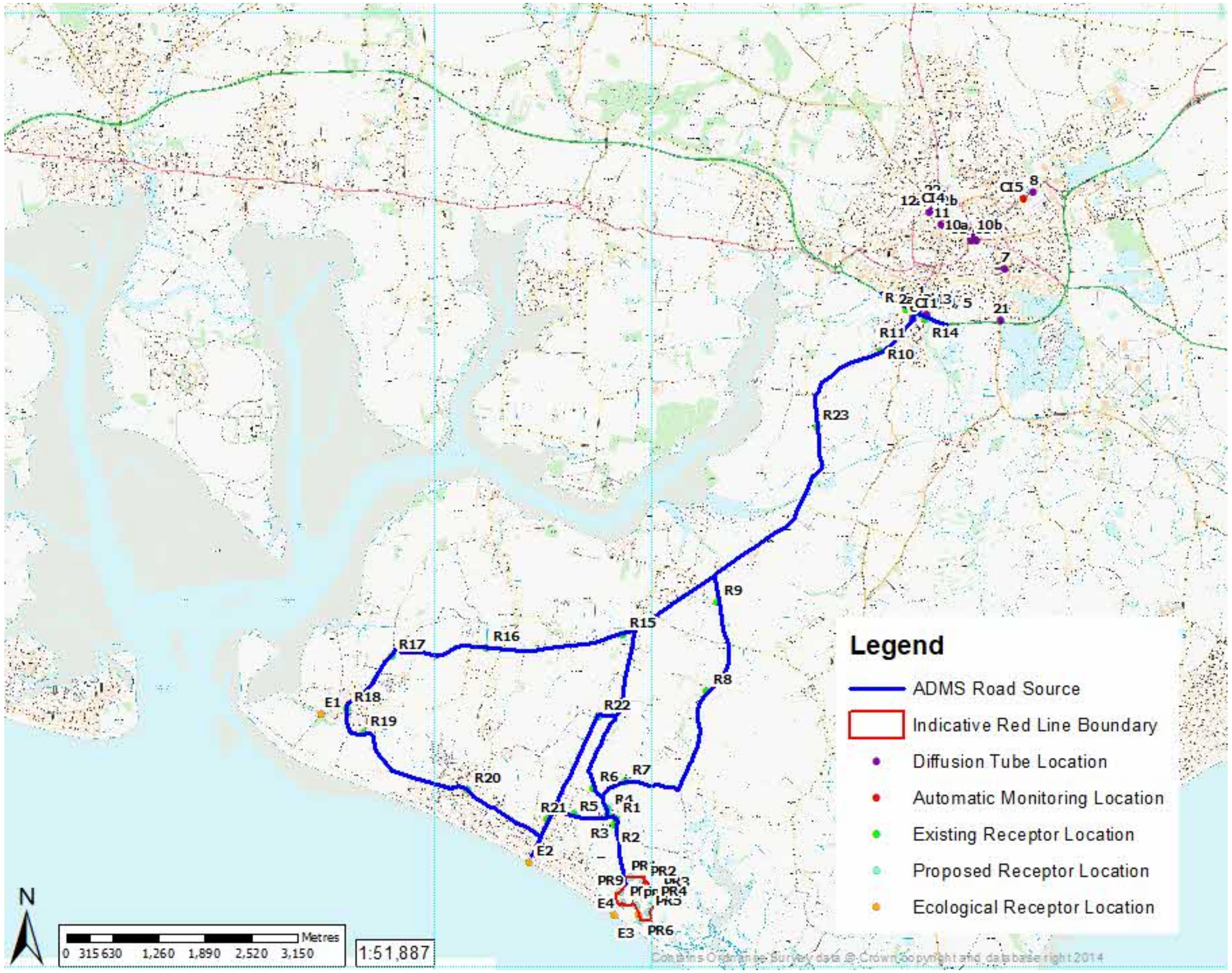
APPENDIX A ASSESSMENT AREA

Figure A-1: Assessment Area



APPENDIX B CONSTRUCTION DUST ASSESSMENT METHODOLOGY

This appendix contains the construction dust assessment methodology used in the assessment.

To assess the potential impacts, construction activities are divided into demolition, earthworks, construction and trackout. The descriptors included in this section are based upon the IAQM construction dust guidance. The assessment follows the steps recommended in the guidance.

<u>Step 1</u>: Screen the requirement for assessment

The first step is to screen out the requirement for a construction dust assessment, this is usually a somewhat conservative level of screening. An assessment is usually required where there is:

a 'human receptor' within:

- 350m of the boundary of the site; or
- 50m of the route used by construction vehicles on the public highway, up to 500m from the site entrance(s).

an 'ecological receptor':

- 50m of the boundary of the site; or
- 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

<u>Step 2A</u>: Defining the Potential Dust Emission Magnitude

Demolition

The dust emission magnitude category for demolition is varied for each site in terms of timing, building type, duration and scale. Examples of the potential dust emission classes are provided in the guidance as follows:

Large: Total building volume >50,000m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20m above ground level;

Medium: Total building volume 20,000m^3 – 50,000m^3, potentially dusty construction material, demolition activities 10m – 20m above ground level; and

Small: Total building volume <20,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

Earthworks

The dust emission magnitude category for earthworks is varied for each site in terms of timing, geology, topography and duration. Examples of the potential dust emission classes are provided in the guidance as follows:

Large: Total site area >10,000m^2, potentially dusty soil type (e.g. clay), >10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100,000 tonnes;

Medium: Total site area 2,500 – 10,000m^2, moderately dusty soil type (e.g. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8m in height, total material moved 20,000 – 100,000 tonnes; and

Small: Total site area < 2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <10,000 tonnes, earthworks during wetter months.

Construction

The dust emission magnitude category for construction is varied for each site in terms of timing, building type, duration, and scale. Examples of the potential dust emissions classes are provided in the guidance as follows:

Large: Total building volume >100,000m^3, on site concrete batching, sandblasting;

Medium: Total building volume 25,000 – 100,000m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and

Small: Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

Factors which determine the dust emission magnitude class of trackout activities are vehicle size, vehicle speed, vehicle number, geology and duration. Examples of the potential dust emissions classes are provided in the guidance as follows:

Large: >50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;

Medium: 10 – 50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 – 100m; and

Small: <10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

<u>Step 2B</u>: Defining the Sensitivity of the Area

The sensitivity of the area is defined for dust soiling, human health and ecosystems. The sensitivity of the area takes into account the following factors:

The specific sensitivities of receptors in the area;

The proximity and number of those receptors;

In the case of PM_{10}, the local background concentration; and

Site-specific factors, such as whether here are natural shelters such as trees, to reduce the risk of wind-blown dust.

Table A1 has been used to define the sensitivity of different types of receptors to dust soiling, health effects and ecological effects.

Table A1: Sensitivity of the Area Surrounding the Site

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
High	Users can reasonably expect enjoyment of a high level of amenity. The appearance, aesthetics or value of their property would be diminished by soiling. The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.	Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day) Examples include residential properties, hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	Locations with an international or national designation *and* the designated features may be affected by dust soiling. Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain. Examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home. The appearance, aesthetics or value of their property could be diminished by soiling. The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Examples include parks and places of work.	Locations where the people exposed are workers and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown. Locations with a national designation where the features may be affected by dust deposition. Example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	The enjoyment of amenity would not reasonably be expected. Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling. There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.	Locations where human exposure is transient. Indicative examples include public footpaths, playing fields, parks and shopping streets.	Locations with a local designation where the features may be affected by dust deposition. Example is a local Nature Reserve with dust sensitive features.

Based on the sensitivities assigned of the different types of receptors surrounding the site and numbers of receptors within certain distances of the site, a sensitivity classification for the area can be defined for each. **Tables A2** to **A4** indicate the method used to determine the sensitivity of the area for dust soiling, human health and ecological impacts, respectively.

For trackout, as per the IAQM construction dust guidance, it is only considered necessary to consider trackout impacts up to 50m from the edge of the road.

Table A2: Sensitivity of the area to dust soiling effects on people and property

Receptor Sensitivity	Number of Receptors	Distances 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 A3: Sensitivity of the area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Conc.	Number of Receptors	Distances from the Source (m)				
			<20	<50	<100	<200	<350
High	>32μg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32μg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28μg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 μg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32μg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32μg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28μg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 μg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table A4: Sensitivity of the area to Ecological Impacts

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

<u>Step 2C</u>: Defining the Risk of Impacts

The final step is to use both the dust emission magnitude classification with the sensitivity of the area, to determine a potential risk of impacts for each construction activity, before the application of mitigation. **Tables A5** to **A7** indicate the method used to assign the level of risk for each construction activity.

Table A5: Risk of Dust Impacts from Demolition

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 A6: Risk of Dust Impacts from Earthworks/Construction

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

Table A7: Risk of Dust Impacts from Trackout

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

APPENDIX C
ROAD TRAFFIC DATA

This appendix contains the traffic data used in the dispersion modelling assessment. The data was provided by the project transport consultants including traffic flow data in AADT and the percentage Heavy Duty Vehicles (HDV), the speed included for each road link and the diurnal profile used. Reduced speeds were used at junctions, roundabout, roads with traffic light and pedestrian lane.

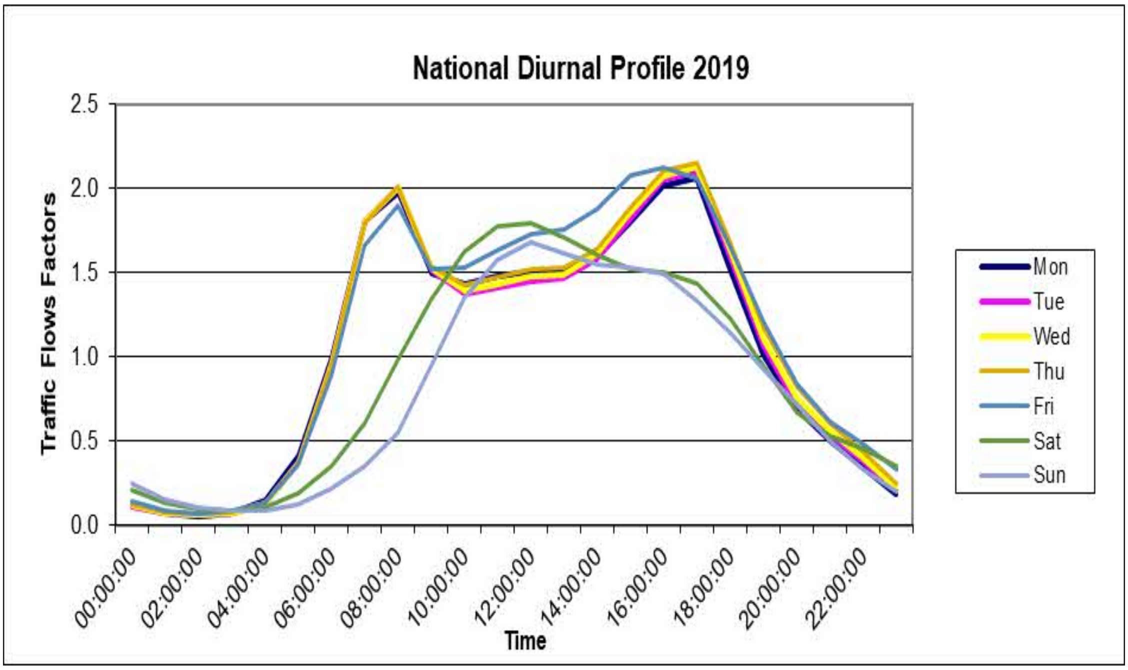
Table C1 24-hour Traffic Flow (AADT) and Speed Data used in the Dispersion Modelling Assessment

Figure C1 Diurnal Profile Included in the Dispersion Modelling Assessment

Table C1: 24-hour Traffic Flow (AADT) and Speed Data used in the Dispersion Modelling Assessment

Ref	Road Link	Average Speed (kph)	(S1) 2019 Base year		(S2) 2025 Without Development	
			Total AADT	HDV%	Total AADT	HDV%
1	Drove Lane	24	417	10.00	438	10.00
2	Clapper lane	48	1,500	10.00	1,575	10.00
3	Bookers Lane	48	1,500	10.00	1,575	10.00
4	Almodington	48	1,500	10.00	1,575	10.00
5	Stockbridge road 78145	64	16,472	2.11	17,296	2.11
6	Birdham A286 26880	64	14,840	2.12	15,582	2.12
7	Bell lane	48	6,000	10.00	6,300	10.00
8	B2179 Rookwood Rd	64	3,400	10.00	3,570	10.00
9	B2179 Cakeham Rd	64	3,400	10.00	3,570	10.00
10	Chichester bypass westbound	110	49,166	5.23	51,624	5.23
11	Chichester bypass eastbound	110	46,022	5.62	48,323	5.62
12	Stockbridge road above round about	48	11,699	1.47	12,284	1.47
13	Drove Lane	24	417	10.00	438	10.00

Figure C1 Diurnal Profile Included in the Dispersion Modelling Assessment



APPENDIX D
MODELLING OF OPERATIONAL PHASE – VERIFICATION METHODOLOGY

The dispersion model results were verified following the relevant guidance in LAQM TG.22. Predicted results from a dispersion model may differ from measured concentrations for a variety of reasons, these are identified in LAQM TG.22 to include:

- Estimates of background concentrations;
- Meteorological data uncertainties;
- Uncertainties in source data for example, traffic flow data, stack emissions and emission factors;
- Model input parameters such as roughness length, minimum Monin-Obukhov and overall model limitations; and,
- Uncertainties associated with monitoring data, including locations.

The diffusion tubes 1, 2a,2b and 6 were used for the dispersion model verification against traffic data. Tables C1, C2, C3 and C4 present details of the monitoring location used and the dispersion model verification process.

Table C1: Monitoring Location used in NO_x- NO_2 Verification Process

Site ID	Receptor Location	Site Type	Grid Reference		Height (m)
			X	Y	
2a, 2b	Kings Ave/SouthbankJct	Roadside	485772	103847	3
6	Claremont Court	Roadside	485695	103731	2.5
1	Cabin	Roadside	485776	103961	3

Table C2: Monitoring Location used in PM_{10} Verification Process

Site ID	Receptor Location	Site Type	Grid Reference		Height (m)
			X	Y	
CI1	Stockbridge	Sub urban Background	485881	103791	3

Table C3: Modelled versus Monitored NO_x/NO_2

Site	Monitored total NO_2	Background NO_2	Monitored Road Contribution NO_x	Modelled road contribution NO_x	Ratio of Modelled and Measured Road NO_x
2a, 2b	33.00	12.14	41.33	23.83	1.73

Site	Monitored total NO_2	Background NO_2	Monitored Road Contribution NO_x	Modelled road contribution NO_x	Ratio of Modelled and Measured Road NO_x
6	33.00	12.14	41.33	11.76	3.51
1	25.00	12.14	24.58	6.36	3.86
Overall Adjustment Factor					**2.18**

An adjustment factor of **2.18** was obtained during the verification process and applied to the modelled road-NO_x component predicted at each receptor. The verified annual mean modelled road contribution NO_x concentrations have then been converted into annual mean road NO_2 by using the Defra NO_x to NO_2 spreadsheet; a comparison of monitored and model adjusted NO_2 is presented in Table C4. This shows that, following adjustment, the modelled NO_2 result is within +/- 25% of monitored NO_2 concentrations. In accordance with the LAQM TG.22 guidance, it is not considered that further verification is required.

Table C4: Modelled versus Monitored NO_2 Concentrations

Site	Background NO_2	Monitored Total NO_2	Modelled total NO_2 (after adjustment)	% Difference [(modelled - monitored)/monitored] x100
2a, 2b	12.14	33.00	**38.30**	16.06%
6	12.14	33.00	**25.76**	-21.93%
1	12.14	25.00	**19.69**	-21.26%

It should be noted that TG(22) states that in the absence of any Particulate Matter (PM_{10} and $PM_{2.5}$) monitoring data for verification, it may be appropriate to apply the NO_X-NO_2 adjustment factor to the modelled Particulate Matter.

TG(22) also states that care needs to be taken when applying model adjustment based on one monitoring site only as the adjustment may not be representative of other locations. However, upon undertaking verification for PM_{10} using the nearest automatic monitoring station CI1, the adjustment factor was calculated as **1.96** as shown in Table C5 which is less than the adjustment factor for NO_2.

Table C5: Modelled versus Monitored PM_{10}

Site	Monitored total PM_{10}	Modelled total PM_{10} after adjustment	Difference %
2a, 2b	19	19	0
Adjustment Factor			1.96

As such, the NO_2 adjustment factor has also been applied to the PM_{10} and $PM_{2.5}$ modelled results, in accordance with LAQM.TG(22) for robust assessment.