

Land off St Georges Avenue, Havant, PO9 2RX



Air Quality Assessment

784-B030031

8th July 2021

PRESENTED TO

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EXECUTIVE SUMMARY

This report presents the findings of an air quality assessment undertaken to assess road traffic emissions in support a planning application for the construction of a new residential development, at the Land off St Georges Avenue, Havant, PO9 2RX.

Construction Phase

The potential effects during the demolition and construction phases include fugitive dust emissions from site activities, such as earthworks, construction and trackout. The impacts during the operational phase take into account exhaust emissions from additional road traffic generated due to the proposed development.

During the construction phase, site specific mitigation measures detailed within this assessment will be implemented. With these mitigation measures in place, the effects from the construction phase are not predicted to be significant.

Operational Phase

Detailed dispersion modelling of traffic pollutants has been undertaken for the proposed development. An operational year assessment for 2023 traffic emissions has been undertaken to assess the effects of the Proposed Development. The impacts during the operational phase take into account exhaust emissions from additional road traffic generated due to the proposed development.

2023 “Do Something” Scenario 1 ‘Without Mitigation’ which reflects the existing road layout

The long-term (annual) assessment of the effects associated with the proposed development with respect to Nitrogen Dioxide (NO₂) is determined to be ‘negligible’. With respect to PM₁₀ and PM_{2.5} exposure, the effect is determined to be ‘negligible’ at all identified existing sensitive receptor locations.

All proposed receptor locations are expected to be exposed to air quality below the Air Quality Objectives for NO₂, PM₁₀ and PM_{2.5}. No mitigation is required to protect future occupants.

2023 “Do Something” Scenario 2 ‘With Mitigation’ which redistributes right-turners at the Castle Avenue / Emsworth Road junction

The long-term (annual) assessment of the effects associated with the proposed development with respect to Nitrogen Dioxide (NO₂) is determined to be ‘negligible’. With respect to PM₁₀ and PM_{2.5} exposure, the effect is determined to be ‘negligible’ at all identified existing sensitive receptor locations.

All proposed receptor locations are expected to be exposed to air quality below the Air Quality Objectives for NO₂, PM₁₀ and PM_{2.5}. No mitigation is required to protect future occupants.

TABLE OF CONTENTS

1.0 INTRODUCTION	8
1.1 Site Location	8
1.2 Context	8
1.3 Report Structure	9
2.0 POLICY AND LEGISLATIVE CONTEXT	10
2.1 Documents Consulted	10
2.2 Air Quality Legislative Framework	11
2.3 Planning And Policy Guidance	13
3.0 ASSESSMENT METHODOLOGY	17
3.1 Determining Impact Description Of The Air Quality Effects	17
4.0 BASELINE CONDITIONS	19
4.1 Air Quality Review	19
4.2 Meteorology	21
4.3 Emission Sources	22
4.4 Sensitive Receptors	22
4.5 Ecological Receptors	23
5.0 ASSESSMENT OF AIR QUALITY IMPACTS - CONSTRUCTION PHASE	26
5.1 Pollutant Sources	26
5.2 Particulate Matter (PM ₁₀)	26
5.3 Dust	26
5.4 Methodology	27
5.5 Assessment Results	27
6.0 ASSESSMENT OF AIR QUALITY IMPACTS - OPERATIONAL PHASE	29
6.1 Existing And Predicted Traffic Flows	29
6.2 Background Concentrations	31
6.3 Model Verification	35
6.4 ADMS-Roads Model Inputs	36
6.5 ADMS Modelling Results	37
6.5.1 Traffic Assessment	37
6.5.2 Assessment Scenarios	37
6.5.3 Operational Traffic Assessment	37
7.0 DAMAGE COSTS ASSESSMENT	62
8.0 MITIGATION	63
8.1 Construction Phase	63
8.2 Operational Phase	64

9.0 CONCLUSIONS	66
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LIST OF TABLES

Table 2-1. Air Quality Standards, Objectives, Limits and Target Values	12
Table 2-2. Ecological Air Quality Standards, Objectives, Limit and Target Values	12
Table 3-1. Impact Descriptors for Individual Receptors	18
Table 4-1. Monitored Annual Mean NO₂ Concentrations at Diffusion Tubes	19
Table 4-2. Modelled Sensitive Receptor Locations.....	22
Table 4-3. Ecological Sensitive Receptor Locations.....	24
Table 5-1. Dust Emission Magnitude	27
Table 5-2. Sensitivity of the Area	27
Table 5-3. Impact Description of Construction Activities without Mitigation.....	28
Table 6-1. Traffic Data.....	30
Table 6-2. Published Background Air Quality Levels (µg/m³)	31
Table 6-3. Pollutant Source Apportionment of NO_x (µg/m³)	33
Table 6-4. Utilised Background Concentrations (µg/m³).....	34
Table 6-5. Comparison of Roadside Modelling & Monitoring Results for NO₂	36
Table 6-6. Summary of ADMS Roads Model Inputs	36
Table 6-7. Predicted Annual Average Concentrations of NO₂ at Receptor Locations.....	38
Table 6-8. Impact Description of Effects at Key Receptors (NO₂)	42
Table 6-9. Predicted Annual Average Concentrations of PM₁₀ at Receptor Locations	43
Table 6-10. Impact Description of Effects at Key Receptors (PM₁₀).....	44
Table 6-11. Predicted Annual Average Concentrations of PM_{2.5} at Receptor Locations.....	45
Table 6-12. Impact Description of Effects at Key Receptors (PM_{2.5})	47
Table 6-13. Predicted Annual Average Concentrations of NO_x at Ecological Receptor Locations	48
Table 6-14. Predicted Annual Average Concentrations of NO₂ at Receptor Locations.....	49
Table 6-15. Impact Description of Effects at Key Receptors (NO₂)	54
Table 6-16. Predicted Annual Average Concentrations of PM₁₀ at Receptor Locations	55
Table 6-17. Impact Description of Effects at Key Receptors (PM₁₀).....	56
Table 6-18. Predicted Annual Average Concentrations of PM_{2.5} at Receptor Locations.....	57
Table 6-19. Impact Description of Effects at Key Receptors (PM_{2.5})	59
Table 6-20. Predicted Annual Average Concentrations of NO_x at Ecological Receptor Locations	60
Table 7-1. Annual Emissions Factor Outputs (g/tonnes/year)	62
Table 7-2. Central Damage Costs (£)	62
Table 8-1. IAQM Guidance on the Assessment of Dust from Demolition and Construction ‘Highly Recommended’ Mitigation Measures	63
Table 8-2. IAQM Guidance on the Assessment of Dust from Demolition and Construction ‘Desirable’ Mitigation Measures.....	64

LIST OF FIGURES

Figure 1-1. Satellite Image of Site and Surrounding Area.....	8
Figure 4-1. Local Authority Monitoring Locations	20
Figure 4-2. Thorney Island 2018 Wind Rose.....	21
Figure 4-3. Sensitive Receptor Locations.....	25
Figure 6-1. Annual Average Long-Term Nitrogen Dioxide (NO₂) Contribution from Proposed Development (µg/m³)	40
Figure 6-2. Total Long Term Annual Average Nitrogen Dioxide (NO₂) Concentration at Proposed Development (µg/m³).....	41

Figure 6-3. Annual Average Long-Term Nitrogen Dioxide (NO ₂) Contribution from Proposed Development (µg/m ³)	52
Figure 6-4. Total Long Term Annual Average Nitrogen Dioxide (NO ₂) Concentration at Proposed Development (µg/m ³)	53
Figure A-1 Air Quality Assessment Area	69

APPENDICES

APPENDIX A - FIGURES	68
APPENDIX B - CONSTRUCTION PHASE ASSESSMENT METHODOLOGY	70
APPENDIX C - THEORETICAL SCENARIO (NO REDUCTION IN UK FLEET EMISSIONS OVER TIME) RESULTS	74
APPENDIX D - REPORT TERMS & CONDITIONS	90

ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AADT	Annual Average Daily Traffic
ADMS	Atmospheric Dispersion Modelling Software
AQAL	the Air Quality Assessment Level
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Standards
CHP	Combined Heat and Power
CL	Critical Level
CO	Carbon Monoxide
DEFRA	Department for Environment Food & Rural Affairs
EAL	Environmental Assessment Limits
EC	European Commission
EFT	The Emissions Factors Toolkit
EPUK	Environmental Protection UK
EU	European Union
EPAQS	The Expert Panel on Air Quality Standards
IAQM	The Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
NGR	The United Kingdom National Grid Reference
NO	Nitric Oxide
NO ₂	Nitrogen Dioxide
PC	Process Contribution
MHCLG	the Ministry for Housing, Communities and Local Government
NPPF	The National Planning Policy Framework
OS	the UK Ordnance Survey
PEC	Predicted Environment Concentration
PPG	Planning Policy Guidance
PPS	Planning Policy Statements
SAC	Special Areas of Conservation
SPA	Special Protection Area
SSSI	Sites of Special Scientific Interest
VOC	Volatile organic compounds
WHO	World Health Organization
UK	The United Kingdom

1.0 INTRODUCTION

This report presents the findings of an air quality assessment undertaken to assess road traffic emissions in support a planning application for the construction of a new residential development, at the Land off St Georges Avenue, Havant, PO9 2RX.

1.1 SITE LOCATION

The central Grid Reference is approximately 473273,106337. The application site is bounded to the north by agricultural land, to the east and south by the A27 and residential properties beyond, and to the west by residential properties.

Reference should be made to **Figure 1-1** for a map of the application site and surrounding area.

Figure 1-1. Satellite Image of Site and Surrounding Area



Google Imagery (2021)

1.2 CONTEXT

The primary source of the air quality associated with the proposed scheme is from vehicle movements, arriving and departing the proposed development. The traffic data generated by the development (provided by Paul Basham Associates) has been assessed at the surrounding sensitive receptors and proposed sensitive receptors.

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

- Baseline evaluation;
- Assessment of potential air quality impacts during the construction phase;

- Assessment of potential air quality impacts during the operational phase;
- Air Quality Damage Cost Assessment; and,
- Identification of mitigation measures (as required).

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

The construction phase assessment considers the potential effects of dust and particulate emissions from site activities and materials movement using a qualitative risk assessment method based on the Institute of Air Quality Management's (IAQM) 'Guidance on the Assessment of Dust from Demolition and Construction' document, published in 2014.

The assessment of the potential air quality impacts that are associated with the operational phase has focused on the predicted impact of changes in ambient nitrogen dioxide (NO₂) and particulate matter with an aerodynamic diameter of less than 10 µm (PM₁₀) and less than 2.5 µm (PM_{2.5}) as a result of the development at key local receptor locations. The changes have been referenced to EU air quality limits and UK air quality objectives and the magnitude and impact description of the changes have been referenced to non-statutory guidance issued by the IAQM and Environmental Protection UK (EPUK).

1.3 REPORT STRUCTURE

Following this introductory section, the remainder of this report is structured as follows:

- Section 2: Policy and Legislative Context
- Section 3: Assessment Methodology
- Section 4: Baseline Conditions
- Section 5: Assessment of Air Quality Impacts – Construction Phase
- Section 6: Assessment of Air Quality Impacts – Operational Phase
- Section 7: 'Damage Costs' Assessment
- Section 8: Mitigation
- Section 9: Conclusions

All technical Appendices are included at the end of this report for information.

2.0 POLICY AND LEGISLATIVE CONTEXT

2.1 DOCUMENTS CONSULTED

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

Legislation and Best Practice Guidance

- National Planning Policy Framework, Ministry for Housing, Communities and Local Government, Revised February 2019;
- Planning Practice Guidance: Air Quality, Ministry for Housing, Communities and Local Government, November 2019;
- The Air Quality Standards Regulations (Amendments), 2016;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Defra, 2007;
- The Environment Act, 1995;
- Local Air Quality Management Technical Guidance LAQM.TG16, Defra, 2021;
- Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, LA 105 Air quality, Highways England, November 2019;
- Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017;
- Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014;
- A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.0), IAQM, May 2020; and,
- Ecological Assessment of Air Quality Impacts, CIEEM, January 2021.

Websites Consulted

- Google maps (maps.google.co.uk);
- The UK National Air Quality Archive (www.airquality.co.uk);
- Department for Transport Matrix (www.dft.gov.uk/matrix);
- emapsite.com;
- Multi-Agency Geographic Information for the Countryside (<http://magic.defra.gov.uk/>);
- Planning Practice Guidance (<http://planningguidance.planningportal.gov.uk/>); and,
- Havant Borough Council (<https://www.havant.gov.uk/>).

Site Specific Reference Documents

- Havant Borough Council, Air Quality Annual Status Report 2019;
- Havant Borough Council: Havant Local Plan (adopted in March 2011); and,
- Havant Borough Council: Havant Submission Local Plan (Submitted February 2021).

2.2 AIR QUALITY LEGISLATIVE FRAMEWORK

European Legislation

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

- **Directive 1999/30/EC** – the First Air Quality "Daughter" Directive – sets ambient air limit values for NO₂ and oxides of nitrogen, sulphur dioxide, lead and PM₁₀;
- **Directive 2000/69/EC** – the Second Air Quality "Daughter" Directive – sets ambient air limit values for benzene and carbon monoxide; and,
- **Directive 2002/3/EC** – the Third Air Quality "Daughter" Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

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

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

The European Commission (EC) Directive Limits, outlined above, have been transposed in the UK through the Air Quality Standards Regulations. In the UK responsibility for meeting ambient air quality limit values is devolved to the national administrations in Scotland, Wales and Northern Ireland.

The European Union (Withdrawal) Act 2018 (EUWA) provides a new framework for the continuity of 'retained EU law' in the UK. EU Directives no longer have to be implemented by the UK except to any extent agreed or decided by the UK unilaterally.

EUWA retains the domestic effect of EU Directives to the extent already implemented in UK law, by preserving the relevant domestic implementing legislation enacted in UK law before 'Implementation Period' completion day. Though the EU Directives are not retained, following the UK's departure from the EU, the EUWA converts the current framework of Air Quality targets, however the role that the EU instructions were party to are lost.

UK Legislation

The Air Quality Standards Regulations (Amendments 2016) seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives and also transpose the Fourth Daughter Directive within the UK. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

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

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

The AQOs for pollutants included within the Air Quality Strategy and assessed as part of the scope of this report are presented in **Table 2-1** and **Table 2-2** along with European Commission (EC) Directive Limits and World Health Organisation (WHO) Guidelines. The ecological levels are based on WHO and CLRTAP (Convention on Long-range Transboundary Air Pollution) guidance.

Table 2-1. Air Quality Standards, Objectives, Limits and Target Values

Pollutant	Applies	Objective	Concentration Measured as ¹⁰	Date to be achieved and maintained thereafter	European Obligations	Date to be achieved and maintained thereafter	New or existing
PM ₁₀	UK	50µg/m ³ by end of 2004 (max 35 exceedances a year)	24-hour Mean	1 st January 2005	50µg/m ³ by end of 2004 (max 35 exceedances a year)	1 st January 2005	Retain Existing
	UK	40µg/m ³ by end of 2004	Annual Mean	1 st January 2005	40µg/m ³	1 st January 2005	
PM _{2.5}	UK	25µg/m ³	Annual Mean	31 st December 2010	25µg/m ³	1 st January 2010	Retain Existing
NO ₂	UK	200µg/m ³ not to be exceeded more than 18 times a year	1-Hour Mean	31 st December 2005	200µg/m ³ not to be exceeded more than 18 times a year	1 st January 2010	Retain Existing
	UK	40µg/m ³	Annual Mean	31 st December 2005	40µg/m ³	1 st January 2010	

Table 2-2. Ecological Air Quality Standards, Objectives, Limit and Target Values

Pollutant	Applies	Objective	Concentration Measured as
NO _x	UK	30µg/m ³	Annual Mean

Within the context of this assessment, the annual mean objectives are those against which facades of residential receptors will be assessed and the short-term objectives apply to all other receptor locations, where people may be exposed over a short duration, both residential and non-residential such as using gardens, balconies, walking along streets, using playgrounds, footpaths or external areas of employment uses.

Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves assessing present and likely future air quality against the AQOs. If it is predicted that levels at the façade of buildings where members of the public are regularly present (normally residential properties) are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA).

2.3 PLANNING AND POLICY GUIDANCE

National Policy

The National Planning Policy Framework (NPPF), revised February 2019, principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policy making. The NPPF (para. 181) 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 or 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 or 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’.

The Planning Practice Guidance (PPG) web-based resource was updated by the Ministry for Housing, Communities and Local Government (MHCLG) on 1st November 2019 to support the National Planning Policy Framework and make it more accessible. A review of PPG: Air Quality identified the following guidance (Paragraph: 001 Reference ID: 32-001-20191101):

“The 2008 Ambient Air Quality Directive sets legally binding limits for concentrations in outdoor air of major air pollutants that affect public health such as particulate matter (PM₁₀ and PM_{2.5}) and nitrogen dioxide (NO₂).

The UK also has national emission reduction commitments for overall UK emissions of 5 damaging air pollutants:

- *fine particulate matter (PM_{2.5});*
- *ammonia (NH₃);*
- *nitrogen oxides (NO_x);*
- *sulphur dioxide (SO₂); and*
- *non-methane volatile organic compounds (NMVOCs).*

As well as having direct effects on public health, habitats and biodiversity, these pollutants can combine in the atmosphere to form ozone, a harmful air pollutant (and potent greenhouse gas) which can be transported great distances by weather systems. Odour and dust can also be a planning concern, for example, because of the effect on local amenity."

Local Policy

The Havant Borough Council (HBC) Local Plan (adopted in March 2011) sets out and provides guidance for managing development and land use within the borough. Following a review of the HBC Local Plan, the following policies have been identified:

"Policy DM10 Pollution

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

- 1. The health and safety of existing and future users of the site, or nearby occupiers and residents is not put at risk.*
- 2. National air quality standards or objectives would not be breached.*
- 3. The water environment would not be detrimentally affected.*
- 4. It would not lead to an unacceptable deterioration in the quality or potential yield of coastal, surface and ground water resources.*
- 5. External lighting is of the minimum level of illumination and duration required for security and operational purposes. 6. External lighting would not interfere with safe navigation in either Chichester or Langstone Harbours and other coastal locations."*

The Havant Borough Council (HBC) has developed a new Local Plan, submitted the Secretary of State for Housing Communities and Local Government on 12th February 2021. Until adoption, the Submission Local Plan has limited weight in determining planning applications, however, this Submission Local Plan has been reviewed and the following policies have been identified:

"E23 | Air quality

Offsetting emissions

- a. Major development proposals will be expected to provide mitigation measures which offset emissions and are proportionate to the scale and nature of the development.*

Threshold based assessment

In addition to a., development proposals of 150 or more (gross) residential units, 1,000 sqm or more of commercial floorspace, or which are likely to materially alter the traffic flow on the local highway network will be permitted where:

- b. Projected levels of air pollution or emissions associated with the development would not result in*

a significant deterioration of current air quality at a location where national air quality objectives or limit values apply; or

c. Measures are provided which demonstrably mitigate the impact on air quality to an acceptable level.”

“H15 | Land east of Castle Avenue

Residential development of about 255 dwellings will be permitted where:

a. Sufficient information is submitted to address the site-specific planning considerations. This is to be agreed at the pre-application stage and is expected to include the following:

- i. Environmental Statement if required;*
- ii. Transport Assessment and Travel Plan;*
- iii. Ecological Assessment;*
- iv. Flood Risk Assessment;*
- v. Archaeological Assessment;*
- vi. Air Quality Assessment;*
- vii. Noise Impact Assessment;*
- viii. Contaminated Land Investigation Report (to include gas monitoring);*
- ix. Arboricultural Assessment;*

b. The site is developed comprehensively, or if this is not possible, the development of one part must not prejudice the development of the other part;

c. Opportunities have been explored for the prior extraction of minerals to the satisfaction of Hampshire County Council;

d. Mitigation for Solent Waders and Brent Geese is provided upfront, prior to development and to the satisfaction of the Council in line with Policy E17; and

e. The design and layout:

- i. Does not prejudice the future delivery of A27 junction improvements to facilitate access arrangements to the Southleigh Strategic site to the north;*
- ii. Takes account of and mitigates noise disturbance from the A27;*
- iii. Avoids unacceptable harm to the amenity of existing properties on the east side of Castle Avenue through loss of privacy, noise, outlook and overlooking;*
- iv. Creates a new pedestrian and cycle access to Emsworth Road in the south-west of the site;*
- v. Provides or, at least does not prejudice, a pedestrian and cycle link under the railway line to provide easy access to Warblington Station from Southleigh (Policy KP5);*

vi. Provides on-site public open space and community food growing provisions in line with Policy E9;

vii. Provides play space for children and young people to address the deficit highlighted in Policy E11.”

3.0 ASSESSMENT METHODOLOGY

The potential environmental effects of the operational phase of the proposed development have been identified as proposed vehicle movements. The significance of potential environmental effects is assessed according to the latest guidance produced by EPUK and IAQM in January 2017 '*Land-Use Planning & Development Control: Planning for Air Quality*' and May 2020 '*A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites*'.

The methodology used to determine the potential air quality effects of the construction phase of the proposed development has been derived from the IAQM '*Guidance on the Assessment of the Impacts of Dust from Demolition and Construction*' document and is summarised in Section 5.

3.1 DETERMINING IMPACT DESCRIPTION OF THE AIR QUALITY EFFECTS

The impact description of the effects during the operational phase of the development is based on the latest guidance produced by EPUK and IAQM in January 2017. The guidance provides a basis for a consistent approach that could be used by all parties associated with the planning process to professionally judge the overall impact description of the air quality effects based on severity of air quality impacts.

The following rationale is used in determining the severity of the air quality effects at individual receptors:

1. The change in concentration of air pollutants, air quality effects, are quantified and evaluated in the context of AQOs. The effects are provided as a percentage of the Air Quality Objective (AQO), which may be an AQO, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)';
2. The absolute concentrations are also considered in terms of the AQO and are divided into categories for long term concentration. The categories are based on the sensitivity of the individual receptor in terms of harm potential. The degree of harm potential to change increases as absolute concentrations are close to or above the AQO;
3. Severity of the effect is described as qualitative descriptors; negligible, slight, moderate or substantial, by taking into account in combination the harm potential and air quality effect. This means that a small increase at a receptor which is already close to or above the AQO will have higher severity compared to a relatively large change at a receptor which is significantly below the AQO;
4. The effects can be adverse when pollutant concentrations increase or beneficial when concentrations decrease as a result of development;
5. The judgement of overall impact description of the effects is then based on severity of effects on all the individual receptors considered; and,
6. Where a development is not resulting in any change in emissions itself, the impact description of effect is based on the effect of surrounding sources on new residents or users of the development, i.e., will they be exposed to levels above the AQO.

Table 3-1. Impact Descriptors for Individual Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to AQO			
	1	2-5	6-10	>10
≤75% of AQO	Negligible	Negligible	Slight	Moderate
76-94% of AQO	Negligible	Slight	Moderate	Moderate
95-102% of AQO	Slight	Moderate	Moderate	Substantial
103-109 of AQO	Moderate	Moderate	Substantial	Substantial
≥110 of AQO	Moderate	Substantial	Substantial	Substantial

In accordance with explanation note 2 of Table 6.3 of the EPUK & IAQM guidance, the Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.

4.0 BASELINE CONDITIONS

4.1 AIR QUALITY REVIEW

This section provides a review of the existing air quality in the vicinity of the application site in order to provide a benchmark against which to assess potential air quality impacts of the proposed development. Baseline air quality in the vicinity of the application site has been defined from several sources, as described in the following sections.

Local Air Quality Management (LAQM)

As required under section 82 of the Environment Act 1995, Havant Borough Council (HBC) has undertaken an ongoing exercise to review and assess air quality within its area of jurisdiction. The assessments have indicated that concentrations of NO₂ are not above the relevant AQOs at any locations of relevant public exposure within the Borough. Therefore, HBC has designated no Air Quality Management Areas (AQMAs).

Air Quality Monitoring

Monitoring of air quality within HBC has been undertaken through non-automatic monitoring methods in 2018. These have been reviewed in order to provide an indication of existing air quality in the area surrounding the application site. The most recent, available monitoring data within HBC was undertaken during 2018.

Non - Continuous Monitoring

Havant Borough Council operates a network of 37 passive diffusion tubes. The closest diffusion tube is diffusion tube 29, which is located on Orchard Road, approximately 1.14 km west south west of the application site. The most recently available diffusion tube data is from 2018 which is presented in **Table 4-1**.

Table 4-1. Monitored Annual Mean NO₂ Concentrations at Diffusion Tubes

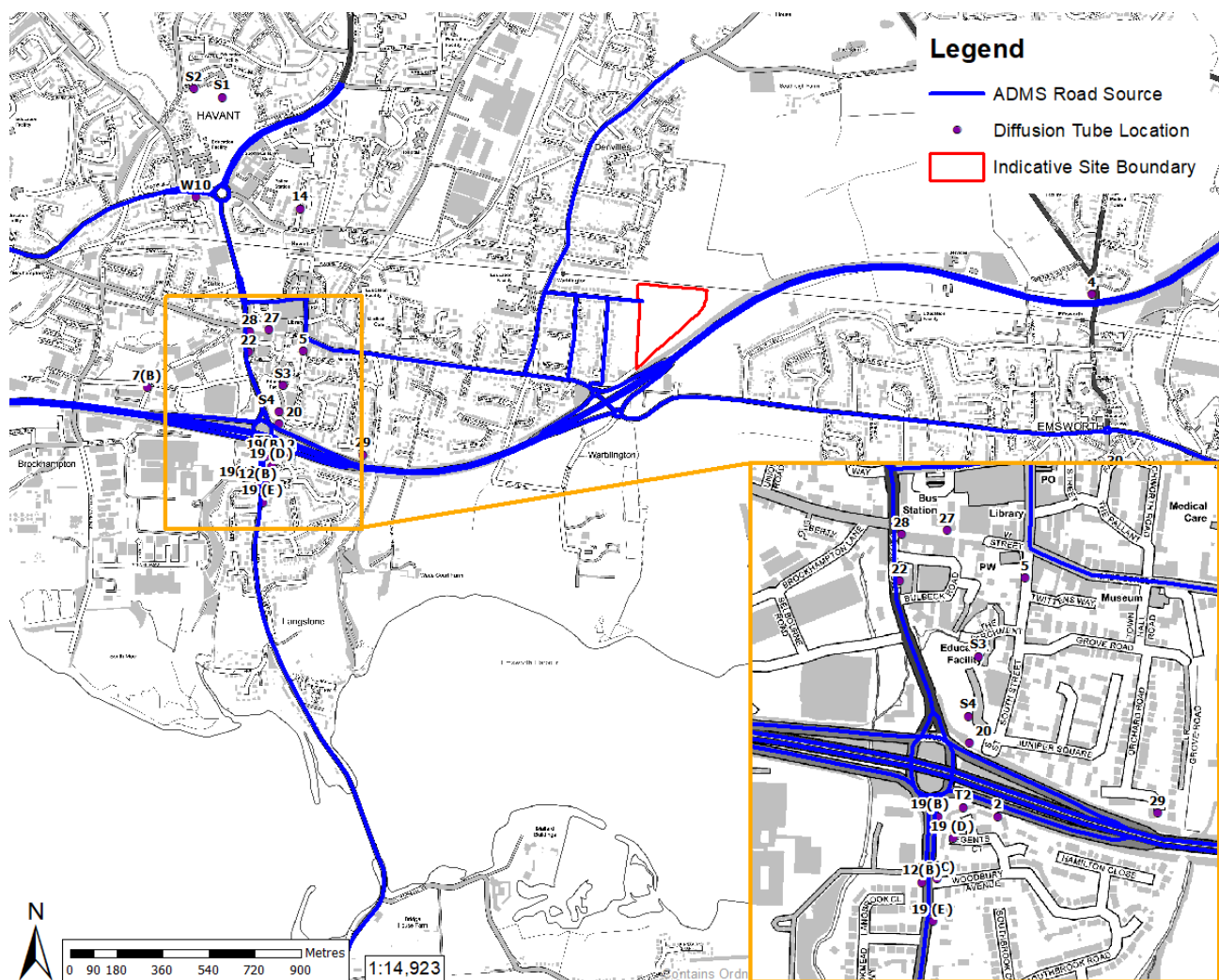
Site ID	Location	Site Type	Distance from Kerb (m)	Inlet Height (m)	Monitored 2018 Annual Mean NO ₂ Concentration (µg/m ³)
2	Rectory Road	Suburban	11.0	2.8	25.82
4	New Brighton Road	Suburban	2.5	2.7	21.14
5	South Street	Urban Centre	1.5	3.1	20.78
7(B)	Brockhampton Lane	Urban Centre	8.0	2.7	25.28
12(B)	Xyratex	Roadside	2.8	2.5	30.47
14	Elm Park Road	Suburban	1.8	2.7	20.30
19(B)	Langstone Road (East, Bus Stop)	Kerbside	1.0	2.6	47.71
19(C)	Langstone Road East (Woodbury)	Roadside	3.8	2.5	34.83
19 (D)	Regents Court	Roadside	28.0	2.5	26.08
19 (E)	Langstone Road East (11A)	Roadside	2.9	2.5	33.60
20	Bosmere Junior	Urban Centre	35.0	2.4	27.09
22	Park Road South (Bulbeck Road)	Roadside	2.0	3.1	32.95
27	Havant Precinct	Urban Background	82.0	2.5	25.19

28	Park Road South (West Street)	Roadside	4.8	2.8	34.90
29	Orchard Road	Suburban	31.0	2.5	24.95
30	St. Peters Square, Emsworth	Urban Centre	2.8	2.7	18.40
W10	Compton Court	Roadside	12.5	2.4	29.14
T2	The Limes	Not Classifiable	17.3	2.7	25.26
S3	Bosmere Junior Sch. (Sand-Pit)	Urban Background	N/A	2.0	24.58
S4	Bosmere Junior Sch. (Car Park)	Suburban	28.4	2.0	31.48

As indicated in **Table 4-1**, all diffusion tubes located within the Air Quality Assessment area monitored annual average NO₂ concentrations below the AQO for NO₂ (40 µg/m³ annual mean) during 2018 excluding diffusion tube 19(B) which monitored an exceedance of 40 µg/m³ during 2018.

It should be noted that as part of the model verification a review of diffusion tubes locations and monitoring heights was undertaken. As part of this process, the locations and monitoring heights were adjusted following desk-based review using Google Maps.

Figure 4-1. Local Authority Monitoring Locations

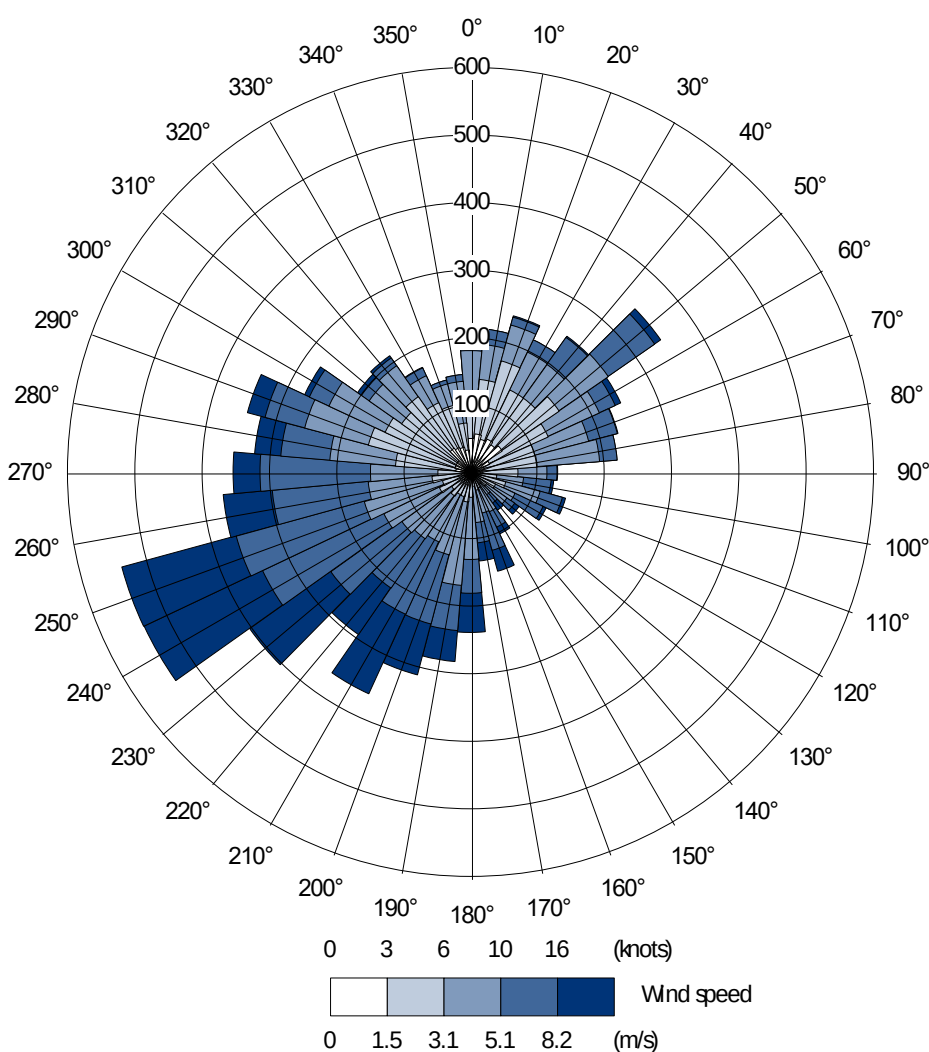


4.2 METEOROLOGY

Meteorological conditions have significant influence over air pollutant concentrations and dispersion. Pollutant levels can vary significantly from hour to hour as well as day to day, thus any air quality predictions need to be based on detailed meteorological data. The ADMS (Atmospheric Dispersion Modelling System) model calculates the dispersion of pollutants on an hourly basis using a year of local meteorological data.

The 2018 meteorological data used in the assessment is derived from Thorney Island Meteorological Station. This is the nearest meteorological station, which is considered representative of the application site, with all the complete parameters necessary for the ADMS model. Reference should be made to **Figure 4-2** for an illustration of the prevalent wind conditions at Thorney Island Meteorological Station site.

Figure 4-2. Thorney Island 2018 Wind Rose



4.3 EMISSION SOURCES

A desktop assessment has identified that traffic movements are likely to be the most significant local source of pollutants affecting the site and its surroundings. The principal traffic derived pollutants likely to impact local receptors are NO₂, PM₁₀ and PM_{2.5}.

The assessment has therefore modelled all roads within the immediate vicinity of the application site which are considered likely to experience significant changes in traffic flow as a result of the proposed development. Reference should be made to **Figure A-1** for a graphical representation of the traffic data utilised within the ADMS Roads 5.0 model.

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

4.4 SENSITIVE RECEPTORS

Receptors that are considered as part of the air quality assessment are primarily those existing receptors that are situated along routes predicted to experience significant changes in traffic flow as a result of the proposed development.

The existing receptor locations are summarised in **Table 4-2** and the spatial locations of all of the receptors are illustrated in **Figure 4-3**.

Table 4-2. Modelled Sensitive Receptor Locations

	Existing Sensitive Receptor	X	Y	Receptor Height (m)
R1	26 Saint Georges Avenue	472990	106430	1.5
R2	23 Saint Georges Avenue	472990	106397	1.5
R3	2 Castle Avenue	472965	106097	1.5
R4	39 Warblington Avenue	472834	106101	1.5
R5	1 Warblington Avenue	472866	106408	1.5
R6	1 Saint Georges Avenue	472738	106423	1.5
R7	Warblington School	472695	106443	1.5
R8	27 Southleigh Road	472773	106559	1.5
R9	1 Fifth Avenue	472857	106829	1.5
R10	1 Southleigh Road	472643	106142	1.5
R11	66 East Street	472137	106168	1.5
R12	42 East Street	471944	106196	1.5
R13	Church View, 1 South Street	471805	106244	1.5
R14	2 Elm Lane	471758	106421	1.5
R15	66 West Street	471541	106313	1.5
R16	25 Mavis Crescent	471519	106669	1.5
R17	Westbourne Court, Chidham Close	471434	106790	1.5
R18	Havant College	471462	106903	1.5
R19	Havant College	471373	106875	1.5
R20	8 The Drive	471671	107114	1.5
R21	13 Willow Park, Leigh Road	471872	107145	1.5
R22	Whyke Court, Chidham Close (W10)	471368	106805	1.5
R23	2 Bedhampton Road	470780	106598	1.5

R24	Bosmere Junior School	471686	106045	1.5
R25	Bosmere Junior School	471709	105945	1.5
R26	The Limes, Regents Court	471658	105801	1.5
R27	2 Langbrook Close	471600	105595	1.5
R28	36 Langstone Road	471722	104906	1.5
R29	Bosham Gardens	473297	106154	1.5
R30	Bosham Gardens	473429	106264	1.5
R31	Bosham Gardens	473546	106345	1.5
R32	1 Selangor Avenue	473488	106036	1.5
R33	37 Havant Road	474586	105902	1.5
R34	1 Kings Terrace	474949	105876	1.5
Committed Sensitive Receptor		X	Y	Receptor Height (m)
CR1	Committed Residential Receptor	473038	106395	1.5
CR2	Committed Residential Receptor	473073	106391	1.5
CR3	Committed Residential Receptor	473057	106414	1.5
CR4	Committed Residential Receptor	473078	106168	1.5
CR5	Committed Residential Receptor	473026	106173	1.5
Proposed Sensitive Receptor		X	Y	Receptor Height (m)
PR1	Proposed Residential Receptor	473146	106213	1.5
PR2	Proposed Residential Receptor	473227	106273	1.5
PR3	Proposed Residential Receptor	473279	106316	1.5
PR4	Proposed Residential Receptor	473320	106350	1.5
PR5	Proposed Residential Receptor	473104	106204	1.5
PR6	Proposed Residential Receptor	473101	106382	1.5
PR7	Proposed Residential Receptor	473100	106412	1.5
PR8	Proposed Residential Receptor	473355	106433	1.5

Thirty-four existing receptor locations, eight proposed residential receptors and five committed residential receptors have been assessed to determine the effect of air quality, associated with the proposed development. The locations of the receptor are identified on **Figure 4-3**.

4.5 ECOLOGICAL RECEPTORS

Air quality impacts associated with the proposed re-development have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The IAQM guidance on 'Air Quality Impacts on Designated Nature Conservation Sites' (2020) outlines the types of designated nature sites within 2 km of the proposed development which require air quality assessment. These are inclusive of;

- 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).

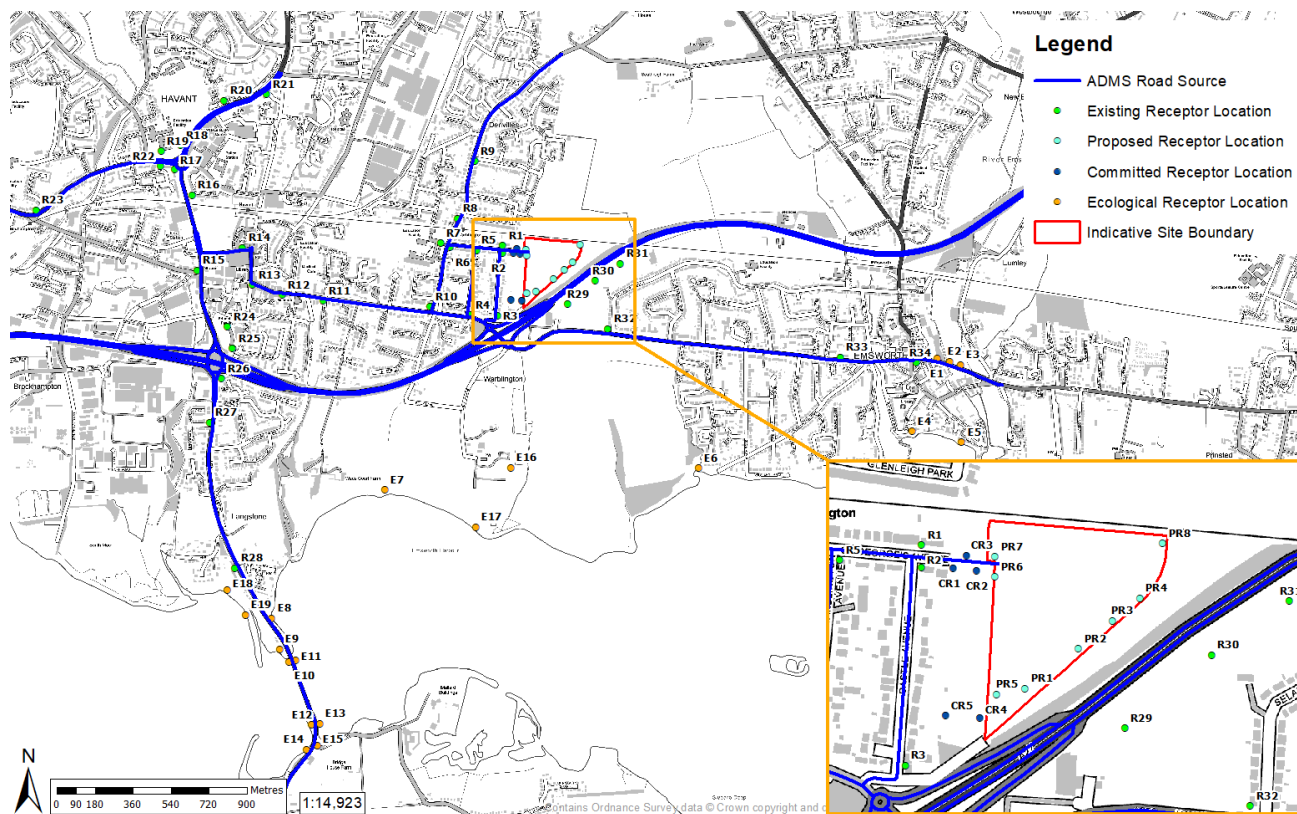
A study was undertaken to identify any statutory designated sites of ecological or nature conservation importance within the extents of the dispersion modelling assessment. This was completed using the Multi-Agency Geographic Information for the Countryside (MAGIC) web-based interactive mapping service, which draws together information on key environmental schemes and designations. Following a search within a 2 km radius of the site boundary, the following ecological receptors were identified:

Table 4-3. Ecological Sensitive Receptor Locations

Site ID	Site	Designation	UK NGR (m)		Distance from Site (km)	Distance from Nearest Affected Road (m)
			X	Y		
E1	Brook Meadow (Emsworth)	LNR	475048	105896	1.77	14
E2	Brook Meadow (Emsworth)	LNR	475107	105883	1.83	17
E3	Brook Meadow (Emsworth)	LNR	475156	105866	1.88	18
E4	Chichester Harbour	SSSI & Ramsar	474927	105552	1.78	331
E5	Chichester Harbour	SSSI & Ramsar	475161	105502	2.01	319
E6	Chichester Harbour	SSSI & Ramsar	473916	105379	1.12	580
E7	Chichester Harbour	SSSI & Ramsar	472430	105276	1.08	468
E8	Chichester Harbour	SSSI & Ramsar	471896	104671	1.89	18
E9	Chichester Harbour	SSSI & Ramsar	471933	104525	1.98	33
E10	Chichester Harbour	SSSI & Ramsar	471978	104464	2.00	15
E11	Chichester Harbour	SSSI & Ramsar	472010	104472	1.98	17
E12	Chichester Harbour	SSSI & Ramsar	472082	104166	2.21	19
E13	Chichester Harbour	SSSI & Ramsar	472122	104172	2.19	21
E14	Chichester Harbour	SSSI & Ramsar	472061	104050	2.32	18
E15	Chichester Harbour	SSSI & Ramsar	472112	104069	2.29	19
E16	Warblington Meadow	SSSI	473028	105381	0.76	558
E17	Warblington Meadow	SSSI	472863	105100	1.06	1084
E18	Chichester & Langstone Harbours	SSSI & Ramsar	471686	104801	1.93	96
E19	Chichester & Langstone Harbours	SSSI & Ramsar	471773	104685	1.96	77

It should be noted that the IAQM Guidance only requires the assessment of ecological receptors which are located within 200 m of the affected road network. Therefore, ecological receptors E4, E5, E6, E7, E16, and E17 have been scoped out of this assessment.

Figure 4-3. Sensitive Receptor Locations



5.0 ASSESSMENT OF AIR QUALITY IMPACTS - CONSTRUCTION PHASE

5.1 POLLUTANT SOURCES

The main emissions during construction are likely to be dust and particulate matter generated during earth moving (particularly during dry months) or from construction materials. The main potential effects of dust and particulate matter are:

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

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

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

5.2 PARTICULATE MATTER (PM₁₀)

The UK Air Quality Standards seek to control the health implications of respirable PM₁₀. However, the majority of particles released from construction will be greater than this in size.

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

5.3 DUST

Particles greater than 10µm are likely to settle out relatively quickly and may cause annoyance due to their soiling capability. Although there are no formal standards or criteria for nuisance caused by deposited particles, the IAQM 'Guidance on Monitoring in the Vicinity of Demolition and Construction Sites' (October 2018) and the Environment Agency Technical Guidance Note (TGN) M17 states that dust is usually compared with a 'complaints likely' guideline of 200mg/m²/day. Therefore, a deposition rate of 200mg/m²/day is often presented as a threshold for serious nuisance though this is usually only applied to long term exposure as people are generally more tolerant of dust for a short or defined period. Significant nuisance is likely when the dust coverage of surfaces is visible in contrast with adjacent clean areas, especially when it happens regularly. Severe dust nuisance occurs when the dust is perceptible without a clean reference surface.

Construction activities have the potential to suspend dust, which could result in annoyance of residents surrounding the site. Measures will be taken to minimise the emissions of dust as part of good site practice.

Recommended mitigation measures proportionate to the risk associated with the development and based on best practice guidance are discussed in the following sections.

5.4 METHODOLOGY

The construction phase assessment utilises the IAQM Guidance on the Assessment of Dust from Demolition and Construction document published in February 2014.

Four construction processes are considered; these are demolition, earthworks, construction and trackout. For each of these phases, the impact description of the potential dust impacts is derived following the determination of a dust emission magnitude and the distance of activities to the nearest sensitive receptor, therefore assessing worst case impacts. A full explanation of the methodology is contained in Appendix A.

5.5 ASSESSMENT RESULTS

Based on the methodology detailed in Appendix A, the scale of the anticipated works has determined the potential dust emission magnitude for each process, as presented in the **Table 5-1** below.

Table 5-1. Dust Emission Magnitude

Construction Process	Site Criteria	Dust Emission Magnitude
Demolition	No demolition required	N/A
Earthworks	Total Site Area: >10,000 m ²	Large
Construction	Total Building Volume >100,000 m ³	Large
Trackout	Assumed 10 - 50 HDV outward movements in any one day	Medium

The sensitivity of the surrounding area to each construction process has been determined following stage 2B of the IAQM guidance. The assessment has determined the area sensitivities as shown in the **Table 5-2**.

The sensitivity of the ecological receptors is considered not applicable within the construction phase assessment due to the distance from the application site which is greater than 50m. This is in accordance with Table 4 of the IAQM Guidance.

Table 5-2. Sensitivity of the Area

Source	Area Sensitivity					
	Dust Soiling	Site Sensitivity Criteria	Health Effects of PM ₁₀	Site Sensitivity Criteria	Ecological	Site Sensitivity Criteria
Demolition	N/A	No demolition required	N/A	No demolition required	N/A	No demolition required
Earthworks	Low	10-100 Highly Sensitive Receptors within 100m	Low	Annual Mean of <24 ug/m ³ for PM ₁₀	N/A	>50 m from site boundary
Construction	Low		Low	10-100 Highly Sensitive Receptors within 50m	N/A	
Trackout	Medium	10-100 Highly Sensitive Receptors within 50m of roads within 500m of site	Low	Annual Mean of <24 ug/m ³ for PM ₁₀ 10-100 Highly Sensitive Receptors within 50m of roads within 500m of site	N/A	>50 m from roads within 500 m from site boundary

The dust emission magnitude determined in **Table 5-1** has been combined with the sensitivity of the area determined in **Table 5-2**, to determine the risk of impacts prior to the implementation of appropriate mitigation measures. The potential impact significance of dust emissions associated with the development, without mitigation, is presented in **Table 5-3**.

Table 5-3. Impact Description of Construction Activities without Mitigation

Source	Summary Risk of Impacts Prior to Mitigation		
	Dust Soiling	Health Effects of PM ₁₀	Ecological
Demolition	N/A	N/A	N/A
Earthworks	Low	Low	N/A
Construction	Low	Low	N/A
Trackout	Low	Low	N/A

Appropriate mitigation measures are detailed and presented in Section 7. Following the adoption of these measures, the subsequent impact significance of the construction phase is not predicted to be significant.

6.0 ASSESSMENT OF AIR QUALITY IMPACTS - OPERATIONAL PHASE

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

The operational phase assessment therefore consists of the quantified predictions of the change in NO₂, PM₁₀ and PM_{2.5} for the operational phase of the development due to changes in traffic movement. Predictions of air quality at the site have been undertaken for the operational phase of the development using ADMS Roads.

In accordance with the provided traffic data, the operational phase assessment has been undertaken with an assumed operational opening year of 2023. The assessment scenarios are therefore:

- 2018 Baseline = Existing Baseline conditions;
- 2023 “Do Minimum” = 2023 Baseline + Committed Development Flows (through local growth factor);
- 2023 “Do Something” Scenario 1 = 2023 Baseline + Committed Development Flows (through local growth factor) + Development Traffic Flows: (‘Without Mitigation’ which reflects the existing road layout); and,
- 2023 “Do Something” Scenario 2 = 2023 Baseline + Committed Development Flows (through local growth factor) + Development Traffic Flows (‘With Mitigation’ which redistributes right-turners at the Castle Avenue / Emsworth Road junction).

6.1 EXISTING AND PREDICTED TRAFFIC FLOWS

Baseline 2018 traffic data, projected 2023 ‘Do Minimum’ and ‘Do Something’ traffic data, and average vehicle speeds have been obtained for the operational phase assessment in the form of Annual Average Daily Traffic figures (AADT). Development traffic flows have been provided by Paul Basham Associates.

Baseline 2018 traffic data was downloaded from the Department for Transport (DfT) website.

The proposed development opening year is assumed to be a worst-case year of 2023. To determine the traffic flows for the 2023 ‘Do Minimum’ traffic flows, a TEMPro factor of 1.0524 has been applied to the 2018 Baseline traffic data.

To calculate the 2023 ‘Do Something’ operational year traffic flows, the proposed development traffic flows have been distributed across the model area and have been added onto the 2023 ‘Do Minimum’ scenario flows. Development traffic flows were provided by Paul Basham Associates.

Emission factors for the 2018 baseline and 2023 projected ‘Do Minimum’ and ‘Do Something’ scenarios have been calculated using the Emission Factor Toolkit (EFT) Version 10.1 (August 2020).

It is assumed the average vehicle speeds on the local road network in an opening year of 2023 will be broadly the same as the ones in 2018. 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 A-1**. Detailed traffic figures are provided in **Table 6-1**.

Table 6-1. Traffic Data

Link	Speed (km/h)	2018 Baseline		2023 Do Minimum		2023 Do Something Scenario 1 Without Mitigation		2023 Do Something Scenario 2 With Mitigation	
		AADT	HGV %	AADT	%HGV	AADT	%HGV	AADT	%HGV
St George's Avenue (East of Castle Avenue)	48	962	0.4	1012	0.4	2,332	0.2	2,332	0.2
Castle Avenue	48	962	0.4	1012	0.4	1,923	0.2	1,481	0.3
St George's Avenue (West of Castle Avenue)	48	962	0.4	1012	0.4	1,421	0.3	1,863	0.2
St George's Avenue (West of Warblington Avenue)	48	962	0.4	1012	0.4	1,421	0.3	1,421	0.3
Emsworth Road (East of Castle Avenue)	48	19,493	1.4	20514	1.4	21,425	1.3	21,337	1.3
Emsworth Road (West of Castle Avenue)	48	19,493	1.4	20514	1.4	20,514	1.4	20,956	1.3
Southleigh Road (South of St George's Avenue)	48	6,047	0.8	6364	0.8	6,655	0.7	6,655	0.7
Southleigh Road (North of St George's Avenue)	48	6,047	0.8	6364	0.8	6,483	0.8	6,483	0.8
East Street	48	19,493	1.4	20514	1.4	20,805	1.3	20,805	1.3
Elm Lane	48	19,493	1.4	20514	1.4	20,805	1.3	20,805	1.3
Park Road North	48	24,182	1.4	25449	1.4	25,595	1.3	25,595	1.3
Petersfield Road	48/64	17,259	1.9	18163	1.9	18,236	1.9	18,236	1.9
B2140 New Road	48	14,398	0.9	15152	0.9	15,225	0.9	15,225	0.9
Park Road South (North of West Street)	48	24,182	1.4	25449	1.4	25,595	1.3	25,595	1.3
Park Road South (South of West Street)	48	24,182	1.4	25449	1.4	25,595	1.3	25,595	1.3
A259 Havant Road	48/80	19,493	1.4	20514	1.4	20,553	1.4	20,553	1.4
Langstone Road	64	24,424	1.4	25704	1.4	25,849	1.3	25,849	1.3
A27 (West of Park Road South)	112	78,868	4.0	83001	4.0	83,700	3.9	83,700	3.9
A27 (East of Park Road South)	112	69,911	4.4	73574	4.4	74,273	4.3	74,273	4.3
A27 (East of Emsworth Road)	112	49,263	5.8	51844	5.8	52,015	5.7	52,308	5.7
Warblington Avenue	48	962	0.4	1,012	0.4	1,012	0.4	1,454	0.3

6.2 BACKGROUND CONCENTRATIONS

The use of background concentrations within the modelling process ensures that pollutant sources other than traffic are represented appropriately. Background sources of pollutants include industrial, domestic and rail emissions within the vicinity of the study site. Several sources have been used to obtain representative background levels as discussed below.

The background concentrations used within the assessment have been determined with reference to the IAQM Guidance and Technical Guidance (TG) (16).

The IAQM Guidance states:

“A matter of judgement should take into account the background and future background air quality and whether it is likely to approach or exceed the value of the AQO.”

Additionally, TG (16) states:

“Typically, only the process contributions from local sources are represented within an output by the dispersion model. In these circumstances, it is necessary to add an appropriate background concentration(s) to the modelled source contributions to derive the total pollutant concentrations.”

Defra Published Background Concentrations for 2019

The background concentrations shown in **Table 6-2** were referenced from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the application site. In May 2019, Defra issued revised 2018 based background maps for nitrogen oxide (NO_x), NO₂, PM₁₀ and PM_{2.5}.

Table 6-2. Published Background Air Quality Levels (µg/m³)

Receptor Location	2018			
	NO _x	NO ₂	PM ₁₀	PM _{2.5}
Local Authority Monitoring				
W10	26.10	18.34	15.35	10.99
12(B)	30.61	21.00	15.71	10.82
19(B)	30.61	21.00	15.71	10.82
19(C)	30.61	21.00	15.71	10.82
19(E)	30.61	21.00	15.71	10.82
22	26.10	18.34	15.35	10.99
28	26.10	18.34	15.35	10.99
Existing Sensitive Receptors				
R1	25.97	18.17	15.25	10.88
R2	25.97	18.17	15.25	10.88
R3	25.97	18.17	15.25	10.88
R4	25.97	18.17	15.25	10.88
R5	25.97	18.17	15.25	10.88
R6	25.97	18.17	15.25	10.88
R7	25.97	18.17	15.25	10.88
R8	25.97	18.17	15.25	10.88

R9	25.97	18.17	15.25	10.88
R10	25.97	18.17	15.25	10.88
R11	25.97	18.17	15.25	10.88
R12	26.10	18.34	15.35	10.99
R13	26.10	18.34	15.35	10.99
R14	26.10	18.34	15.35	10.99
R15	26.10	18.34	15.35	10.99
R16	26.10	18.34	15.35	10.99
R17	26.10	18.34	15.35	10.99
R18	26.10	18.34	15.35	10.99
R19	26.10	18.34	15.35	10.99
R20	22.19	15.96	16.33	11.94
R21	22.19	15.96	16.33	11.94
R22	26.10	18.34	15.35	10.99
R23	26.06	18.38	15.95	11.18
R24	26.10	18.34	15.35	10.99
R25	30.61	21.00	15.71	10.82
R26	30.61	21.00	15.71	10.82
R27	30.61	21.00	15.71	10.82
R28	17.62	13.03	13.24	9.29
R29	21.67	15.69	15.95	10.59
R30	21.67	15.69	15.95	10.59
R31	21.67	15.69	15.95	10.59
R32	21.67	15.69	15.95	10.59
R33	16.71	12.44	13.78	9.68
R34	16.71	12.44	13.78	9.68
Committed Sensitive Receptors				
CR1 – CR5	21.67	15.69	15.95	10.59
Proposed Sensitive Receptors				
PR1 – PR8	21.67	15.69	15.95	10.59
Ecological Sensitive Receptors				
E1	16.62	12.38	14.17	9.89
E2	16.62	12.38	14.17	9.89
E3	16.62	12.38	14.17	9.89
E8	17.62	13.03	13.24	9.29
E9	17.62	13.03	13.24	9.29
E10	17.62	13.03	13.24	9.29
E11	16.06	11.99	13.09	9.10
E12	16.06	11.99	13.09	9.10
E13	16.06	11.99	13.09	9.10
E14	16.06	11.99	13.09	9.10
E15	16.06	11.99	13.09	9.10
E18	17.62	13.03	13.24	9.29
E19	17.62	13.03	13.24	9.29

All the Defra background concentrations detailed in **Table 6-2** for 2019, show that the background levels are predicted to be below the relevant AQO within the study area.

A breakdown of the background source apportionment of NO_x concentrations at each monitoring location and receptor is shown in **Table 6-3**.

Table 6-3. Pollutant Source Apportionment of NO_x (µg/m³)

Receptor Location	2019						
	Total NO _x	% of NO _x from Road Sources	% of NO _x from Industrial Sources	% of NO _x from Domestic Sources	% of NO _x from Aircraft Sources	% of NO _x from Rail Sources	% of NO _x from Other Sources
Local Authority Monitoring							
W10	26.10	34.39	3.95	11.75	0.00	0.31	49.61
12(B)	30.61	38.99	6.49	6.49	0.00	0.12	47.90
19(B)	30.61	38.99	6.49	6.49	0.00	0.12	47.90
19(C)	30.61	38.99	6.49	6.49	0.00	0.12	47.90
19(E)	30.61	38.99	6.49	6.49	0.00	0.12	47.90
22	26.10	34.39	3.95	11.75	0.00	0.31	49.61
28	26.10	34.39	3.95	11.75	0.00	0.31	49.61
Existing Sensitive Receptors							
R1	25.97	27.10	3.75	10.29	0.00	0.32	58.54
R2	25.97	27.10	3.75	10.29	0.00	0.32	58.54
R3	25.97	27.10	3.75	10.29	0.00	0.32	58.54
R4	25.97	27.10	3.75	10.29	0.00	0.32	58.54
R5	25.97	27.10	3.75	10.29	0.00	0.32	58.54
R6	25.97	27.10	3.75	10.29	0.00	0.32	58.54
R7	25.97	27.10	3.75	10.29	0.00	0.32	58.54
R8	25.97	27.10	3.75	10.29	0.00	0.32	58.54
R9	25.97	27.10	3.75	10.29	0.00	0.32	58.54
R10	25.97	27.10	3.75	10.29	0.00	0.32	58.54
R11	25.97	27.10	3.75	10.29	0.00	0.32	58.54
R12	26.10	34.39	3.95	11.75	0.00	0.31	49.61
R13	26.10	34.39	3.95	11.75	0.00	0.31	49.61
R14	26.10	34.39	3.95	11.75	0.00	0.31	49.61
R15	26.10	34.39	3.95	11.75	0.00	0.31	49.61
R16	26.10	34.39	3.95	11.75	0.00	0.31	49.61
R17	26.10	34.39	3.95	11.75	0.00	0.31	49.61
R18	26.10	34.39	3.95	11.75	0.00	0.31	49.61
R19	26.10	34.39	3.95	11.75	0.00	0.31	49.61
R20	22.19	32.33	4.38	11.42	0.00	0.22	51.65
R21	22.19	32.33	4.38	11.42	0.00	0.22	51.65
R22	26.10	34.39	3.95	11.75	0.00	0.31	49.61
R23	26.06	39.32	4.80	7.34	0.00	0.33	48.21
R24	26.10	34.39	3.95	11.75	0.00	0.31	49.61
R25	30.61	38.99	6.49	6.49	0.00	0.12	47.90
R26	30.61	38.99	6.49	6.49	0.00	0.12	47.90
R27	30.61	38.99	6.49	6.49	0.00	0.12	47.90
R28	17.62	26.94	4.27	5.65	0.00	0.15	63.00
R29	21.67	37.42	3.86	6.43	0.00	0.23	52.06
R30	21.67	37.42	3.86	6.43	0.00	0.23	52.06
R31	21.67	37.42	3.86	6.43	0.00	0.23	52.06
R32	21.67	37.42	3.86	6.43	0.00	0.23	52.06
R33	16.71	28.65	3.98	7.37	0.00	0.12	59.87
R34	16.71	28.65	3.98	7.37	0.00	0.12	59.87
Proposed Sensitive Receptors							

CR1 – CR5	21.67	37.42	3.86	6.43	0.00	0.23	52.06
Proposed Sensitive Receptors							
PR1 – PR8	21.67	37.42	3.86	6.43	0.00	0.23	52.06
Ecological Sensitive Receptors							
E1	16.62	28.47	3.77	7.79	0.00	0.12	59.84
E2	16.62	28.47	3.77	7.79	0.00	0.12	59.84
E3	16.62	28.47	3.77	7.79	0.00	0.12	59.84
E8	17.62	26.94	4.27	5.65	0.00	0.15	63.00
E9	17.62	26.94	4.27	5.65	0.00	0.15	63.00
E10	17.62	26.94	4.27	5.65	0.00	0.15	63.00
E11	16.06	24.78	4.34	5.37	0.00	0.13	65.38
E12	16.06	24.78	4.34	5.37	0.00	0.13	65.38
E13	16.06	24.78	4.34	5.37	0.00	0.13	65.38
E14	16.06	24.78	4.34	5.37	0.00	0.13	65.38
E15	16.06	24.78	4.34	5.37	0.00	0.13	65.38
E18	17.62	26.94	4.27	5.65	0.00	0.15	63.00
E19	17.62	26.94	4.27	5.65	0.00	0.15	63.00

Table 6-3 shows that the major background source of NO_x at the monitoring, sensitive receptor locations where sources have been identified are mainly comprised of road sources.

A review of the Defra background site has determined that they are in line with the Local Authority monitoring within HBC.

Table 6-4 shows the background concentrations utilised within the assessment.

Table 6-4. Utilised Background Concentrations (µg/m³)

Receptor Location	2018		Source
	NO _x	NO ₂	
Local Authority Monitoring			
W10	26.10	18.34	Defra Background Maps
12(B)	30.61	21.00	
19(B)	30.61	21.00	
19(C)	30.61	21.00	
19(E)	30.61	21.00	
22	26.10	18.34	
28	26.10	18.34	
Existing Sensitive Receptors			
R1	25.97	18.17	Defra Background Maps
R2	25.97	18.17	
R3	25.97	18.17	
R4	25.97	18.17	
R5	25.97	18.17	
R6	25.97	18.17	
R7	25.97	18.17	
R8	25.97	18.17	
R9	25.97	18.17	
R10	25.97	18.17	

R11	25.97	18.17		
R12	26.10	18.34		
R13	26.10	18.34		
R14	26.10	18.34		
R15	26.10	18.34		
R16	26.10	18.34		
R17	26.10	18.34		
R18	26.10	18.34		
R19	26.10	18.34		
R20	22.19	15.96		
R21	22.19	15.96		
R22	26.10	18.34		
R23	26.06	18.38		
R24	26.10	18.34		
R25	30.61	21.00		
R26	30.61	21.00		
R27	30.61	21.00		
R28	17.62	13.03		
R29	21.67	15.69		
R30	21.67	15.69		
R31	21.67	15.69		
R1	25.97	18.17		
R2	25.97	18.17		
R3	25.97	18.17		
Committed Sensitive Receptors				
CR1 – CR5	21.67	15.69		Defra Background Maps
Proposed Sensitive Receptors				
PR1 – PR8	21.67	15.69		Defra Background Maps
Ecological Sensitive Receptors				
E1	17.66	-		APIS
E2	17.66	-		
E3	17.66	-		
E8	18.88	-		
E9	18.88	-		
E10	18.88	-		
E11	17.51	-		
E12	17.51	-		
E13	17.51	-		
E14	17.51	-		
E15	17.51	-		
E18	18.88	-		
E19	18.88	-		

6.3 MODEL VERIFICATION

Model verification involves the comparison of modelled data to monitored data in order to gain the best possible representation of current pollutant concentrations for the assessment years. The verification process is in general accordance with that contained in Section 7 of the TG16 guidance note and uses the most recently available diffusion tube monitoring data to best represent this.

The verification process consists of using the monitoring data and the published background air quality data in the UK National Air Quality Information Archive to calculate the road traffic contribution of NO_x at the monitoring locations. Outputs from the ADMS Roads model are provided as predicted road traffic contribution NO_x emissions. These are converted into predicted roadside contribution NO₂ exposure at the relevant receptor locations based on the updated approach to deriving NO₂ from NO_x for road traffic sources published in Local Air Quality Management TG16. The calculation was derived using the NO_x to NO₂ worksheet in the online LAQM tools website hosted by Defra. **Table 6-5** summarises the final model/monitored data correlation following the application of the model correction factor.

Table 6-5. Comparison of Roadside Modelling & Monitoring Results for NO₂

Link	NO ₂ µg/m ³		
	Monitored NO ₂	Modelled NO ₂	Difference (%)
W10	29.14	26.50	-9.07
12(B)	30.47	33.46	9.81
19(B)	47.71	47.31	-0.83
19(C)	34.83	37.59	7.92
19(E)	33.60	34.90	3.87
22	32.95	30.02	-8.90
28	34.90	32.42	-7.09

The final model produced data at the monitoring locations to within 10% of the monitoring results at all of the verification points, as recommended by TG16 guidance.

The final verification model correlation coefficient (representing the model uncertainty) is 1.00. This was achieved by applying a model correction factor of 1.99 to roadside predicted NO_x concentrations before converting to NO₂. This figure demonstrates that the model predictions were in line with the road traffic emissions at the monitoring locations.

6.4 ADMS-ROADS MODEL INPUTS

Table 6-6. Summary of ADMS Roads Model Inputs

Parameter	Description	Input Value
Chemistry	A facility within ADMS-Roads to calculate the chemical reactions in the atmosphere between Nitric Oxide (NO), NO ₂ , Ozone (O ₃) and Volatile organic compounds (VOCs).	No atmospheric chemistry parameters included
Meteorology	Representative meteorological data from a local source	Thorney Island 2018 Meteorological Station , hourly sequential data
Surface Roughness	A setting to define the surface roughness of the model area based upon its location.	1.0m representing a typical surface roughness for Cities and Woodlands was used for the Site 0.5m representing a typical surface roughness for Parkland / Open Suburbia for the met. Measurement site.
Latitude	Allows the location of the model area to be set	United Kingdom = 50.8
Monin-Obukhov Length	This allows a measure of the stability of the atmosphere within the model area to be specified depending upon its character.	Cities and Large Towns = 30m was used for the Site Small Towns = 10m was used for the met. Measurement site.
Elevation of Road	Allows the height of the road link above ground level to be specified.	All other road links were set at ground level = 0m .

Road Width	Allows the width of the road link to be specified.	Road width used depended on data obtained from OS map data for the specific road link
Topography	This enables complex terrain data to be included within the model in order to account for turbulence and plume spread effects of topography	No topographical information used
Time Varied Emissions	This enables daily, weekly or monthly variations in emissions to be applied to road sources	No time varied emissions used
Road Type	Allows the effect of different types of roads to be assessed.	Urban (Not London) settings were used for the relevant links
Road Speeds	Enables individual road speeds to be added for each road link	Based on national speed limits
Canyon Height	Allows the model to take account turbulent flow patterns occurring inside a street with relatively tall buildings on both sides, known as a "street canyon".	No canyons used within the model
Road Source Emissions	Road source emission rates are calculated from traffic flow data using the in-built EFT database of traffic emission factors.	The EFT Version 10.1 (2020) dataset was used.
Year	Predicted EFT emissions rates depend on the year of emission.	2018 data for verification and baseline Operational Phase Assessment. 2023 data for the Operational Phase Traffic Assessment.

6.5 ADMS MODELLING RESULTS

6.5.1 Traffic Assessment

The ADMS Model has predicted concentrations of NO₂, PM₁₀ and PM_{2.5} at relevant receptor locations adjacent to roads likely to be affected by the development, as summarised in the following tables. Only receptors close to roads where there is predicted to be a change in emissions have been assessed.

6.5.2 Assessment Scenarios

For the operational year of 2023, assessment of the effects of emissions from the proposed traffic associated with the scheme, has been undertaken using the Emissions Factor Toolkit (EFT) 2023 emissions rates which take into account of the rate of reduction in emission from road vehicles into the future with the following factors:

- 2018 Baseline = Existing Baseline conditions;
- 2023 "Do Minimum" = 2023 Baseline + Committed Development Flows (through local growth factor);
- 2023 "Do Something" Scenario 1 = 2023 Baseline + Committed Development Flows (through local growth factor) + Development Traffic Flows: ('Without Mitigation' which reflects the existing road layout); and,
- 2023 "Do Something" Scenario 2 = 2023 Baseline + Committed Development Flows (through local growth factor) + Development Traffic Flows ('With Mitigation' which redistributes right-turners at the Castle Avenue / Emsworth Road junction).

Additionally, a sensitivity, theoretical, test has been undertaken in Appendix C assuming no improvements in vehicle emissions between the baseline year of 2018 and the opening year of 2023.

6.5.3 Operational Traffic Assessment

6.5.3.1 Scenario 1 – 'Without Mitigation' which reflects the existing road layout

Nitrogen Dioxide

Table 6-7 presents a summary of the predicted change in NO₂ concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table 6-7. Predicted Annual Average Concentrations of NO₂ at Receptor Locations

Receptor		NO ₂ (µg/m ³)			
		2018 Baseline	2023 Do Minimum	2023 Do Something	Development Contribution
R1	26 Saint Georges Avenue	20.07	19.38	19.53	0.15
R2	23 Saint Georges Avenue	20.58	19.72	20.13	0.41
R3	2 Castle Avenue	26.62	23.52	23.80	0.28
R4	39 Warblington Avenue	28.24	24.76	24.81	0.05
R5	1 Warblington Avenue	20.60	19.74	19.85	0.11
R6	1 Saint Georges Avenue	22.40	20.96	21.12	0.16
R7	Warblington School	20.34	19.58	19.61	0.03
R8	27 Southleigh Road	21.24	20.19	20.22	0.03
R9	1 Fifth Avenue	21.54	20.41	20.44	0.03
R10	1 Southleigh Road	25.22	22.78	22.86	0.08
R11	66 East Street	27.55	24.43	24.51	0.08
R12	42 East Street	29.84	26.06	26.15	0.09
R13	Church View, 1 South Street	33.57	28.54	28.66	0.12
R14	2 Elm Lane	27.64	24.44	24.51	0.07
R15	66 West Street	26.10	23.47	23.50	0.03
R16	25 Mavis Crescent	23.97	22.06	22.08	0.02
R17	Westbourne Court, Chidham Close	29.68	25.93	25.97	0.04
R18	Havant College	22.58	21.10	21.11	0.01
R19	Havant College	21.04	20.11	20.12	0.01
R20	8 The Drive	18.26	17.46	17.47	0.01
R21	13 Willow Park, Leigh Road	20.85	19.17	19.18	0.01
R22	Whyke Court, Chidham Close (W10)	26.81	24.00	24.03	0.03
R23	2 Bedhampton Road	22.07	20.82	20.83	0.01
R24	Bosmere Junior School	24.64	22.40	22.43	0.03
R25	Bosmere Junior School	31.91	28.00	28.04	0.04
R26	The Limes, Regents Court	42.81	35.35	35.43	0.08
R27	2 Langbrook Close	30.37	27.14	27.18	0.04
R28	36 Langstone Road	20.38	17.91	17.93	0.02
R29	Bosham Gardens	26.11	22.21	22.24	0.03
R30	Bosham Gardens	26.23	22.29	22.31	0.02
R31	Bosham Gardens	26.54	22.48	22.51	0.03
R32	1 Selangor Avenue	21.63	19.52	19.53	0.01
R33	37 Havant Road	19.13	16.83	16.84	0.01
R34	1 Kings Terrace	23.98	20.10	20.11	0.01
CR1	Committed Residential Receptor	-	17.17	17.52	0.35
CR2	Committed Residential Receptor	-	17.17	17.48	0.31
CR3	Committed Residential Receptor	-	17.07	17.36	0.29
CR4	Committed Residential Receptor	-	19.56	19.60	0.04
CR5	Committed Residential Receptor	-	18.77	18.84	0.07
PR1	Proposed Residential Receptor	-	-	19.27	-
PR2	Proposed Residential Receptor	-	-	18.88	-

PR3	Proposed Residential Receptor	-	-	18.64	-
PR4	Proposed Residential Receptor	-	-	18.45	-
PR5	Proposed Residential Receptor	-	-	18.88	-
PR6	Proposed Residential Receptor	-	-	17.29	-
PR7	Proposed Residential Receptor	-	-	17.24	-
PR8	Proposed Residential Receptor	-	-	17.47	-
Annual Mean AQO		40 µg/m ³			

All modelled existing receptors are predicted to be below the AQO for NO₂ in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table 6-7**, the maximum predicted increase in annual average exposure to NO₂ at any existing receptor, due to changes in traffic movements associated with the proposed development is likely to be 0.41 µg/m³ at 23 Saint Georges Avenue (R2).

The maximum predicted annual average exposure to NO₂ at any proposed receptor at the ground floor is 19.27 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for NO₂.

The predicted long-term NO₂ concentrations at all proposed, committed and existing receptors are well below 60 µg/m³ in all scenarios. Therefore, it is unlikely there will be any exceedances for the short-term NO₂ AQO at all modelled receptors as outlined in LAQM TG16 technical guidance.

Figure 6-1 and **Figure 6-2** below illustrate the Total Long Term Annual Average Nitrogen Dioxide (NO₂) Concentration and contribution at the Proposed Development (µg/m³).

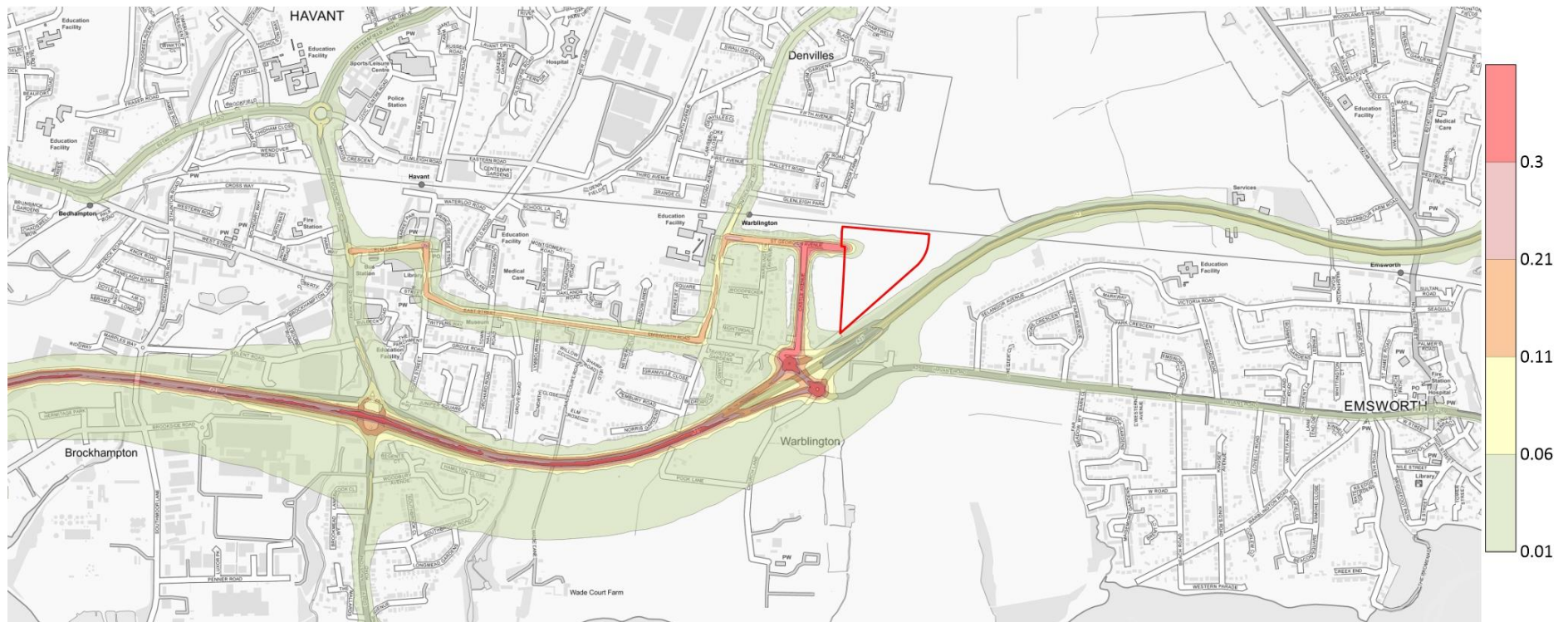
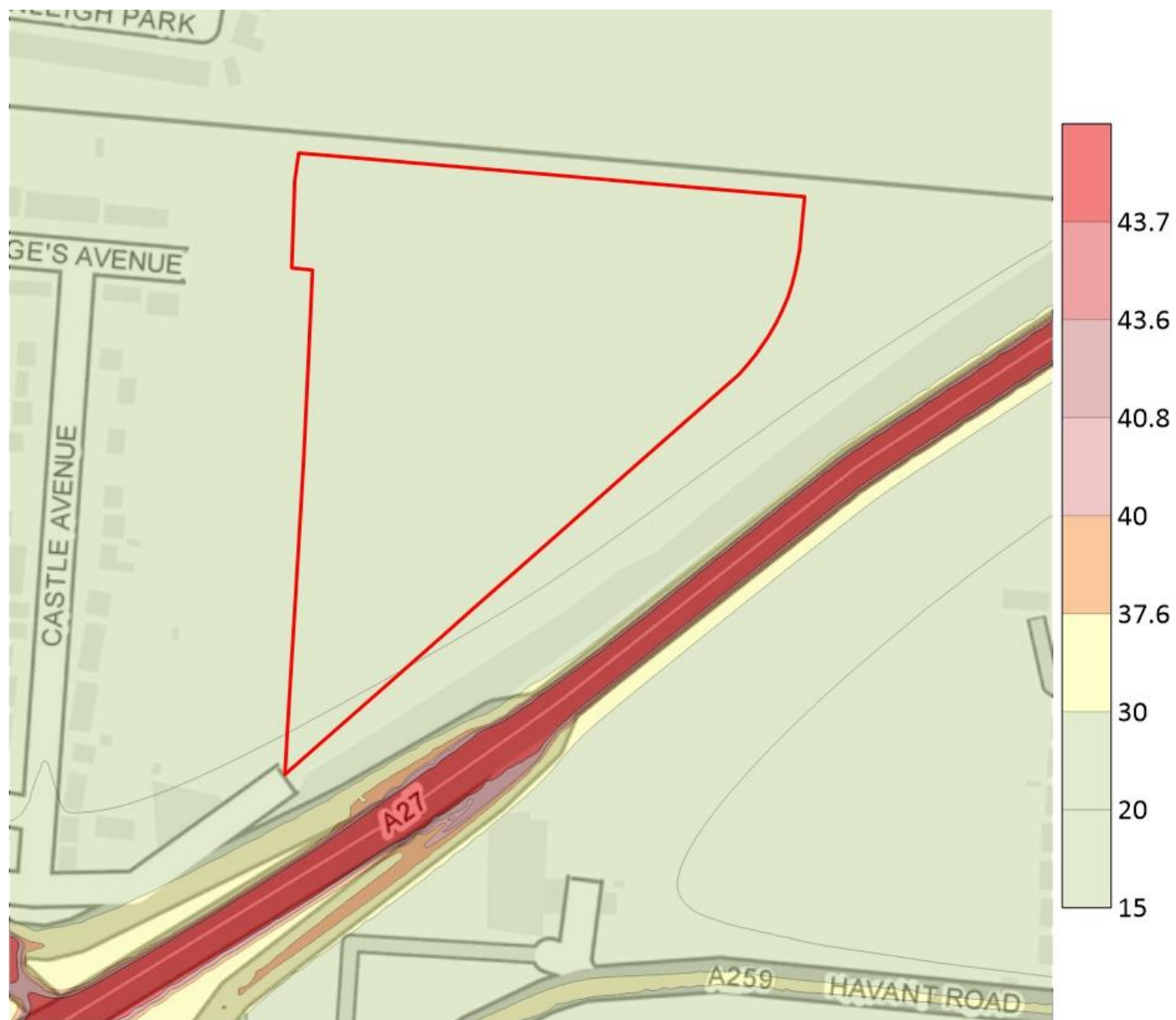
Figure 6-1. Annual Average Long-Term Nitrogen Dioxide (NO₂) Contribution from Proposed Development (µg/m³)

Figure 6-2. Total Long Term Annual Average Nitrogen Dioxide (NO₂) Concentration at Proposed Development (µg/m³)

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean NO₂ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 6-8**.

Table 6-8. Impact Description of Effects at Key Receptors (NO₂)

Impact Description of NO ₂ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.15	0.38	0%	≤75% of AQO	Negligible
R2	0.41	1.03	1%	≤75% of AQO	Negligible
R3	0.28	0.70	1%	≤75% of AQO	Negligible
R4	0.05	0.13	0%	≤75% of AQO	Negligible
R5	0.11	0.28	0%	≤75% of AQO	Negligible
R6	0.16	0.40	0%	≤75% of AQO	Negligible
R7	0.03	0.08	0%	≤75% of AQO	Negligible
R8	0.03	0.08	0%	≤75% of AQO	Negligible
R9	0.03	0.08	0%	≤75% of AQO	Negligible
R10	0.08	0.20	0%	≤75% of AQO	Negligible
R11	0.08	0.20	0%	≤75% of AQO	Negligible
R12	0.09	0.23	0%	≤75% of AQO	Negligible
R13	0.12	0.30	0%	≤75% of AQO	Negligible
R14	0.07	0.18	0%	≤75% of AQO	Negligible
R15	0.03	0.08	0%	≤75% of AQO	Negligible
R16	0.02	0.05	0%	≤75% of AQO	Negligible
R17	0.04	0.10	0%	≤75% of AQO	Negligible
R18	0.01	0.03	0%	≤75% of AQO	Negligible
R19	0.01	0.03	0%	≤75% of AQO	Negligible
R20	0.01	0.03	0%	≤75% of AQO	Negligible
R21	0.01	0.03	0%	≤75% of AQO	Negligible
R22	0.03	0.08	0%	≤75% of AQO	Negligible
R23	0.01	0.03	0%	≤75% of AQO	Negligible
R24	0.03	0.08	0%	≤75% of AQO	Negligible
R25	0.04	0.10	0%	≤75% of AQO	Negligible
R26	0.08	0.20	0%	76-94% of AQO	Negligible
R27	0.04	0.10	0%	≤75% of AQO	Negligible
R28	0.02	0.05	0%	≤75% of AQO	Negligible
R29	0.03	0.08	0%	≤75% of AQO	Negligible
R30	0.02	0.05	0%	≤75% of AQO	Negligible
R31	0.03	0.08	0%	≤75% of AQO	Negligible
R32	0.01	0.03	0%	≤75% of AQO	Negligible
R33	0.01	0.03	0%	≤75% of AQO	Negligible
R34	0.01	0.03	0%	≤75% of AQO	Negligible
CR1	0.35	0.88	1%	≤75% of AQO	Negligible
CR2	0.31	0.78	1%	≤75% of AQO	Negligible
CR3	0.29	0.73	1%	≤75% of AQO	Negligible
CR4	0.04	0.10	0%	≤75% of AQO	Negligible
CR5	0.07	0.18	0%	≤75% of AQO	Negligible

+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO₂ exposure for existing receptors, is determined to be 'negligible' at all modelled receptors. This is based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

Particulate Matter (PM₁₀)

Table 6-9 presents a summary of the predicted change in annual mean PM₁₀ concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table 6-9. Predicted Annual Average Concentrations of PM₁₀ at Receptor Locations

Receptor		PM ₁₀ (µg/m ³)			
		2018 Baseline	2023 Do Minimum	2023 Do Something	Development Contribution
R1	26 Saint Georges Avenue	15.57	15.56	15.60	0.04
R2	23 Saint Georges Avenue	15.65	15.64	15.75	0.11
R3	2 Castle Avenue	16.65	16.60	16.68	0.08
R4	39 Warblington Avenue	17.09	17.05	17.07	0.02
R5	1 Warblington Avenue	15.66	15.65	15.68	0.03
R6	1 Saint Georges Avenue	15.97	15.96	16.00	0.04
R7	Warblington School	15.61	15.60	15.61	0.01
R8	27 Southleigh Road	15.78	15.78	15.79	0.01
R9	1 Fifth Avenue	15.88	15.88	15.89	0.01
R10	1 Southleigh Road	16.39	16.36	16.38	0.02
R11	66 East Street	17.04	17.03	17.05	0.02
R12	42 East Street	17.56	17.55	17.58	0.03
R13	Church View, 1 South Street	17.76	17.71	17.74	0.03
R14	2 Elm Lane	16.83	16.79	16.81	0.02
R15	66 West Street	16.71	16.69	16.70	0.01
R16	25 Mavis Crescent	16.38	16.37	16.37	<0.01
R17	Westbourne Court, Chidham Close	17.27	17.25	17.25	<0.01
R18	Havant College	16.08	16.07	16.07	<0.01
R19	Havant College	15.81	15.80	15.80	<0.01
R20	8 The Drive	16.77	16.76	16.76	<0.01
R21	13 Willow Park, Leigh Road	17.28	17.28	17.28	<0.01
R22	Whyke Court, Chidham Close (W10)	16.80	16.78	16.79	0.01
R23	2 Bedhampton Road	16.64	16.63	16.64	0.01
R24	Bosmere Junior School	16.38	16.35	16.36	0.01
R25	Bosmere Junior School	17.52	17.46	17.47	0.01
R26	The Limes, Regents Court	19.54	19.43	19.45	0.02
R27	2 Langbrook Close	17.50	17.47	17.48	0.01
R28	36 Langstone Road	14.69	14.69	14.70	0.01
R29	Bosham Gardens	17.62	17.55	17.56	0.01
R30	Bosham Gardens	17.62	17.55	17.55	<0.01
R31	Bosham Gardens	17.66	17.59	17.60	0.01
R32	1 Selangor Avenue	16.99	16.97	16.97	<0.01

R33	37 Havant Road	15.01	14.99	14.99	<0.01
R34	1 Kings Terrace	15.54	15.50	15.50	<0.01
CR1	Committed Residential Receptor	-	16.32	16.42	0.10
CR2	Committed Residential Receptor	-	16.32	16.40	0.08
CR3	Committed Residential Receptor	-	16.29	16.37	0.08
CR4	Committed Residential Receptor	-	16.90	16.91	0.01
CR5	Committed Residential Receptor	-	16.71	16.72	0.01
PR1	Proposed Residential Receptor	-	-	16.82	-
PR2	Proposed Residential Receptor	-	-	16.72	-
PR3	Proposed Residential Receptor	-	-	16.66	-
PR4	Proposed Residential Receptor	-	-	16.61	-
PR5	Proposed Residential Receptor	-	-	16.73	-
PR6	Proposed Residential Receptor	-	-	16.35	-
PR7	Proposed Residential Receptor	-	-	16.34	-
PR8	Proposed Residential Receptor	-	-	16.37	-
Annual Mean AQO		40 µg/m³			

All modelled existing receptors are predicted to be below the AQO for PM₁₀ in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table 6-9**, the maximum predicted increase in annual average exposure to PM₁₀ at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.11 µg/m³ at 23 Saint Georges Avenue (R2).

The maximum predicted annual average exposure to PM₁₀ at any proposed receptor at the ground floor is 16.82 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for PM₁₀.

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean PM₁₀ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 6-10**.

Table 6-10. Impact Description of Effects at Key Receptors (PM₁₀)

Impact Description of PM ₁₀ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.04	0.10	0%	≤75% of AQO	Negligible
R2	0.11	0.26	0%	≤75% of AQO	Negligible
R3	0.08	0.19	0%	≤75% of AQO	Negligible
R4	0.02	0.03	0%	≤75% of AQO	Negligible
R5	0.03	0.08	0%	≤75% of AQO	Negligible
R6	0.04	0.10	0%	≤75% of AQO	Negligible
R7	0.01	0.02	0%	≤75% of AQO	Negligible
R8	0.01	0.03	0%	≤75% of AQO	Negligible
R9	0.01	0.03	0%	≤75% of AQO	Negligible
R10	0.02	0.05	0%	≤75% of AQO	Negligible
R11	0.02	0.06	0%	≤75% of AQO	Negligible
R12	0.03	0.07	0%	≤75% of AQO	Negligible
R13	0.03	0.07	0%	≤75% of AQO	Negligible

R14	0.02	0.04	0%	≤75% of AQO	Negligible
R15	0.01	0.02	0%	≤75% of AQO	Negligible
R16	<0.01	0.02	0%	≤75% of AQO	Negligible
R17	<0.01	0.02	0%	≤75% of AQO	Negligible
R18	<0.01	0.01	0%	≤75% of AQO	Negligible
R19	<0.01	0.01	0%	≤75% of AQO	Negligible
R20	<0.01	0.00	0%	≤75% of AQO	Negligible
R21	<0.01	0.01	0%	≤75% of AQO	Negligible
R22	0.01	0.01	0%	≤75% of AQO	Negligible
R23	0.01	0.01	0%	≤75% of AQO	Negligible
R24	0.01	0.02	0%	≤75% of AQO	Negligible
R25	0.01	0.02	0%	≤75% of AQO	Negligible
R26	0.02	0.05	0%	≤75% of AQO	Negligible
R27	0.01	0.02	0%	≤75% of AQO	Negligible
R28	0.01	0.02	0%	≤75% of AQO	Negligible
R29	0.01	0.02	0%	≤75% of AQO	Negligible
R30	<0.01	0.02	0%	≤75% of AQO	Negligible
R31	0.01	0.01	0%	≤75% of AQO	Negligible
R32	<0.01	0.01	0%	≤75% of AQO	Negligible
R33	<0.01	0.01	0%	≤75% of AQO	Negligible
R34	<0.01	0.01	0%	≤75% of AQO	Negligible
CR1	0.10	0.25	0%	≤75% of AQO	Negligible
CR2	0.08	0.22	0%	≤75% of AQO	Negligible
CR3	0.08	0.20	0%	≤75% of AQO	Negligible
CR4	0.01	0.03	0%	≤75% of AQO	Negligible
CR5	0.01	0.05	0%	≤75% of AQO	Negligible

+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM₁₀ exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

Particulate Matter (PM_{2.5})

Table 6-11 presents a summary of the predicted change in annual mean PM_{2.5} concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table 6-11. Predicted Annual Average Concentrations of PM_{2.5} at Receptor Locations

Receptor		PM _{2.5} (µg/m ³)			Development Contribution
		2018 Baseline	2023 Do Minimum	2023 Do Something	
R1	26 Saint Georges Avenue	11.07	11.05	11.08	0.03
R2	23 Saint Georges Avenue	11.12	11.10	11.16	0.06
R3	2 Castle Avenue	11.72	11.64	11.69	0.05
R4	39 Warblington Avenue	11.97	11.89	11.90	0.01
R5	1 Warblington Avenue	11.12	11.10	11.12	0.02
R6	1 Saint Georges Avenue	11.31	11.28	11.30	0.02

R7	Warblington School	11.09	11.08	11.08	<0.01
R8	27 Southleigh Road	11.20	11.18	11.18	<0.01
R9	1 Fifth Avenue	11.25	11.23	11.24	0.01
R10	1 Southleigh Road	11.56	11.51	11.52	0.01
R11	66 East Street	11.93	11.88	11.89	0.01
R12	42 East Street	12.29	12.23	12.24	0.01
R13	Church View, 1 South Street	12.45	12.34	12.36	0.02
R14	2 Elm Lane	11.88	11.81	11.82	0.01
R15	66 West Street	11.80	11.75	11.75	<0.01
R16	25 Mavis Crescent	11.60	11.56	11.57	0.01
R17	Westbourne Court, Chidham Close	12.14	12.07	12.07	<0.01
R18	Havant College	11.43	11.40	11.40	<0.01
R19	Havant College	11.26	11.25	11.25	<0.01
R20	8 The Drive	12.19	12.18	12.18	<0.01
R21	13 Willow Park, Leigh Road	12.49	12.47	12.47	<0.01
R22	Whyke Court, Chidham Close (W10)	11.86	11.80	11.81	0.01
R23	2 Bedhampton Road	11.58	11.56	11.56	<0.01
R24	Bosmere Junior School	11.61	11.56	11.56	<0.01
R25	Bosmere Junior School	11.91	11.81	11.81	<0.01
R26	The Limes, Regents Court	13.11	12.92	12.93	0.01
R27	2 Langbrook Close	11.87	11.81	11.81	<0.01
R28	36 Langstone Road	10.14	10.10	10.10	<0.01
R29	Bosham Gardens	11.59	11.49	11.50	0.01
R30	Bosham Gardens	11.60	11.49	11.49	<0.01
R31	Bosham Gardens	11.62	11.51	11.52	0.01
R32	1 Selangor Avenue	11.21	11.17	11.17	<0.01
R33	37 Havant Road	10.40	10.36	10.36	<0.01
R34	1 Kings Terrace	10.74	10.66	10.66	<0.01
CR1	Committed Residential Receptor	-	10.80	10.86	0.06
CR2	Committed Residential Receptor	-	10.80	10.85	0.05
CR3	Committed Residential Receptor	-	10.79	10.83	0.04
CR4	Committed Residential Receptor	-	11.13	11.14	0.01
CR5	Committed Residential Receptor	-	11.02	11.03	0.01
PR1	Proposed Residential Receptor	-	-	11.08	-
PR2	Proposed Residential Receptor	-	-	11.03	-
PR3	Proposed Residential Receptor	-	-	10.99	-
PR4	Proposed Residential Receptor	-	-	10.97	-
PR5	Proposed Residential Receptor	-	-	11.03	-
PR6	Proposed Residential Receptor	-	-	10.82	-
PR7	Proposed Residential Receptor	-	-	10.81	-
PR8	Proposed Residential Receptor	-	-	10.83	-
Annual Mean AQO		25 µg/m³			

All modelled existing receptors are predicted to be below the AQO for PM_{2.5} in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table 6-11**, the maximum predicted increase in annual average exposure to PM_{2.5} at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.06 µg/m³ at 23 Saint Georges Avenue (R2), and Committed Residential Receptor (CR1).

The maximum predicted annual average exposure to NO₂ at any proposed receptor at the ground floor is 11.08 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for PM_{2.5}.

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean PM_{2.5} exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 6-12**.

Table 6-12. Impact Description of Effects at Key Receptors (PM_{2.5})

Impact Description of PM _{2.5} Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.03	0.09	0%	≤75% of AQO	Negligible
R2	0.06	0.24	0%	≤75% of AQO	Negligible
R3	0.05	0.17	0%	≤75% of AQO	Negligible
R4	0.01	0.03	0%	≤75% of AQO	Negligible
R5	0.02	0.07	0%	≤75% of AQO	Negligible
R6	0.02	0.09	0%	≤75% of AQO	Negligible
R7	<0.01	0.02	0%	≤75% of AQO	Negligible
R8	<0.01	0.02	0%	≤75% of AQO	Negligible
R9	0.01	0.02	0%	≤75% of AQO	Negligible
R10	0.01	0.05	0%	≤75% of AQO	Negligible
R11	0.01	0.05	0%	≤75% of AQO	Negligible
R12	0.01	0.06	0%	≤75% of AQO	Negligible
R13	0.02	0.07	0%	≤75% of AQO	Negligible
R14	0.01	0.04	0%	≤75% of AQO	Negligible
R15	<0.01	0.02	0%	≤75% of AQO	Negligible
R16	0.01	0.01	0%	≤75% of AQO	Negligible
R17	<0.01	0.03	0%	≤75% of AQO	Negligible
R18	<0.01	0.01	0%	≤75% of AQO	Negligible
R19	<0.01	0.01	0%	≤75% of AQO	Negligible
R20	<0.01	0.01	0%	≤75% of AQO	Negligible
R21	<0.01	0.01	0%	≤75% of AQO	Negligible
R22	0.01	0.02	0%	≤75% of AQO	Negligible
R23	<0.01	0.01	0%	≤75% of AQO	Negligible
R24	<0.01	0.02	0%	≤75% of AQO	Negligible
R25	<0.01	0.02	0%	≤75% of AQO	Negligible
R26	0.01	0.05	0%	≤75% of AQO	Negligible
R27	<0.01	0.02	0%	≤75% of AQO	Negligible
R28	<0.01	0.02	0%	≤75% of AQO	Negligible
R29	0.01	0.02	0%	≤75% of AQO	Negligible
R30	<0.01	0.02	0%	≤75% of AQO	Negligible
R31	0.01	0.01	0%	≤75% of AQO	Negligible
R32	<0.01	0.01	0%	≤75% of AQO	Negligible
R33	<0.01	0.01	0%	≤75% of AQO	Negligible
R34	<0.01	0.01	0%	≤75% of AQO	Negligible
CR1	0.06	0.22	0%	≤75% of AQO	Negligible
CR2	0.05	0.19	0%	≤75% of AQO	Negligible
CR3	0.04	0.18	0%	≤75% of AQO	Negligible

CR4	0.01	0.03	0%	≤75% of AQO	Negligible
CR5	0.01	0.04	0%	≤75% of AQO	Negligible

+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM₁₀ exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

6.5.3.2 Scenario 1 – Ecological Sensitive Receptor Locations

Background concentrations at each of the ecologically sensitive sites were determined through a review of the NO_x pollutants published on the APIS website.

The below assessment has been undertaken in accordance with A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites (IAQM, 2020).

Nitrogen Oxide

Table 6-13 presents a summary of the predicted change in NO_x concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table 6-13. Predicted Annual Average Concentrations of NO_x at Ecological Receptor Locations

Ecological Receptor		Predicted Maximum Annual Mean Concentration (µg/m ³)				
		Do Minimum 2023 NO _x	Do Something 2023 NO _x	Process Contribution (PC)	PC as %age of AQO	Background
E1	Brook Meadow (Emsworth) (LNR)	25.28	25.30	0.02	0.06	17.66
E2	Brook Meadow (Emsworth) (LNR)	24.12	24.14	0.01	0.05	17.66
E3	Brook Meadow (Emsworth) (LNR)	24.13	24.14	0.01	0.05	17.66
E8	Chichester Harbour (SSSI & Ramsar)	26.90	26.95	0.05	0.16	18.88
E9	Chichester Harbour (SSSI & Ramsar)	24.09	24.13	0.03	0.10	18.88
E10	Chichester Harbour (SSSI & Ramsar)	27.96	28.01	0.05	0.17	18.88
E11	Chichester Harbour (SSSI & Ramsar)	25.92	25.97	0.05	0.16	17.51
E12	Chichester Harbour (SSSI & Ramsar)	24.94	24.98	0.04	0.14	17.51
E13	Chichester Harbour (SSSI & Ramsar)	24.73	24.77	0.04	0.14	17.51
E14	Chichester Harbour (SSSI & Ramsar)	24.49	24.53	0.04	0.13	17.51
E15	Chichester Harbour (SSSI & Ramsar)	25.63	25.68	0.05	0.16	17.51
E18	Chichester & Langstone Harbours (SSSI & Ramsar)	21.63	21.64	0.02	0.06	18.88
E19	Chichester & Langstone Harbours (SSSI & Ramsar)	21.87	21.89	0.02	0.06	18.88

Annual Mean AQO/Critical Level (CL)	30 µg/m ³
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As indicated in **Table 6-13**, the maximum predicted increase in the annual average exposure to NO_x at any ecological receptor, due to changes in traffic movements associated with the development, is 0.05 µg/m³ at Chichester Harbour (SSSI & Ramsar) (E8, E10, E11 and E15).

Section 5.5.4.1 of *A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*, IAQM 2020 states:

“Where the assessment indicates that changes in annual mean NO_x concentrations within a designated site cannot be dismissed as imperceptible (i.e. an increase of over 0.4 µg/m³) and the NO_x critical level is exceeded, then changes in nutrient nitrogen deposition should be calculated as supporting information to further assist in the evaluation of significance.”

The maximum predicted increase in the annual average exposure to NO_x at the identified ecological receptor, due to changes in traffic movements associated with the development, is 0.05 µg/m³ at Chichester Harbour (SSSI & Ramsar) (E8, E10, E11 and E15) which is below the 0.40 µg/m³ development contribution stated within the guidance of *A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*, IAQM 2020.

As a result, no further assessment is required and the impact at Chichester Harbour (SSSI & Ramsar) (E8, E10, E11 and E15) as this is considered to be negligible.

6.5.3.3 Scenario 2 – ‘With Mitigation’ which redistributes right-turners at the Castle Avenue / Emsworth Road junction

Nitrogen Dioxide

Table 6-14 presents a summary of the predicted change in NO₂ concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled ‘Do Minimum’ and ‘Do Something’ scenarios.

Table 6-14. Predicted Annual Average Concentrations of NO₂ at Receptor Locations

Receptor		NO ₂ (µg/m ³)			
		2018 Baseline	2023 Do Minimum	2023 Do Something	Development Contribution
R1	26 Saint Georges Avenue	20.07	19.38	19.53	0.15
R2	23 Saint Georges Avenue	20.58	19.72	20.08	0.36
R3	2 Castle Avenue	26.62	23.52	23.71	0.19
R4	39 Warblington Avenue	28.24	24.76	24.97	0.21
R5	1 Warblington Avenue	20.60	19.74	20.01	0.27
R6	1 Saint Georges Avenue	22.40	20.96	21.12	0.16
R7	Warblington School	20.34	19.58	19.61	0.03
R8	27 Southleigh Road	21.24	20.19	20.23	0.04
R9	1 Fifth Avenue	21.54	20.41	20.45	0.04
R10	1 Southleigh Road	25.22	22.78	22.88	0.10
R11	66 East Street	27.55	24.43	24.51	0.08
R12	42 East Street	29.84	26.06	26.15	0.09
R13	Church View, 1 South Street	33.57	28.54	28.66	0.12

R14	2 Elm Lane	27.64	24.44	24.51	0.07
R15	66 West Street	26.10	23.47	23.50	0.03
R16	25 Mavis Crescent	23.97	22.06	22.08	0.02
R17	Westbourne Court, Chidham Close	29.68	25.93	25.97	0.04
R18	Havant College	22.58	21.10	21.12	0.02
R19	Havant College	21.04	20.11	20.12	0.01
R20	8 The Drive	18.26	17.46	17.47	0.01
R21	13 Willow Park, Leigh Road	20.85	19.17	19.18	0.01
R22	Whyke Court, Chidham Close (W10)	26.81	24.00	24.03	0.03
R23	2 Bedhampton Road	22.07	20.82	20.83	0.01
R24	Bosmere Junior School	24.64	22.40	22.43	0.03
R25	Bosmere Junior School	31.91	28.00	28.04	0.04
R26	The Limes, Regents Court	42.81	35.35	35.43	0.08
R27	2 Langbrook Close	30.37	27.14	27.18	0.04
R28	36 Langstone Road	20.38	17.91	17.93	0.02
R29	Bosham Gardens	26.11	22.21	22.27	0.06
R30	Bosham Gardens	26.23	22.29	22.34	0.05
R31	Bosham Gardens	26.54	22.48	22.54	0.06
R32	1 Selangor Avenue	21.63	19.52	19.54	0.02
R33	37 Havant Road	19.13	16.83	16.84	0.01
R34	1 Kings Terrace	23.98	20.10	20.11	0.01
CR1	Committed Residential Receptor	-	17.17	17.52	0.35
CR2	Committed Residential Receptor	-	17.17	17.48	0.31
CR3	Committed Residential Receptor	-	17.07	17.36	0.29
CR4	Committed Residential Receptor	-	19.56	19.61	0.05
CR5	Committed Residential Receptor	-	18.77	18.84	0.07
PR1	Proposed Residential Receptor	-	-	19.28	-
PR2	Proposed Residential Receptor	-	-	18.90	-
PR3	Proposed Residential Receptor	-	-	18.65	-
PR4	Proposed Residential Receptor	-	-	18.46	-
PR5	Proposed Residential Receptor	-	-	18.89	-
PR6	Proposed Residential Receptor	-	-	17.29	-
PR7	Proposed Residential Receptor	-	-	17.25	-
PR8	Proposed Residential Receptor	-	-	17.47	-
Annual Mean AQO		40 µg/m ³			

All modelled receptors are predicted to be below the AQO for NO₂ in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table 6-14**, the maximum predicted increase in annual average exposure to NO₂ at any existing or committed receptor, due to changes in traffic movements associated with the proposed development is 0.36 µg/m³ at 23 Saint Georges Avenue (R2).

The maximum predicted annual average exposure to NO₂ at any proposed receptor at the ground floor is 19.28 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for NO₂.

The predicted long-term NO₂ concentrations at all proposed, committed and existing receptors are well below 60 µg/m³ in all scenarios. Therefore, it is unlikely there will be any exceedances for the short-term NO₂ AQO at all modelled receptors as outlined in LAQM TG16 technical guidance.

Figure 6-3 and **Figure 6-4** below illustrate the Total Long Term Annual Average Nitrogen Dioxide (NO₂) Concentration and contribution at the Proposed Development (µg/m³).

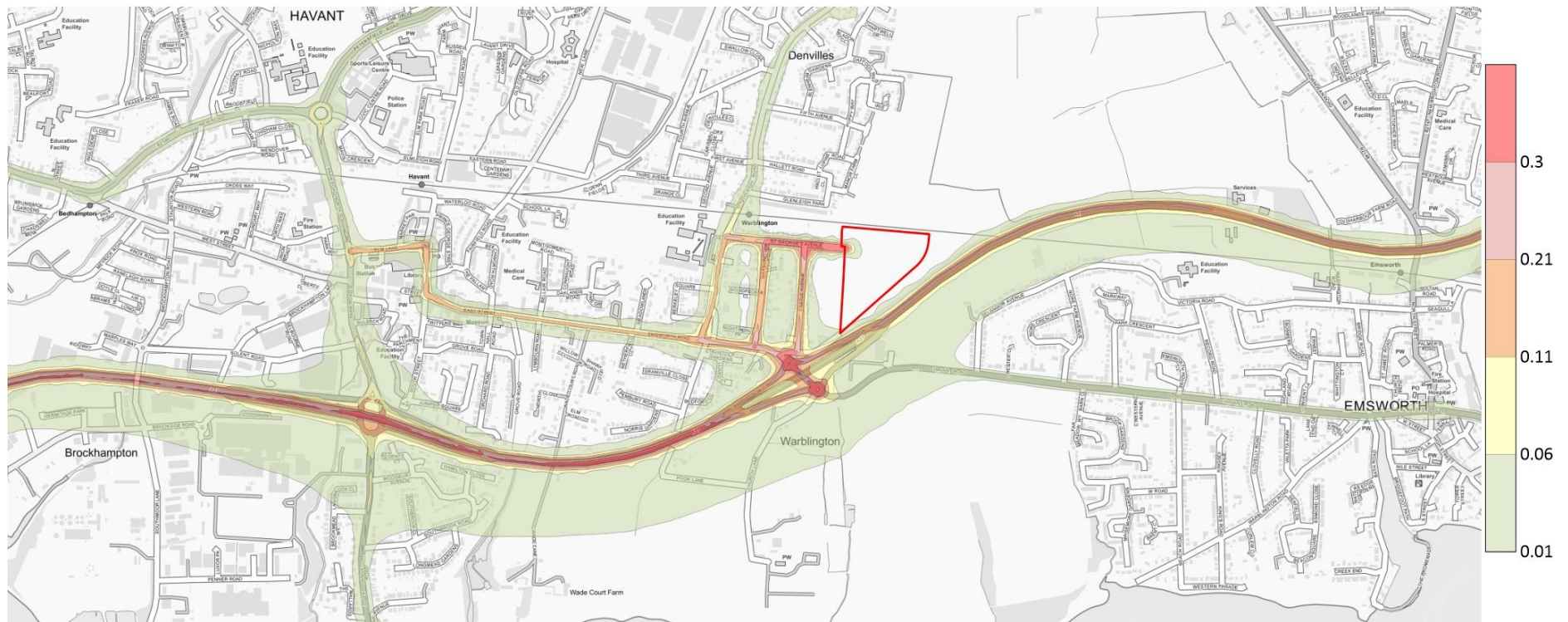
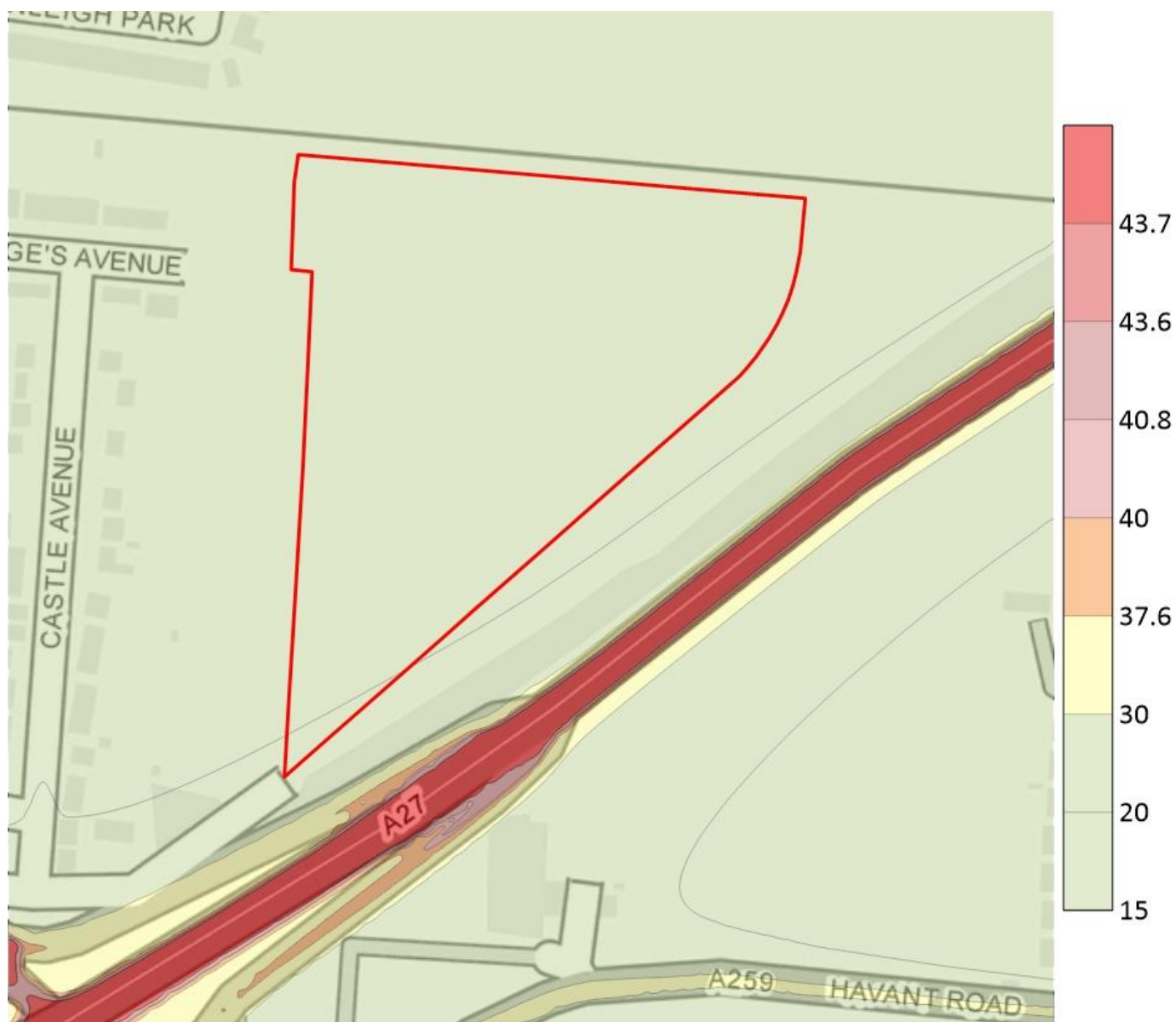
Figure 6-3. Annual Average Long-Term Nitrogen Dioxide (NO₂) Contribution from Proposed Development (µg/m³)

Figure 6-4. Total Long Term Annual Average Nitrogen Dioxide (NO₂) Concentration at Proposed Development (µg/m³)

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean NO₂ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 6-15**.

Table 6-15. Impact Description of Effects at Key Receptors (NO₂)

Impact Description of NO ₂ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.15	0.38	0%	≤75% of AQO	Negligible
R2	0.36	0.90	1%	≤75% of AQO	Negligible
R3	0.19	0.48	0%	≤75% of AQO	Negligible
R4	0.21	0.53	1%	≤75% of AQO	Negligible
R5	0.27	0.68	1%	≤75% of AQO	Negligible
R6	0.16	0.40	0%	≤75% of AQO	Negligible
R7	0.03	0.08	0%	≤75% of AQO	Negligible
R8	0.04	0.10	0%	≤75% of AQO	Negligible
R9	0.04	0.10	0%	≤75% of AQO	Negligible
R10	0.10	0.25	0%	≤75% of AQO	Negligible
R11	0.08	0.20	0%	≤75% of AQO	Negligible
R12	0.09	0.23	0%	≤75% of AQO	Negligible
R13	0.12	0.30	0%	≤75% of AQO	Negligible
R14	0.07	0.18	0%	≤75% of AQO	Negligible
R15	0.03	0.08	0%	≤75% of AQO	Negligible
R16	0.02	0.05	0%	≤75% of AQO	Negligible
R17	0.04	0.10	0%	≤75% of AQO	Negligible
R18	0.02	0.05	0%	≤75% of AQO	Negligible
R19	0.01	0.03	0%	≤75% of AQO	Negligible
R20	0.01	0.03	0%	≤75% of AQO	Negligible
R21	0.01	0.03	0%	≤75% of AQO	Negligible
R22	0.03	0.08	0%	≤75% of AQO	Negligible
R23	0.01	0.03	0%	≤75% of AQO	Negligible
R24	0.03	0.08	0%	≤75% of AQO	Negligible
R25	0.04	0.10	0%	≤75% of AQO	Negligible
R26	0.08	0.20	0%	76-94% of AQO	Negligible
R27	0.04	0.10	0%	≤75% of AQO	Negligible
R28	0.02	0.05	0%	≤75% of AQO	Negligible
R29	0.06	0.15	0%	≤75% of AQO	Negligible
R30	0.05	0.13	0%	≤75% of AQO	Negligible
R31	0.06	0.15	0%	≤75% of AQO	Negligible
R32	0.02	0.05	0%	≤75% of AQO	Negligible
R33	0.01	0.03	0%	≤75% of AQO	Negligible
R34	0.01	0.03	0%	≤75% of AQO	Negligible
CR1	0.35	0.88	1%	≤75% of AQO	Negligible
CR2	0.31	0.78	1%	≤75% of AQO	Negligible
CR3	0.29	0.73	1%	≤75% of AQO	Negligible
CR4	0.05	0.13	0%	≤75% of AQO	Negligible
CR5	0.07	0.18	0%	≤75% of AQO	Negligible

+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO₂ exposure for existing receptors, is determined to be 'negligible' at all modelled receptors. This is based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

Particulate Matter (PM₁₀)

Table 6-16 presents a summary of the predicted change in annual mean PM₁₀ concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table 6-16. Predicted Annual Average Concentrations of PM₁₀ at Receptor Locations

Receptor		PM ₁₀ (µg/m ³)			
		2018 Baseline	2023 Do Minimum	2023 Do Something	Development Contribution
R1	26 Saint Georges Avenue	15.57	15.56	15.60	0.04
R2	23 Saint Georges Avenue	15.65	15.64	15.74	0.10
R3	2 Castle Avenue	16.65	16.60	16.66	0.06
R4	39 Warblington Avenue	17.09	17.05	17.11	0.06
R5	1 Warblington Avenue	15.66	15.65	15.72	0.07
R6	1 Saint Georges Avenue	15.97	15.96	16.00	0.04
R7	Warblington School	15.61	15.60	15.61	0.01
R8	27 Southleigh Road	15.78	15.78	15.79	0.01
R9	1 Fifth Avenue	15.88	15.88	15.89	0.01
R10	1 Southleigh Road	16.39	16.36	16.39	0.03
R11	66 East Street	17.04	17.03	17.05	0.02
R12	42 East Street	17.56	17.55	17.58	0.03
R13	Church View, 1 South Street	17.76	17.71	17.74	0.03
R14	2 Elm Lane	16.83	16.79	16.81	0.02
R15	66 West Street	16.71	16.69	16.70	0.01
R16	25 Mavis Crescent	16.38	16.37	16.37	<0.01
R17	Westbourne Court, Chidham Close	17.27	17.25	17.25	<0.01
R18	Havant College	16.08	16.07	16.07	<0.01
R19	Havant College	15.81	15.80	15.80	<0.01
R20	8 The Drive	16.77	16.76	16.76	<0.01
R21	13 Willow Park, Leigh Road	17.28	17.28	17.28	<0.01
R22	Whyke Court, Chidham Close (W10)	16.80	16.78	16.79	0.01
R23	2 Bedhampton Road	16.64	16.63	16.64	0.01
R24	Bosmere Junior School	16.38	16.35	16.36	0.01
R25	Bosmere Junior School	17.52	17.46	17.47	0.01
R26	The Limes, Regents Court	19.54	19.43	19.45	0.02
R27	2 Langbrook Close	17.50	17.47	17.48	0.01
R28	36 Langstone Road	14.69	14.69	14.70	0.01
R29	Bosham Gardens	17.62	17.55	17.56	0.01
R30	Bosham Gardens	17.62	17.55	17.56	0.01
R31	Bosham Gardens	17.66	17.59	17.60	0.01
R32	1 Selangor Avenue	16.99	16.97	16.97	<0.01

R33	37 Havant Road	15.01	14.99	14.99	<0.01
R34	1 Kings Terrace	15.54	15.50	15.51	0.01
CR1	Committed Residential Receptor	-	16.32	16.42	0.10
CR2	Committed Residential Receptor	-	16.32	16.40	0.08
CR3	Committed Residential Receptor	-	16.29	16.37	0.08
CR4	Committed Residential Receptor	-	16.90	16.92	0.02
CR5	Committed Residential Receptor	-	16.71	16.72	0.01
PR1	Proposed Residential Receptor	-	-	16.83	-
PR2	Proposed Residential Receptor	-	-	16.72	-
PR3	Proposed Residential Receptor	-	-	16.66	-
PR4	Proposed Residential Receptor	-	-	16.61	-
PR5	Proposed Residential Receptor	-	-	16.73	-
PR6	Proposed Residential Receptor	-	-	16.35	-
PR7	Proposed Residential Receptor	-	-	16.34	-
PR8	Proposed Residential Receptor	-	-	16.38	-
Annual Mean AQO		40 µg/m³			

All modelled existing receptors are predicted to be below the AQO for PM₁₀ in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table 6-16**, the maximum predicted increase in annual average exposure to PM₁₀ at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.10 µg/m³ at 23 Saint Georges Avenue (R2), and Committed Residential Receptor (CR1).

The maximum predicted annual average exposure to PM₁₀ at any proposed receptor at the ground floor is 16.83 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for PM₁₀.

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean PM₁₀ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 6-17**.

Table 6-17. Impact Description of Effects at Key Receptors (PM₁₀)

Impact Description of PM ₁₀ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.04	0.10	0%	≤75% of AQO	Negligible
R2	0.10	0.24	0%	≤75% of AQO	Negligible
R3	0.06	0.13	0%	≤75% of AQO	Negligible
R4	0.06	0.14	0%	≤75% of AQO	Negligible
R5	0.07	0.17	0%	≤75% of AQO	Negligible
R6	0.04	0.10	0%	≤75% of AQO	Negligible
R7	0.01	0.02	0%	≤75% of AQO	Negligible
R8	0.01	0.03	0%	≤75% of AQO	Negligible
R9	0.01	0.03	0%	≤75% of AQO	Negligible
R10	0.03	0.06	0%	≤75% of AQO	Negligible
R11	0.02	0.06	0%	≤75% of AQO	Negligible
R12	0.03	0.07	0%	≤75% of AQO	Negligible
R13	0.03	0.07	0%	≤75% of AQO	Negligible

R14	0.02	0.04	0%	≤75% of AQO	Negligible
R15	0.01	0.02	0%	≤75% of AQO	Negligible
R16	<0.01	0.02	0%	≤75% of AQO	Negligible
R17	<0.01	0.02	0%	≤75% of AQO	Negligible
R18	<0.01	0.01	0%	≤75% of AQO	Negligible
R19	<0.01	0.01	0%	≤75% of AQO	Negligible
R20	<0.01	0.00	0%	≤75% of AQO	Negligible
R21	<0.01	0.01	0%	≤75% of AQO	Negligible
R22	0.01	0.01	0%	≤75% of AQO	Negligible
R23	0.01	0.01	0%	≤75% of AQO	Negligible
R24	0.01	0.02	0%	≤75% of AQO	Negligible
R25	0.01	0.02	0%	≤75% of AQO	Negligible
R26	0.02	0.05	0%	≤75% of AQO	Negligible
R27	0.01	0.03	0%	≤75% of AQO	Negligible
R28	0.01	0.02	0%	≤75% of AQO	Negligible
R29	0.01	0.03	0%	≤75% of AQO	Negligible
R30	0.01	0.03	0%	≤75% of AQO	Negligible
R31	0.01	0.03	0%	≤75% of AQO	Negligible
R32	<0.01	0.01	0%	≤75% of AQO	Negligible
R33	<0.01	0.01	0%	≤75% of AQO	Negligible
R34	0.01	0.01	0%	≤75% of AQO	Negligible
CR1	0.10	0.25	0%	≤75% of AQO	Negligible
CR2	0.08	0.22	0%	≤75% of AQO	Negligible
CR3	0.08	0.21	0%	≤75% of AQO	Negligible
CR4	0.02	0.03	0%	≤75% of AQO	Negligible
CR5	0.01	0.04	0%	≤75% of AQO	Negligible

+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM₁₀ exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

Particulate Matter (PM_{2.5})

Table 6-18 presents a summary of the predicted change in annual mean PM_{2.5} concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table 6-18. Predicted Annual Average Concentrations of PM_{2.5} at Receptor Locations

Receptor		PM _{2.5} (µg/m ³)			Development Contribution
		2018 Baseline	2023 Do Minimum	2023 Do Something	
R1	26 Saint Georges Avenue	11.07	11.05	11.08	0.03
R2	23 Saint Georges Avenue	11.12	11.10	11.16	0.06
R3	2 Castle Avenue	11.72	11.64	11.67	0.03
R4	39 Warblington Avenue	11.97	11.89	11.93	0.04
R5	1 Warblington Avenue	11.12	11.10	11.15	0.05
R6	1 Saint Georges Avenue	11.31	11.28	11.30	0.02

R7	Warblington School	11.09	11.08	11.08	<0.01
R8	27 Southleigh Road	11.20	11.18	11.18	<0.01
R9	1 Fifth Avenue	11.25	11.23	11.24	0.01
R10	1 Southleigh Road	11.56	11.51	11.53	0.02
R11	66 East Street	11.93	11.88	11.89	0.01
R12	42 East Street	12.29	12.23	12.24	0.01
R13	Church View, 1 South Street	12.45	12.34	12.36	0.02
R14	2 Elm Lane	11.88	11.81	11.82	0.01
R15	66 West Street	11.80	11.75	11.75	<0.01
R16	25 Mavis Crescent	11.60	11.56	11.57	0.01
R17	Westbourne Court, Chidham Close	12.14	12.07	12.07	<0.01
R18	Havant College	11.43	11.40	11.40	<0.01
R19	Havant College	11.26	11.25	11.25	<0.01
R20	8 The Drive	12.19	12.18	12.18	<0.01
R21	13 Willow Park, Leigh Road	12.49	12.47	12.47	<0.01
R22	Whyke Court, Chidham Close (W10)	11.86	11.80	11.81	0.01
R23	2 Bedhampton Road	11.58	11.56	11.56	<0.01
R24	Bosmere Junior School	11.61	11.56	11.56	<0.01
R25	Bosmere Junior School	11.91	11.81	11.81	<0.01
R26	The Limes, Regents Court	13.11	12.92	12.93	0.01
R27	2 Langbrook Close	11.87	11.81	11.81	<0.01
R28	36 Langstone Road	10.14	10.10	10.10	<0.01
R29	Bosham Gardens	11.59	11.49	11.50	0.01
R30	Bosham Gardens	11.60	11.49	11.50	0.01
R31	Bosham Gardens	11.62	11.51	11.52	0.01
R32	1 Selangor Avenue	11.21	11.17	11.17	<0.01
R33	37 Havant Road	10.40	10.36	10.36	<0.01
R34	1 Kings Terrace	10.74	10.66	10.66	<0.01
CR1	Committed Residential Receptor	-	10.80	10.86	0.06
CR2	Committed Residential Receptor	-	10.80	10.85	0.05
CR3	Committed Residential Receptor	-	10.79	10.83	0.04
CR4	Committed Residential Receptor	-	11.13	11.14	0.01
CR5	Committed Residential Receptor	-	11.02	11.03	0.01
PR1	Proposed Residential Receptor	-	-	11.09	-
PR2	Proposed Residential Receptor	-	-	11.03	-
PR3	Proposed Residential Receptor	-	-	10.99	-
PR4	Proposed Residential Receptor	-	-	10.97	-
PR5	Proposed Residential Receptor	-	-	11.03	-
PR6	Proposed Residential Receptor	-	-	10.82	-
PR7	Proposed Residential Receptor	-	-	10.81	-
PR8	Proposed Residential Receptor	-	-	10.83	-
Annual Mean AQO		25 µg/m³			

All modelled existing receptors are predicted to be below the AQO for PM_{2.5} in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table 6-18**, the maximum predicted increase in annual average exposure to PM_{2.5} at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.06 µg/m³ at 23 Saint Georges Avenue (R2), and Committed Residential Receptor (CR1).

The maximum predicted annual average exposure to NO₂ at any proposed receptor at the ground floor is 11.09 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for PM_{2.5}.

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean PM_{2.5} exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 6-19**.

Table 6-19. Impact Description of Effects at Key Receptors (PM_{2.5})

Impact Description of PM _{2.5} Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.03	0.10	0%	≤75% of AQO	Negligible
R2	0.06	0.22	0%	≤75% of AQO	Negligible
R3	0.03	0.12	0%	≤75% of AQO	Negligible
R4	0.04	0.13	0%	≤75% of AQO	Negligible
R5	0.05	0.16	0%	≤75% of AQO	Negligible
R6	0.02	0.09	0%	≤75% of AQO	Negligible
R7	<0.01	0.02	0%	≤75% of AQO	Negligible
R8	<0.01	0.02	0%	≤75% of AQO	Negligible
R9	0.01	0.02	0%	≤75% of AQO	Negligible
R10	0.02	0.06	0%	≤75% of AQO	Negligible
R11	0.01	0.05	0%	≤75% of AQO	Negligible
R12	0.01	0.06	0%	≤75% of AQO	Negligible
R13	0.02	0.07	0%	≤75% of AQO	Negligible
R14	0.01	0.04	0%	≤75% of AQO	Negligible
R15	<0.01	0.02	0%	≤75% of AQO	Negligible
R16	0.01	0.01	0%	≤75% of AQO	Negligible
R17	<0.01	0.03	0%	≤75% of AQO	Negligible
R18	<0.01	0.01	0%	≤75% of AQO	Negligible
R19	<0.01	0.01	0%	≤75% of AQO	Negligible
R20	<0.01	0.01	0%	≤75% of AQO	Negligible
R21	<0.01	0.01	0%	≤75% of AQO	Negligible
R22	0.01	0.02	0%	≤75% of AQO	Negligible
R23	<0.01	0.01	0%	≤75% of AQO	Negligible
R24	<0.01	0.02	0%	≤75% of AQO	Negligible
R25	<0.01	0.02	0%	≤75% of AQO	Negligible
R26	0.01	0.05	0%	≤75% of AQO	Negligible
R27	<0.01	0.02	0%	≤75% of AQO	Negligible
R28	<0.01	0.02	0%	≤75% of AQO	Negligible
R29	0.01	0.03	0%	≤75% of AQO	Negligible
R30	0.01	0.03	0%	≤75% of AQO	Negligible
R31	0.01	0.03	0%	≤75% of AQO	Negligible
R32	<0.01	0.01	0%	≤75% of AQO	Negligible
R33	<0.01	0.01	0%	≤75% of AQO	Negligible
R34	<0.01	0.01	0%	≤75% of AQO	Negligible
CR1	0.06	0.22	0%	≤75% of AQO	Negligible
CR2	0.05	0.20	0%	≤75% of AQO	Negligible
CR3	0.04	0.19	0%	≤75% of AQO	Negligible

CR4	0.01	0.03	0%	≤75% of AQO	Negligible
CR5	0.01	0.04	0%	≤75% of AQO	Negligible

+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM₁₀ exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

6.5.3.4 Scenario 2 – Ecological Sensitive Receptor Locations

Background concentrations at each of the ecologically sensitive sites were determined through a review of the NO_x pollutants published on the APIS website.

The below assessment has been undertaken in accordance with A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites (IAQM, 2020).

Nitrogen Oxide

Table 6-20 presents a summary of the predicted change in NO_x concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table 6-20. Predicted Annual Average Concentrations of NO_x at Ecological Receptor Locations

Ecological Receptor		Predicted Maximum Annual Mean Concentration (µg/m ³)				
		Do Minimum 2023 NO _x	Do Something 2023 NO _x	Process Contribution (PC)	PC as %age of AQO	Background
E1	Brook Meadow (Emsworth) (LNR)	25.28	25.30	0.02	0.07	17.66
E2	Brook Meadow (Emsworth) (LNR)	24.12	24.14	0.02	0.07	17.66
E3	Brook Meadow (Emsworth) (LNR)	24.13	24.15	0.02	0.06	17.66
E8	Chichester Harbour (SSSI & Ramsar)	26.90	26.95	0.05	0.16	18.88
E9	Chichester Harbour (SSSI & Ramsar)	24.09	24.13	0.03	0.11	18.88
E10	Chichester Harbour (SSSI & Ramsar)	27.96	28.01	0.05	0.18	18.88
E11	Chichester Harbour (SSSI & Ramsar)	25.92	25.97	0.05	0.17	17.51
E12	Chichester Harbour (SSSI & Ramsar)	24.94	24.98	0.04	0.15	17.51
E13	Chichester Harbour (SSSI & Ramsar)	24.73	24.77	0.04	0.14	17.51
E14	Chichester Harbour (SSSI & Ramsar)	24.49	24.53	0.04	0.14	17.51
E15	Chichester Harbour (SSSI & Ramsar)	25.63	25.68	0.05	0.16	17.51
E18	Chichester & Langstone Harbours (SSSI & Ramsar)	21.63	21.65	0.02	0.06	18.88
E19	Chichester & Langstone Harbours (SSSI & Ramsar)	21.87	21.89	0.02	0.07	18.88

Annual Mean AQO/Critical Level (CL)	30 µg/m ³
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As indicated in **Table 6-13**, the maximum predicted increase in the annual average exposure to NO_x at any ecological receptor, due to changes in traffic movements associated with the development, is 0.05 µg/m³ at Chichester Harbour (SSSI & Ramsar) (E8, E10, E11 and E15).

Section 5.5.4.1 of *A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*, IAQM 2020 states:

“Where the assessment indicates that changes in annual mean NO_x concentrations within a designated site cannot be dismissed as imperceptible (i.e. an increase of over 0.4 µg/m³) and the NO_x critical level is exceeded, then changes in nutrient nitrogen deposition should be calculated as supporting information to further assist in the evaluation of significance.”

The maximum predicted increase in the annual average exposure to NO_x at the identified ecological receptor, due to changes in traffic movements associated with the development, is 0.05 µg/m³ at Chichester Harbour (SSSI & Ramsar) (E8, E10, E11 and E15) which is below the 0.40 µg/m³ development contribution stated within the guidance of *‘A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites’*, IAQM 2020.

As a result, no further assessment is required and the impact at Chichester Harbour (SSSI & Ramsar) (E8, E10, E11 and E15) as this is considered to be negligible.

7.0 DAMAGE COSTS ASSESSMENT

The pollutant emissions costs calculation identifies the environmental damage costs associated with the proposal and determine the amount (value) of mitigation that is expected to be spent on measures to mitigate the impacts. The calculation utilises the most recent Defra Emissions Factor Toolkit (version 10.1) to estimate the additional pollutant emissions from a proposed development and the latest Defra Air Quality Damage Costs (published January 2019) for the specific pollutant of interest, to calculate the resultant damage cost.

The Emissions Assessment Calculator has been, as detailed below.

EFT Input:

- 1,320 cars
- 0 HGVs (0.00% HGV)
- 50 kph
- 10 km (NTS UK avg.)

A Baseline Year of 2018 for 'Road Transport' has been used within this assessment.

Table 7-1 and **Table 7-2** below shows how the total damage cost calculations have been calculated.

Table 7-1. Annual Emissions Factor Outputs (g/tonnes/year)

Pollutant	Year				
	2023	2024	2025	2026	2027
NO _x	1.00	0.90	0.81	0.73	0.66
PM _{2.5}	0.09	0.08	0.08	0.08	0.08

Table 7-2. Central Damage Costs (£)

Pollutant	Year				
	2023	2024	2025	2026	2027
NO _x	£12,180	£10,869	£9,664	£8,571	£7,566
PM _{2.5}	£19,848	£19,388	£18,980	£18,612	£18,272

Total NO_x = £48,850

Total PM_{2.5} = £95,100

Total Damage Costs = **£143,950**

This calculated figure is to be put towards the mitigation measures outlined in Section 8 of the report and does not represent a sum owed by the developer.

8.0 MITIGATION

8.1 CONSTRUCTION PHASE

The dust risk categories have been determined in Section 5 for each of the four construction activities. The assessment has determined that the potential impact description of dust emissions associated with the construction phase of the proposed development is 'low risk' at the worst affected receptors.

Using the methodology described in Appendix A, appropriate site-specific mitigation measures associated with the determined level of risk can be found in Section 8.2 of the 'IAQM Guidance on the Assessment of Dust from Demolition and Construction'.

The mitigation measures have been divided into general measures applicable to all sites and measures applicable specifically to demolition, earthworks, construction and trackout. They are categorised into 'highly recommended' and 'desirable' measures.

The mitigation measures for the proposed development are detailed in **Table 8-1** and **Table 8-2**.

Table 8-1. IAQM Guidance on the Assessment of Dust from Demolition and Construction 'Highly Recommended' Mitigation Measures

Communications
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
Display the head or regional office contact information.
Dust 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 offsite, and the action taken to resolve the situation in the log book.
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.
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 the site boundary that are at least as high as any stockpiles on site.
Avoid site runoff of water or mud.
Ensure all vehicles 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.
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-potable water where possible and appropriate.
Use enclosed chutes and 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.
Avoid bonfires and burning of waste materials.
Earthworks
No Action Required.

Construction
No Action Required.
Trackout
No Action Required.

Table 8-2. IAQM Guidance on the Assessment of Dust from Demolition and Construction ‘Desirable’ Mitigation Measures

Communications
No Action Required.
Dust Management
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real time PM ₁₀ continuous monitoring and/or visual inspections.
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.
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
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.
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads 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).
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.
Earthworks
No Action Required.
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.
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.
Record all inspections of haul routes and any subsequent action in a site log book.
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

Following the implementation of the mitigation measures detailed in the tables above, the impact description of the construction phase is not considered to be significant.

8.2 OPERATIONAL PHASE

Operational phase mitigation is not deemed necessary as the predicted level of significance associated with the additional vehicle movements at all modelled receptors is negligible. In addition, the proposed receptor locations are not considered to be exposed to poor air quality and will be below the Air Quality Objective.

Mitigation measures are proposed within the associated travel plan to reduce the impacts of road traffic emissions. Mitigation measures proposed within the travel plan predicted to have an impact on reducing the

effect of road traffic emissions include cycle parking and the promotion of sustainable transport. The promotion of sustainable transport is proposed through information provided to residents outlining the key facilities for walking, cycling and public transport, safe cycling practice, and information promoting the health and cost benefits of walking and cycling.

9.0 CONCLUSIONS

Tetra Tech have undertaken an Air Quality Assessment to support a planning application for the construction of a new residential development, at the Land off St Georges Avenue, Havant, PO9 2RX.

Construction Phase

Prior to the implementation of appropriate mitigation measures, the potential impact description of dust emissions associated with the construction phase of the proposed development is 'low risk' at the worst affected receptors without mitigation. However, appropriate site-specific mitigation measures have been proposed based on Section 8.2 of 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

2023 "Do Something" Scenario 1 'Without Mitigation' which reflects the existing road layout

The 2023 assessment of the effect of emissions from traffic associated with the scheme, has determined that the maximum predicted increase in the annual average exposure to NO₂ at any existing receptor is likely to be 0.41 µg/m³ at 23 Saint Georges Avenue (R2).

The predicted long-term NO₂ 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 NO₂ AQO at all proposed receptors as outlined in LAQM TG16 technical guidance.

For PM₁₀, the maximum predicted increase in the annual average exposure is likely to be 0.11 µg/m³ at 23 Saint Georges Avenue (R2). For PM_{2.5}, the maximum predicted increase in the annual average exposure is likely to be 0.06 µg/m³ at 23 Saint Georges Avenue (R2) and Committed Residential Receptor (CR1).

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO₂, PM₁₀ and PM_{2.5} exposure, is determined to be 'negligible' at all existing receptors.

At any proposed sensitive receptors, there is not predicted to be any exceedances of the NO₂, PM₁₀ or PM_{2.5} pollutant concentrations and therefore, mitigation is not required at the proposed development.

2023 "Do Something" Scenario 2 'With Mitigation' which redistributes right-turners at the Castle Avenue / Emsworth Road junction

The 2023 assessment of the effect of emissions from traffic associated with the scheme, has determined that the maximum predicted increase in the annual average exposure to NO₂ at any existing receptor is likely to be 0.36 µg/m³ at 23 Saint Georges Avenue (R2).

The predicted long-term NO₂ 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 NO₂ AQO at all proposed receptors as outlined in LAQM TG16 technical guidance.

For PM₁₀, the maximum predicted increase in the annual average exposure is likely to be 0.10 µg/m³ at 23 Saint Georges Avenue (R2) and Committed Residential Receptor (CR1). For PM_{2.5}, the maximum predicted increase

in the annual average exposure is likely to be $0.06 \mu\text{g}/\text{m}^3$ at 23 Saint Georges Avenue (R2), and Committed Residential Receptor (CR1).

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2 , PM_{10} and $\text{PM}_{2.5}$ exposure, is determined to be 'negligible' at all existing receptors.

At any proposed sensitive receptors, there is not predicted to be any exceedances of the NO_2 , PM_{10} or $\text{PM}_{2.5}$ pollutant concentrations and therefore, mitigation is not required at the proposed development.

Operational Assessment – Ecology

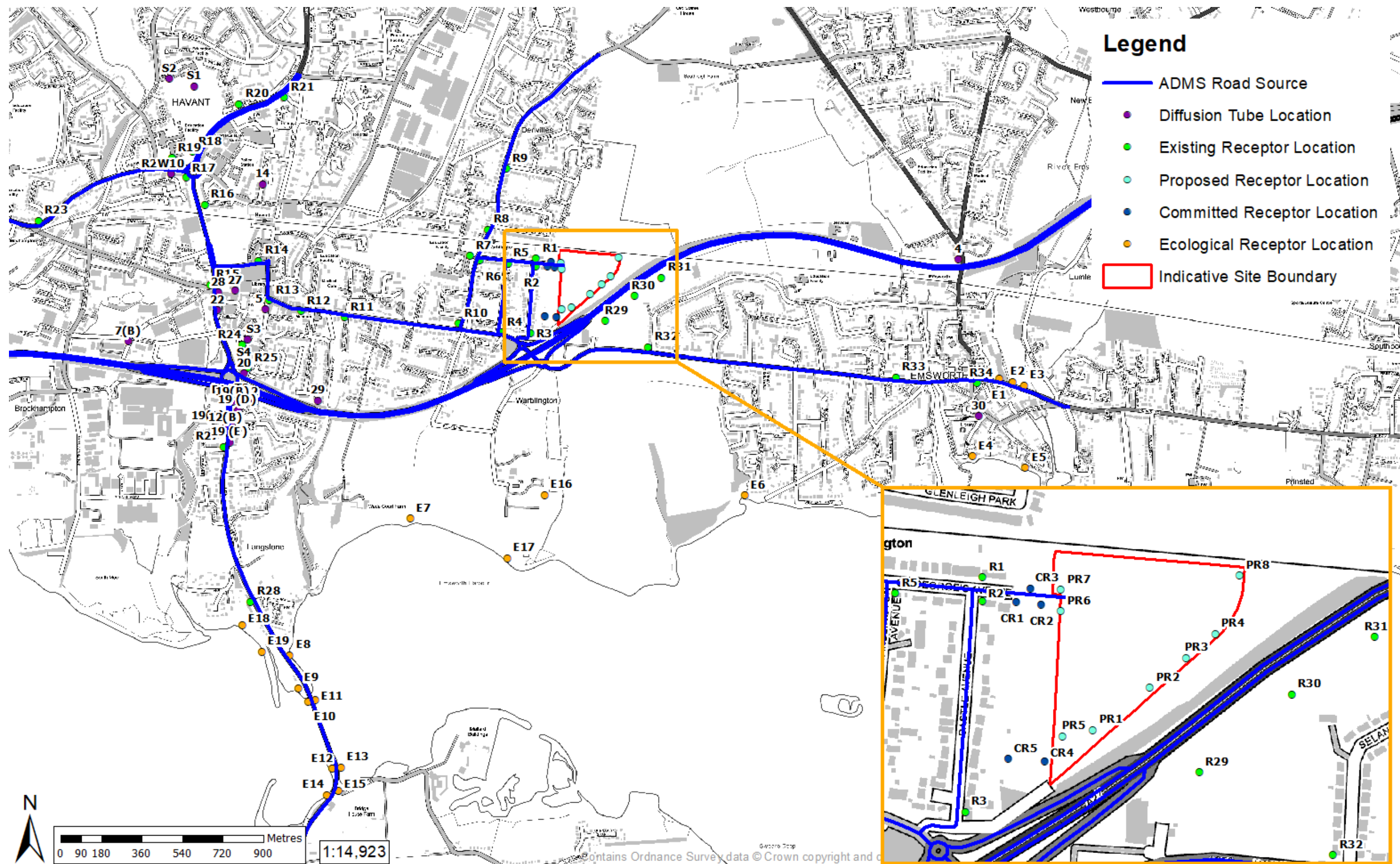
The maximum predicted increase in the annual average exposure to NO_x at the identified ecological receptor, due to changes in traffic movements associated with the development, in either Scenario 1 or Scenario 2, is $0.05 \mu\text{g}/\text{m}^3$ at Chichester Harbour (SSSI & Ramsar) (E8, E10, E11 and E15) which is below the $0.40 \mu\text{g}/\text{m}^3$ development contribution stated within the guidance of '*A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*', IAQM 2020. As a result, no further assessment is required and the impact at Chichester Harbour (SSSI & Ramsar) (E8, E10, E11 and E15) as this is considered to be negligible.

Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

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

APPENDIX A - FIGURES

Figure A-1 Air Quality Assessment Area



APPENDIX B - CONSTRUCTION PHASE ASSESSMENT METHODOLOGY

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

Step 1 – Screen the Requirement for a more Detailed Assessment

An assessment is required if there are sensitive receptors within 350m of the site boundary, within 50m of the route(s) used by construction vehicles on the surrounding road network, or within 500m from the site entrance. A detailed assessment is also required if there is an ecological receptor within 50m of the site boundary.

Step 2A – Define the Potential Dust Emission Magnitude

Demolition

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

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

Earthworks

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

- *Large:* Total site area >10 000m², potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), > 10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100 000 tonnes;
- *Medium:* Total site area 2 500m² – 10 000m², moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4m-8m in height, total material moved 20 000 tonnes – 100 000 tonnes; and
- *Small:* Total site area <2 500 m², soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10 000 tonnes, earthworks during wetter months.

Construction

The dust emission magnitude for the construction phase has been determined based on the below criteria:

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

Trackout

The dust emission magnitude for trackout has been determined based on the below criteria:

- *Large:* >50 HGV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- *Medium:* 10-50 HGV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m; and,
- *Small:* <10 HGV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

Step 2B - Defining the Sensitivity of the Area

Sensitivities of People to Dust Soiling Effects

- *High:*
 - * Users can reasonably expect an enjoyment of a high level of amenity;
 - * The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably expect to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land; and,
 - * Indicative examples include dwellings, museums and other culturally important collections, medium- and long-term car parks

¹ Institute of Air Quality Management 2014. *Guidance on the Assessment of dust from demolition and construction*.

and car showrooms.

- **Medium:**
 - * Users can reasonably 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; and,
 - * Indicative examples include parks and places of work.
- **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; and,
 - * Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table B-1. Sensitivity of the Area to Dust Soiling Effects on People and Property

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

Note - The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Sensitivities of People to the Health Effects of PM₁₀

- **High:**
 - * Locations where members of the public are exposed over a time period relevant to the air quality objective for PM₁₀ (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);
 - * Indicative 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.
- **Medium:**
 - * Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM₁₀ (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); and,
 - * Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM₁₀, as protection is covered by Health and Safety at Work legislation.
- **Low:**
 - * Locations where human exposure is transient; and,
 - * Indicative examples include public footpaths, playing fields, parks and shopping streets.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table B-2. Sensitivity of the Area to Human Health Impacts

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

Note - The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Sensitivities of Receptors to Ecological Effects

- *High:*
 - * 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; and,
 - * Indicative 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:*
 - * 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; and,
 - * Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
- *Low:*
 - * Locations with a local designation where the features may be affected by dust deposition; and,
 - * Indicative example is a local Nature Reserve with dust sensitive features.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table B-3. Sensitivity of the Area to Ecological Impacts

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

Note - The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Step 2C - Defining the Risk of Impacts

The risk of impacts with no mitigation is determined by combining the dust emission magnitude determined in Step 2A and the sensitivity of the area determined in Step 2B.

The following tables provide a method of assigning the level of risk for each activity.

*Demolition***Table B-4.** Risk of Dust Impacts, 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

*Earthworks***Table B-5.** Risk of Dust Impacts, Earthworks

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

*Construction***Table B-6.** Risk of Dust Impacts, 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

*Trackout***Table B-7.** Risk of Dust Impacts, 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

Step 3 – Site Specific Mitigation

The dust risk categories for each of the four activities determined in Step 2C should be used to define the appropriate, site-specific mitigation measures to be adopted.

These mitigation measures are contained within section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition and Construction.

APPENDIX C - THEORETICAL SCENARIO (NO REDUCTION IN UK FLEET EMISSIONS OVER TIME) RESULTS

Scenario Context

This additional theoretical scenario uses emission factors for 2018 for the 'Do Minimum' and 'Do Something' scenarios based on a recent appeal decision (planning reference no.APP/D3830/A/14/22269877) that favoured the uncertainty of emissions forecasts. It should be noted that this is a theoretical scenario which assumes that the government (Defra) predictions for reductions in emissions over the forthcoming years will not occur. This should not be considered as a 'more correct' scenario in accordance with the 2010 note [<http://laqm.defra.gov.uk/laqm-faqs/faq5.html>] which confirms that: *'There is no evidence to suggest that background concentrations associated with the other (non-traffic) source contributions should not behave as forecast. This disparity in the historical data highlights the uncertainty of future year projections of both NO_x and NO₂, but at this stage there is no robust evidence upon which to base any revised road traffic emissions projections'*.

The assessment scenarios are defined below:

- 2023 "Do Minimum" = 2023 Baseline + Committed Development Flows (through local growth factor) (using 2018 traffic emission factors);
- 2023 "Do Something" Scenario 1 = 2023 Baseline + Committed Development Flows (through local growth factor) + Development Traffic Flows: ('Without Mitigation' which reflects the existing road layout) (using 2018 traffic emission factors); and,
- 2023 "Do Something" Scenario 2 = 2023 Baseline + Committed Development Flows (through local growth factor) + Development Traffic Flows ('With Mitigation' which redistributes right-turners at the Castle Avenue / Emsworth Road junction) (using 2018 traffic emission factors).

Scenario 1 – 'Without Mitigation' which reflects the existing road layout

Nitrogen Dioxide

Table C-1 presents a summary of the predicted long term NO₂ concentrations at relevant proposed receptor locations based on the modelled 2023 'Do Minimum' and 'Do Something' scenarios.

Table C-1. Predicted Annual Average Concentrations of NO₂ at Receptor Locations

Receptor		NO ₂ (µg/m ³)			
		2018 Baseline	2023 Do Minimum	2023 Do Something	Development Contribution
R1	26 Saint Georges Avenue	20.07	20.17	20.39	0.22
R2	23 Saint Georges Avenue	20.58	20.71	21.33	0.62
R3	2 Castle Avenue	26.62	27.05	27.46	0.41
R4	39 Warblington Avenue	28.24	28.75	28.83	0.08
R5	1 Warblington Avenue	20.60	20.73	20.90	0.17
R6	1 Saint Georges Avenue	22.40	22.62	22.87	0.25
R7	Warblington School	20.34	20.46	20.51	0.05
R8	27 Southleigh Road	21.24	21.40	21.45	0.05

R9	1 Fifth Avenue	21.54	21.71	21.77	0.06
R10	1 Southleigh Road	25.22	25.58	25.71	0.13
R11	66 East Street	27.55	28.02	28.13	0.11
R12	42 East Street	29.84	30.41	30.54	0.13
R13	Church View, 1 South Street	33.57	34.30	34.47	0.17
R14	2 Elm Lane	27.64	28.11	28.22	0.11
R15	66 West Street	26.10	26.49	26.54	0.05
R16	25 Mavis Crescent	23.97	24.26	24.29	0.03
R17	Westbourne Court, Chidham Close	29.68	30.24	30.29	0.05
R18	Havant College	22.58	22.80	22.82	0.02
R19	Havant College	21.04	21.19	21.20	0.01
R20	8 The Drive	18.26	18.39	18.40	0.01
R21	13 Willow Park, Leigh Road	20.85	21.10	21.12	0.02
R22	Whyke Court, Chidham Close (W10)	26.81	27.23	27.27	0.04
R23	2 Bedhampton Road	22.07	22.26	22.28	0.02
R24	Bosmere Junior School	24.64	24.96	25.00	0.04
R25	Bosmere Junior School	31.91	32.47	32.53	0.06
R26	The Limes, Regents Court	42.81	43.85	43.97	0.12
R27	2 Langbrook Close	30.37	30.84	30.90	0.06
R28	36 Langstone Road	20.38	20.75	20.79	0.04
R29	Bosham Gardens	26.11	26.63	26.68	0.05
R30	Bosham Gardens	26.23	26.76	26.81	0.05
R31	Bosham Gardens	26.54	27.08	27.12	0.04
R32	1 Selangor Avenue	21.63	21.94	21.96	0.02
R33	37 Havant Road	19.13	19.48	19.49	0.01
R34	1 Kings Terrace	23.98	24.55	24.57	0.02
CR1	Committed Residential Receptor	-	18.12	18.67	0.55
CR2	Committed Residential Receptor	-	18.14	18.61	0.47
CR3	Committed Residential Receptor	-	17.96	18.41	0.45
CR4	Committed Residential Receptor	-	22.23	22.30	0.07
CR5	Committed Residential Receptor	-	20.87	20.98	0.11
PR1	Proposed Residential Receptor	-	-	21.74	-
PR2	Proposed Residential Receptor	-	-	21.11	-
PR3	Proposed Residential Receptor	-	-	20.69	-
PR4	Proposed Residential Receptor	-	-	20.39	-
PR5	Proposed Residential Receptor	-	-	21.08	-
PR6	Proposed Residential Receptor	-	-	18.33	-
PR7	Proposed Residential Receptor	-	-	18.25	-
PR8	Proposed Residential Receptor	-	-	18.70	-
Annual Mean AQO		40 µg/m³			

As indicated in **Table C-1**, the maximum predicted increase in annual average exposure to NO₂ at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.62 µg/m³ at 23 Saint Georges Avenue (R2).

The maximum predicted annual average exposure to NO₂ at any proposed receptor at the ground floor is 21.74 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for NO₂.

The predicted long-term NO₂ concentrations at all proposed, committed and existing receptors are below 60 µg/m³ in all scenarios. Therefore, it is unlikely there will be any exceedances for the short-term NO₂ AQO at all modelled receptors as outlined in LAQM TG16 technical guidance.

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean NO₂ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table C-2**.

Table C-2. Impact Description of Effects at Key Receptors (NO₂)

Impact Description of NO ₂ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.22	0.55	1%	≤75% of AQO	Negligible
R2	0.62	1.55	2-5%	≤75% of AQO	Negligible
R3	0.41	1.03	1%	≤75% of AQO	Negligible
R4	0.08	0.20	0%	≤75% of AQO	Negligible
R5	0.17	0.43	0%	≤75% of AQO	Negligible
R6	0.25	0.63	1%	≤75% of AQO	Negligible
R7	0.05	0.13	0%	≤75% of AQO	Negligible
R8	0.05	0.13	0%	≤75% of AQO	Negligible
R9	0.06	0.15	0%	≤75% of AQO	Negligible
R10	0.13	0.33	0%	≤75% of AQO	Negligible
R11	0.11	0.28	0%	≤75% of AQO	Negligible
R12	0.13	0.33	0%	76-94% of AQO	Negligible
R13	0.17	0.43	0%	76-94% of AQO	Negligible
R14	0.11	0.28	0%	≤75% of AQO	Negligible
R15	0.05	0.13	0%	≤75% of AQO	Negligible
R16	0.03	0.08	0%	≤75% of AQO	Negligible
R17	0.05	0.13	0%	76-94% of AQO	Negligible
R18	0.02	0.05	0%	≤75% of AQO	Negligible
R19	0.01	0.03	0%	≤75% of AQO	Negligible
R20	0.01	0.03	0%	≤75% of AQO	Negligible
R21	0.02	0.05	0%	≤75% of AQO	Negligible
R22	0.04	0.10	0%	≤75% of AQO	Negligible
R23	0.02	0.05	0%	≤75% of AQO	Negligible
R24	0.04	0.10	0%	≤75% of AQO	Negligible
R25	0.06	0.15	0%	76-94% of AQO	Negligible
R26	0.12	0.30	0%	≥110 of AQO	Negligible
R27	0.06	0.15	0%	76-94% of AQO	Negligible
R28	0.04	0.10	0%	≤75% of AQO	Negligible
R29	0.05	0.13	0%	≤75% of AQO	Negligible
R30	0.05	0.13	0%	≤75% of AQO	Negligible
R31	0.04	0.10	0%	≤75% of AQO	Negligible
R32	0.02	0.05	0%	≤75% of AQO	Negligible
R33	0.01	0.03	0%	≤75% of AQO	Negligible
R34	0.02	0.05	0%	≤75% of AQO	Negligible
CR1	0.55	1.38	1%	≤75% of AQO	Negligible
CR2	0.47	1.18	1%	≤75% of AQO	Negligible

CR3	0.45	1.13	1%	≤75% of AQO	Negligible
CR4	0.07	0.18	0%	≤75% of AQO	Negligible
CR5	0.11	0.28	0%	≤75% of AQO	Negligible

+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO₂ exposure for existing receptors, is determined to be 'negligible' at all modelled receptors. This is based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

Particulate Matter (PM₁₀)

Table C-3 presents a summary of the predicted change in annual mean PM₁₀ concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table C-3. Predicted Annual Average Concentrations of PM₁₀ at Receptor Locations

Receptor		PM ₁₀ (µg/m ³)			
		2018 Baseline	2023 Do Minimum	2023 Do Something	Development Contribution
R1	26 Saint Georges Avenue	15.57	15.58	15.62	0.04
R2	23 Saint Georges Avenue	15.65	15.67	15.78	0.11
R3	2 Castle Avenue	16.65	16.73	16.81	0.08
R4	39 Warblington Avenue	17.09	17.19	17.20	0.01
R5	1 Warblington Avenue	15.66	15.68	15.71	0.03
R6	1 Saint Georges Avenue	15.97	16.01	16.05	0.04
R7	Warblington School	15.61	15.63	15.64	0.01
R8	27 Southleigh Road	15.78	15.81	15.82	0.01
R9	1 Fifth Avenue	15.88	15.92	15.93	0.01
R10	1 Southleigh Road	16.39	16.45	16.47	0.02
R11	66 East Street	17.04	17.13	17.15	0.02
R12	42 East Street	17.56	17.67	17.70	0.03
R13	Church View, 1 South Street	17.76	17.88	17.91	0.03
R14	2 Elm Lane	16.83	16.91	16.93	0.02
R15	66 West Street	16.71	16.78	16.79	0.01
R16	25 Mavis Crescent	16.38	16.43	16.44	0.01
R17	Westbourne Court, Chidham Close	17.27	17.37	17.38	0.01
R18	Havant College	16.08	16.12	16.12	<0.01
R19	Havant College	15.81	15.83	15.83	<0.01
R20	8 The Drive	16.77	16.79	16.79	<0.01
R21	13 Willow Park, Leigh Road	17.28	17.33	17.34	0.01
R22	Whyke Court, Chidham Close (W10)	16.80	16.88	16.88	<0.01
R23	2 Bedhampton Road	16.64	16.67	16.68	0.01
R24	Bosmere Junior School	16.38	16.44	16.44	<0.01
R25	Bosmere Junior School	17.52	17.62	17.63	0.01
R26	The Limes, Regents Court	19.54	19.74	19.76	0.02
R27	2 Langbrook Close	17.50	17.59	17.60	0.01
R28	36 Langstone Road	14.69	14.77	14.78	0.01

R29	Bosham Gardens	17.62	17.71	17.71	<0.01
R30	Bosham Gardens	17.62	17.71	17.71	<0.01
R31	Bosham Gardens	17.66	17.75	17.76	0.01
R32	1 Selangor Avenue	16.99	17.05	17.05	<0.01
R33	37 Havant Road	15.01	15.07	15.07	<0.01
R34	1 Kings Terrace	15.54	15.63	15.63	<0.01
CR1	Committed Residential Receptor	-	16.35	16.45	0.10
CR2	Committed Residential Receptor	-	16.35	16.44	0.09
CR3	Committed Residential Receptor	-	16.32	16.41	0.09
CR4	Committed Residential Receptor	-	17.00	17.01	0.01
CR5	Committed Residential Receptor	-	16.78	16.80	0.02
PR1	Proposed Residential Receptor	-	-	16.91	-
PR2	Proposed Residential Receptor	-	-	16.80	-
PR3	Proposed Residential Receptor	-	-	16.73	-
PR4	Proposed Residential Receptor	-	-	16.68	-
PR5	Proposed Residential Receptor	-	-	16.81	-
PR6	Proposed Residential Receptor	-	-	16.38	-
PR7	Proposed Residential Receptor	-	-	16.37	-
PR8	Proposed Residential Receptor	-	-	16.42	-
Annual Mean AQO		40 µg/m³			

All modelled existing receptors are predicted to be below the AQO for PM₁₀ in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table C-3**, the maximum predicted increase in annual average exposure to PM₁₀ at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.11 µg/m³ at 23 Saint Georges Avenue (R2).

The maximum predicted annual average exposure to PM₁₀ at any proposed receptor at the ground floor is 16.91 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for PM₁₀.

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean PM₁₀ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table C-4**.

Table C-4. Impact Description of Effects at Key Receptors (PM₁₀)

Impact Description of PM ₁₀ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.04	0.10	0%	≤75% of AQO	Negligible
R2	0.11	0.28	0%	≤75% of AQO	Negligible
R3	0.08	0.20	0%	≤75% of AQO	Negligible
R4	0.01	0.03	0%	≤75% of AQO	Negligible
R5	0.03	0.08	0%	≤75% of AQO	Negligible
R6	0.04	0.11	0%	≤75% of AQO	Negligible
R7	0.01	0.02	0%	≤75% of AQO	Negligible
R8	0.01	0.03	0%	≤75% of AQO	Negligible
R9	0.01	0.03	0%	≤75% of AQO	Negligible

R10	0.02	0.06	0%	≤75% of AQO	Negligible
R11	0.02	0.06	0%	≤75% of AQO	Negligible
R12	0.03	0.08	0%	≤75% of AQO	Negligible
R13	0.03	0.07	0%	≤75% of AQO	Negligible
R14	0.02	0.05	0%	≤75% of AQO	Negligible
R15	0.01	0.02	0%	≤75% of AQO	Negligible
R16	0.01	0.02	0%	≤75% of AQO	Negligible
R17	0.01	0.03	0%	≤75% of AQO	Negligible
R18	<0.01	0.01	0%	≤75% of AQO	Negligible
R19	<0.01	0.01	0%	≤75% of AQO	Negligible
R20	<0.01	0.00	0%	≤75% of AQO	Negligible
R21	0.01	0.01	0%	≤75% of AQO	Negligible
R22	<0.01	0.02	0%	≤75% of AQO	Negligible
R23	0.01	0.01	0%	≤75% of AQO	Negligible
R24	<0.01	0.02	0%	≤75% of AQO	Negligible
R25	0.01	0.03	0%	≤75% of AQO	Negligible
R26	0.02	0.06	0%	≤75% of AQO	Negligible
R27	0.01	0.03	0%	≤75% of AQO	Negligible
R28	0.01	0.02	0%	≤75% of AQO	Negligible
R29	<0.01	0.02	0%	≤75% of AQO	Negligible
R30	<0.01	0.02	0%	≤75% of AQO	Negligible
R31	0.01	0.02	0%	≤75% of AQO	Negligible
R32	<0.01	0.01	0%	≤75% of AQO	Negligible
R33	<0.01	0.01	0%	≤75% of AQO	Negligible
R34	<0.01	0.01	0%	≤75% of AQO	Negligible
CR1	0.10	0.26	0%	≤75% of AQO	Negligible
CR2	0.09	0.23	0%	≤75% of AQO	Negligible
CR3	0.09	0.21	0%	≤75% of AQO	Negligible
CR4	0.01	0.03	0%	≤75% of AQO	Negligible
CR5	0.02	0.05	0%	≤75% of AQO	Negligible

+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM₁₀ exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

Particulate Matter (PM_{2.5})

Table C-5 presents a summary of the predicted change in annual mean PM_{2.5} concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table C-5. Predicted Annual Average Concentrations of PM_{2.5} at Receptor Locations

Receptor		PM _{2.5} (µg/m ³)			
		2018 Baseline	2023 Do Minimum	2023 Do Something	Development Contribution
R1	26 Saint Georges Avenue	11.07	11.08	11.10	0.02
R2	23 Saint Georges Avenue	11.12	11.13	11.20	0.07

R3	2 Castle Avenue	11.72	11.76	11.81	0.05
R4	39 Warblington Avenue	11.97	12.03	12.03	<0.01
R5	1 Warblington Avenue	11.12	11.13	11.15	0.02
R6	1 Saint Georges Avenue	11.31	11.33	11.36	0.03
R7	Warblington School	11.09	11.11	11.11	<0.01
R8	27 Southleigh Road	11.20	11.21	11.22	0.01
R9	1 Fifth Avenue	11.25	11.27	11.28	0.01
R10	1 Southleigh Road	11.56	11.60	11.61	0.01
R11	66 East Street	11.93	11.99	12.00	0.01
R12	42 East Street	12.29	12.36	12.37	0.01
R13	Church View, 1 South Street	12.45	12.52	12.54	0.02
R14	2 Elm Lane	11.88	11.93	11.94	0.01
R15	66 West Street	11.80	11.84	11.85	0.01
R16	25 Mavis Crescent	11.60	11.63	11.63	<0.01
R17	Westbourne Court, Chidham Close	12.14	12.20	12.20	<0.01
R18	Havant College	11.43	11.45	11.45	<0.01
R19	Havant College	11.26	11.28	11.28	<0.01
R20	8 The Drive	12.19	12.21	12.21	<0.01
R21	13 Willow Park, Leigh Road	12.49	12.52	12.53	0.01
R22	Whyke Court, Chidham Close (W10)	11.86	11.90	11.90	<0.01
R23	2 Bedhampton Road	11.58	11.61	11.61	<0.01
R24	Bosmere Junior School	11.61	11.64	11.65	0.01
R25	Bosmere Junior School	11.91	11.96	11.97	0.01
R26	The Limes, Regents Court	13.11	13.23	13.24	0.01
R27	2 Langbrook Close	11.87	11.93	11.93	<0.01
R28	36 Langstone Road	10.14	10.18	10.19	0.01
R29	Bosham Gardens	11.59	11.65	11.65	<0.01
R30	Bosham Gardens	11.60	11.65	11.65	<0.01
R31	Bosham Gardens	11.62	11.68	11.68	<0.01
R32	1 Selangor Avenue	11.21	11.24	11.25	0.01
R33	37 Havant Road	10.40	10.44	10.44	<0.01
R34	1 Kings Terrace	10.74	10.80	10.80	<0.01
CR1	Committed Residential Receptor	-	10.83	10.89	0.06
CR2	Committed Residential Receptor	-	10.83	10.88	0.05
CR3	Committed Residential Receptor	-	10.81	10.86	0.05
CR4	Committed Residential Receptor	-	11.22	11.23	0.01
CR5	Committed Residential Receptor	-	11.09	11.10	0.01
PR1	Proposed Residential Receptor	-	-	11.17	-
PR2	Proposed Residential Receptor	-	-	11.10	-
PR3	Proposed Residential Receptor	-	-	11.06	-
PR4	Proposed Residential Receptor	-	-	11.03	-
PR5	Proposed Residential Receptor	-	-	11.11	-
PR6	Proposed Residential Receptor	-	-	10.85	-
PR7	Proposed Residential Receptor	-	-	10.84	-
PR8	Proposed Residential Receptor	-	-	10.87	-
Annual Mean AQO		25 µg/m³			

All modelled existing receptors are predicted to be below the AQO for PM_{2.5} in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table C-5**, the maximum predicted increase in annual average exposure to PM_{2.5} at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.07 µg/m³ at 23 Saint Georges Avenue (R2).

The maximum predicted annual average exposure to NO₂ at any proposed receptor at the ground floor is 11.17 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for PM_{2.5}.

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean PM_{2.5} exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table C-6**.

Table C-6. Impact Description of Effects at Key Receptors (PM_{2.5})

Impact Description of PM _{2.5} Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.02	0.10	0%	≤75% of AQO	Negligible
R2	0.07	0.27	0%	≤75% of AQO	Negligible
R3	0.05	0.19	0%	≤75% of AQO	Negligible
R4	<0.01	0.03	0%	≤75% of AQO	Negligible
R5	0.02	0.08	0%	≤75% of AQO	Negligible
R6	0.03	0.10	0%	≤75% of AQO	Negligible
R7	<0.01	0.02	0%	≤75% of AQO	Negligible
R8	0.01	0.02	0%	≤75% of AQO	Negligible
R9	0.01	0.03	0%	≤75% of AQO	Negligible
R10	0.01	0.05	0%	≤75% of AQO	Negligible
R11	0.01	0.05	0%	≤75% of AQO	Negligible
R12	0.01	0.06	0%	≤75% of AQO	Negligible
R13	0.02	0.07	0%	≤75% of AQO	Negligible
R14	0.01	0.04	0%	≤75% of AQO	Negligible
R15	0.01	0.02	0%	≤75% of AQO	Negligible
R16	<0.01	0.01	0%	≤75% of AQO	Negligible
R17	<0.01	0.03	0%	≤75% of AQO	Negligible
R18	<0.01	0.01	0%	≤75% of AQO	Negligible
R19	<0.01	0.00	0%	≤75% of AQO	Negligible
R20	<0.01	0.00	0%	≤75% of AQO	Negligible
R21	0.01	0.00	0%	≤75% of AQO	Negligible
R22	<0.01	0.01	0%	≤75% of AQO	Negligible
R23	<0.01	0.01	0%	≤75% of AQO	Negligible
R24	0.01	0.02	0%	≤75% of AQO	Negligible
R25	0.01	0.03	0%	≤75% of AQO	Negligible
R26	0.01	0.05	0%	≤75% of AQO	Negligible
R27	<0.01	0.02	0%	≤75% of AQO	Negligible
R28	0.01	0.02	0%	≤75% of AQO	Negligible
R29	<0.01	0.02	0%	≤75% of AQO	Negligible
R30	<0.01	0.02	0%	≤75% of AQO	Negligible
R31	<0.01	0.02	0%	≤75% of AQO	Negligible
R32	0.01	0.01	0%	≤75% of AQO	Negligible
R33	<0.01	0.00	0%	≤75% of AQO	Negligible

R34	<0.01	0.01	0%	≤75% of AQO	Negligible
CR1	0.06	0.25	0%	≤75% of AQO	Negligible
CR2	0.05	0.22	0%	≤75% of AQO	Negligible
CR3	0.05	0.20	0%	≤75% of AQO	Negligible
CR4	0.01	0.03	0%	≤75% of AQO	Negligible
CR5	0.01	0.05	0%	≤75% of AQO	Negligible

+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM₁₀ exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

Scenario 2 – 'With Mitigation' which redistributes right-turners at the Castle Avenue / Emsworth Road junction

Nitrogen Dioxide

Table C-7 presents a summary of the predicted long term NO₂ concentrations at relevant proposed receptor locations based on the modelled 2023 'Do Minimum' and 'Do Something' scenarios.

Table C-7. Predicted Annual Average Concentrations of NO₂ at Receptor Locations

Receptor		NO ₂ (µg/m ³)			
		2018 Baseline	2023 Do Minimum	2023 Do Something	Development Contribution
R1	26 Saint Georges Avenue	20.07	20.17	20.41	0.24
R2	23 Saint Georges Avenue	20.58	20.71	21.26	0.55
R3	2 Castle Avenue	26.62	27.05	27.34	0.29
R4	39 Warblington Avenue	28.24	28.75	29.07	0.32
R5	1 Warblington Avenue	20.60	20.73	21.14	0.41
R6	1 Saint Georges Avenue	22.40	22.62	22.88	0.26
R7	Warblington School	20.34	20.46	20.51	0.05
R8	27 Southleigh Road	21.24	21.40	21.46	0.06
R9	1 Fifth Avenue	21.54	21.71	21.77	0.06
R10	1 Southleigh Road	25.22	25.58	25.74	0.16
R11	66 East Street	27.55	28.02	28.13	0.11
R12	42 East Street	29.84	30.41	30.54	0.13
R13	Church View, 1 South Street	33.57	34.30	34.47	0.17
R14	2 Elm Lane	27.64	28.11	28.22	0.11
R15	66 West Street	26.10	26.49	26.55	0.06
R16	25 Mavis Crescent	23.97	24.26	24.29	0.03
R17	Westbourne Court, Chidham Close	29.68	30.24	30.29	0.05
R18	Havant College	22.58	22.80	22.82	0.02
R19	Havant College	21.04	21.19	21.20	0.01
R20	8 The Drive	18.26	18.39	18.40	0.01
R21	13 Willow Park, Leigh Road	20.85	21.10	21.12	0.02
R22	Whyke Court, Chidham Close (W10)	26.81	27.23	27.27	0.04
R23	2 Bedhampton Road	22.07	22.26	22.28	0.02
R24	Bosmere Junior School	24.64	24.96	25.00	0.04

R25	Bosmere Junior School	31.91	32.47	32.53	0.06
R26	The Limes, Regents Court	42.81	43.85	43.97	0.12
R27	2 Langbrook Close	30.37	30.84	30.90	0.06
R28	36 Langstone Road	20.38	20.75	20.79	0.04
R29	Bosham Gardens	26.11	26.63	26.72	0.09
R30	Bosham Gardens	26.23	26.76	26.85	0.09
R31	Bosham Gardens	26.54	27.08	27.17	0.09
R32	1 Selangor Avenue	21.63	21.94	21.97	0.03
R33	37 Havant Road	19.13	19.48	19.50	0.02
R34	1 Kings Terrace	23.98	24.55	24.57	0.02
CR1	Committed Residential Receptor	-	18.12	18.67	0.55
CR2	Committed Residential Receptor	-	18.14	18.61	0.47
CR3	Committed Residential Receptor	-	17.96	18.42	0.46
CR4	Committed Residential Receptor	-	22.23	22.31	0.08
CR5	Committed Residential Receptor	-	20.87	20.97	0.10
PR1	Proposed Residential Receptor	-	-	21.76	-
PR2	Proposed Residential Receptor	-	-	21.13	-
PR3	Proposed Residential Receptor	-	-	20.72	-
PR4	Proposed Residential Receptor	-	-	20.41	-
PR5	Proposed Residential Receptor	-	-	21.09	-
PR6	Proposed Residential Receptor	-	-	18.34	-
PR7	Proposed Residential Receptor	-	-	18.25	-
PR8	Proposed Residential Receptor	-	-	18.72	-
Annual Mean AQO		40 µg/m³			

As indicated in **Table C-7**, the maximum predicted increase in annual average exposure to NO₂ at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.55 µg/m³ at 23 Saint Georges Avenue (R2), and Committed Residential Receptor (CR1).

The maximum predicted annual average exposure to NO₂ at any proposed receptor at the ground floor is 21.76 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for NO₂.

The predicted long-term NO₂ concentrations at all proposed and existing receptors are below 60 µg/m³ in all scenarios. Therefore, it is unlikely there will be any exceedances for the short-term NO₂ AQO at all modelled receptors as outlined in LAQM TG16 technical guidance.

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean NO₂ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table C-8**.

Table C-8. Impact Description of Effects at Key Receptors (NO₂)

Impact Description of NO ₂ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.24	0.60	1%	≤75% of AQO	Negligible
R2	0.55	1.38	1%	≤75% of AQO	Negligible
R3	0.29	0.73	1%	≤75% of AQO	Negligible
R4	0.32	0.80	1%	≤75% of AQO	Negligible

R5	0.41	1.03	1%	≤75% of AQO	Negligible
R6	0.26	0.65	1%	≤75% of AQO	Negligible
R7	0.05	0.13	0%	≤75% of AQO	Negligible
R8	0.06	0.15	0%	≤75% of AQO	Negligible
R9	0.06	0.15	0%	≤75% of AQO	Negligible
R10	0.16	0.40	0%	≤75% of AQO	Negligible
R11	0.11	0.28	0%	≤75% of AQO	Negligible
R12	0.13	0.33	0%	76-94% of AQO	Negligible
R13	0.17	0.43	0%	76-94% of AQO	Negligible
R14	0.11	0.28	0%	≤75% of AQO	Negligible
R15	0.06	0.15	0%	≤75% of AQO	Negligible
R16	0.03	0.08	0%	≤75% of AQO	Negligible
R17	0.05	0.13	0%	76-94% of AQO	Negligible
R18	0.02	0.05	0%	≤75% of AQO	Negligible
R19	0.01	0.03	0%	≤75% of AQO	Negligible
R20	0.01	0.03	0%	≤75% of AQO	Negligible
R21	0.02	0.05	0%	≤75% of AQO	Negligible
R22	0.04	0.10	0%	≤75% of AQO	Negligible
R23	0.02	0.05	0%	≤75% of AQO	Negligible
R24	0.04	0.10	0%	≤75% of AQO	Negligible
R25	0.06	0.15	0%	76-94% of AQO	Negligible
R26	0.12	0.30	0%	≥110 of AQO	Negligible
R27	0.06	0.15	0%	76-94% of AQO	Negligible
R28	0.04	0.10	0%	≤75% of AQO	Negligible
R29	0.09	0.23	0%	≤75% of AQO	Negligible
R30	0.09	0.23	0%	≤75% of AQO	Negligible
R31	0.09	0.23	0%	≤75% of AQO	Negligible
R32	0.03	0.08	0%	≤75% of AQO	Negligible
R33	0.02	0.05	0%	≤75% of AQO	Negligible
R34	0.02	0.05	0%	≤75% of AQO	Negligible
CR1	0.55	1.38	1%	≤75% of AQO	Negligible
CR2	0.47	1.18	1%	≤75% of AQO	Negligible
CR3	0.46	1.15	1%	≤75% of AQO	Negligible
CR4	0.08	0.20	0%	≤75% of AQO	Negligible
CR5	0.10	0.25	0%	≤75% of AQO	Negligible

+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO₂ exposure for existing receptors, is determined to be 'negligible' at all modelled receptors. This is based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

Particulate Matter (PM₁₀)

Table C-9 presents a summary of the predicted change in annual mean PM₁₀ concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table C-9. Predicted Annual Average Concentrations of PM₁₀ at Receptor Locations

Receptor		PM ₁₀ (µg/m³)			
		2018 Baseline	2023 Do Minimum	2023 Do Something	Development Contribution
R1	26 Saint Georges Avenue	15.57	15.58	15.63	0.05
R2	23 Saint Georges Avenue	15.65	15.67	15.77	0.10
R3	2 Castle Avenue	16.65	16.73	16.78	0.05
R4	39 Warblington Avenue	17.09	17.19	17.25	0.06
R5	1 Warblington Avenue	15.66	15.68	15.75	0.07
R6	1 Saint Georges Avenue	15.97	16.01	16.05	0.04
R7	Warblington School	15.61	15.63	15.64	0.01
R8	27 Southleigh Road	15.78	15.81	15.82	0.01
R9	1 Fifth Avenue	15.88	15.92	15.93	0.01
R10	1 Southleigh Road	16.39	16.45	16.48	0.03
R11	66 East Street	17.04	17.13	17.15	0.02
R12	42 East Street	17.56	17.67	17.70	0.03
R13	Church View, 1 South Street	17.76	17.88	17.91	0.03
R14	2 Elm Lane	16.83	16.91	16.93	0.02
R15	66 West Street	16.71	16.78	16.79	0.01
R16	25 Mavis Crescent	16.38	16.43	16.44	0.01
R17	Westbourne Court, Chidham Close	17.27	17.37	17.38	0.01
R18	Havant College	16.08	16.12	16.12	<0.01
R19	Havant College	15.81	15.83	15.83	<0.01
R20	8 The Drive	16.77	16.79	16.79	<0.01
R21	13 Willow Park, Leigh Road	17.28	17.33	17.34	0.01
R22	Whyke Court, Chidham Close (W10)	16.80	16.88	16.88	<0.01
R23	2 Bedhampton Road	16.64	16.67	16.68	0.01
R24	Bosmere Junior School	16.38	16.44	16.45	0.01
R25	Bosmere Junior School	17.52	17.62	17.63	0.01
R26	The Limes, Regents Court	19.54	19.74	19.76	0.02
R27	2 Langbrook Close	17.50	17.59	17.60	0.01
R28	36 Langstone Road	14.69	14.77	14.78	0.01
R29	Bosham Gardens	17.62	17.71	17.72	0.01
R30	Bosham Gardens	17.62	17.71	17.72	0.01
R31	Bosham Gardens	17.66	17.75	17.77	0.02
R32	1 Selangor Avenue	16.99	17.05	17.05	<0.01
R33	37 Havant Road	15.01	15.07	15.08	0.01
R34	1 Kings Terrace	15.54	15.63	15.63	<0.01
CR1	Committed Residential Receptor	-	16.35	16.45	0.10
CR2	Committed Residential Receptor	-	16.35	16.44	0.09
CR3	Committed Residential Receptor	-	16.32	16.41	0.09
CR4	Committed Residential Receptor	-	17.00	17.01	0.01
CR5	Committed Residential Receptor	-	16.78	16.80	0.02
PR1	Proposed Residential Receptor	-	-	16.91	-
PR2	Proposed Residential Receptor	-	-	16.80	-
PR3	Proposed Residential Receptor	-	-	16.74	-
PR4	Proposed Residential Receptor	-	-	16.68	-
PR5	Proposed Residential Receptor	-	-	16.81	-
PR6	Proposed Residential Receptor	-	-	16.38	-

PR7	Proposed Residential Receptor	-	-	16.37	-
PR8	Proposed Residential Receptor	-	-	16.42	-
Annual Mean AQO		40 µg/m³			

All modelled existing receptors are predicted to be below the AQO for PM₁₀ in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table C-9**, the maximum predicted increase in annual average exposure to PM₁₀ at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.10 µg/m³ at 23 Saint Georges Avenue (R2), and Committed Residential Receptor (CR1).

The maximum predicted annual average exposure to PM₁₀ at any proposed receptor at the ground floor is 16.91 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for PM₁₀.

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean PM₁₀ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table C-10**.

Table C-10. Impact Description of Effects at Key Receptors (PM₁₀)

Impact Description of PM ₁₀ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.05	0.11	0%	≤75% of AQO	Negligible
R2	0.10	0.25	0%	≤75% of AQO	Negligible
R3	0.05	0.14	0%	≤75% of AQO	Negligible
R4	0.06	0.15	0%	≤75% of AQO	Negligible
R5	0.07	0.19	0%	≤75% of AQO	Negligible
R6	0.04	0.11	0%	≤75% of AQO	Negligible
R7	0.01	0.02	0%	≤75% of AQO	Negligible
R8	0.01	0.03	0%	≤75% of AQO	Negligible
R9	0.01	0.03	0%	≤75% of AQO	Negligible
R10	0.03	0.07	0%	≤75% of AQO	Negligible
R11	0.02	0.06	0%	≤75% of AQO	Negligible
R12	0.03	0.08	0%	≤75% of AQO	Negligible
R13	0.03	0.07	0%	≤75% of AQO	Negligible
R14	0.02	0.05	0%	≤75% of AQO	Negligible
R15	0.01	0.02	0%	≤75% of AQO	Negligible
R16	0.01	0.02	0%	≤75% of AQO	Negligible
R17	0.01	0.03	0%	≤75% of AQO	Negligible
R18	<0.01	0.01	0%	≤75% of AQO	Negligible
R19	<0.01	0.01	0%	≤75% of AQO	Negligible
R20	<0.01	0.00	0%	≤75% of AQO	Negligible
R21	0.01	0.01	0%	≤75% of AQO	Negligible
R22	<0.01	0.02	0%	≤75% of AQO	Negligible
R23	0.01	0.01	0%	≤75% of AQO	Negligible
R24	0.01	0.02	0%	≤75% of AQO	Negligible
R25	0.01	0.03	0%	≤75% of AQO	Negligible
R26	0.02	0.06	0%	≤75% of AQO	Negligible

R27	0.01	0.03	0%	≤75% of AQO	Negligible
R28	0.01	0.02	0%	≤75% of AQO	Negligible
R29	0.01	0.04	0%	≤75% of AQO	Negligible
R30	0.01	0.04	0%	≤75% of AQO	Negligible
R31	0.02	0.04	0%	≤75% of AQO	Negligible
R32	<0.01	0.02	0%	≤75% of AQO	Negligible
R33	0.01	0.01	0%	≤75% of AQO	Negligible
R34	<0.01	0.01	0%	≤75% of AQO	Negligible
CR1	0.10	0.26	0%	≤75% of AQO	Negligible
CR2	0.09	0.23	0%	≤75% of AQO	Negligible
CR3	0.09	0.21	0%	≤75% of AQO	Negligible
CR4	0.01	0.04	0%	≤75% of AQO	Negligible
CR5	0.02	0.04	0%	≤75% of AQO	Negligible

+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM₁₀ exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

Particulate Matter (PM_{2.5})

Table C-11 presents a summary of the predicted change in annual mean PM_{2.5} concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table C-11. Predicted Annual Average Concentrations of PM_{2.5} at Receptor Locations

Receptor		PM _{2.5} (µg/m³)			
		2018 Baseline	2023 Do Minimum	2023 Do Something	Development Contribution
R1	26 Saint Georges Avenue	11.07	11.08	11.10	0.02
R2	23 Saint Georges Avenue	11.12	11.13	11.19	0.06
R3	2 Castle Avenue	11.72	11.76	11.80	0.04
R4	39 Warblington Avenue	11.97	12.03	12.06	0.03
R5	1 Warblington Avenue	11.12	11.13	11.18	0.05
R6	1 Saint Georges Avenue	11.31	11.33	11.36	0.03
R7	Warblington School	11.09	11.11	11.11	<0.01
R8	27 Southleigh Road	11.20	11.21	11.22	0.01
R9	1 Fifth Avenue	11.25	11.27	11.28	0.01
R10	1 Southleigh Road	11.56	11.60	11.62	0.02
R11	66 East Street	11.93	11.99	12.00	0.01
R12	42 East Street	12.29	12.36	12.37	0.01
R13	Church View, 1 South Street	12.45	12.52	12.54	0.02
R14	2 Elm Lane	11.88	11.93	11.94	0.01
R15	66 West Street	11.80	11.84	11.85	0.01
R16	25 Mavis Crescent	11.60	11.63	11.63	<0.01
R17	Westbourne Court, Chidham Close	12.14	12.20	12.20	<0.01
R18	Havant College	11.43	11.45	11.45	<0.01
R19	Havant College	11.26	11.28	11.28	<0.01

R20	8 The Drive	12.19	12.21	12.21	<0.01
R21	13 Willow Park, Leigh Road	12.49	12.52	12.53	0.01
R22	Whyke Court, Chidham Close (W10)	11.86	11.90	11.90	<0.01
R23	2 Bedhampton Road	11.58	11.61	11.61	<0.01
R24	Bosmere Junior School	11.61	11.64	11.65	0.01
R25	Bosmere Junior School	11.91	11.96	11.97	0.01
R26	The Limes, Regents Court	13.11	13.23	13.24	0.01
R27	2 Langbrook Close	11.87	11.93	11.93	<0.01
R28	36 Langstone Road	10.14	10.18	10.19	0.01
R29	Bosham Gardens	11.59	11.65	11.66	0.01
R30	Bosham Gardens	11.60	11.65	11.66	0.01
R31	Bosham Gardens	11.62	11.68	11.69	0.01
R32	1 Selangor Avenue	11.21	11.24	11.25	0.01
R33	37 Havant Road	10.40	10.44	10.44	<0.01
R34	1 Kings Terrace	10.74	10.80	10.80	<0.01
CR1	Committed Residential Receptor	-	10.83	10.89	0.06
CR2	Committed Residential Receptor	-	10.83	10.88	0.05
CR3	Committed Residential Receptor	-	10.81	10.87	0.06
CR4	Committed Residential Receptor	-	11.22	11.23	0.01
CR5	Committed Residential Receptor	-	11.09	11.10	0.01
PR1	Proposed Residential Receptor	-	-	11.17	-
PR2	Proposed Residential Receptor	-	-	11.11	-
PR3	Proposed Residential Receptor	-	-	11.06	-
PR4	Proposed Residential Receptor	-	-	11.03	-
PR5	Proposed Residential Receptor	-	-	11.11	-
PR6	Proposed Residential Receptor	-	-	10.85	-
PR7	Proposed Residential Receptor	-	-	10.84	-
PR8	Proposed Residential Receptor	-	-	10.88	-
Annual Mean AQO		25 µg/m ³			

All modelled existing receptors are predicted to be below the AQO for PM_{2.5} in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table C-11**, the maximum predicted increase in annual average exposure to PM_{2.5} at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.06 µg/m³ at 23 Saint Georges Avenue (R2), and Committed Residential Receptor (CR1).

The maximum predicted annual average exposure to NO₂ at any proposed receptor at the ground floor is 11.17 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for PM_{2.5}.

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean PM_{2.5} exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table C-12**.

Table C-12. Impact Description of Effects at Key Receptors (PM_{2.5})

Impact Description of PM _{2.5} Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description

R1	0.02	0.11	0%	≤75% of AQO	Negligible
R2	0.06	0.24	0%	≤75% of AQO	Negligible
R3	0.04	0.13	0%	≤75% of AQO	Negligible
R4	0.03	0.14	0%	≤75% of AQO	Negligible
R5	0.05	0.18	0%	≤75% of AQO	Negligible
R6	0.03	0.11	0%	≤75% of AQO	Negligible
R7	<0.01	0.02	0%	≤75% of AQO	Negligible
R8	0.01	0.03	0%	≤75% of AQO	Negligible
R9	0.01	0.03	0%	≤75% of AQO	Negligible
R10	0.02	0.06	0%	≤75% of AQO	Negligible
R11	0.01	0.05	0%	≤75% of AQO	Negligible
R12	0.01	0.06	0%	≤75% of AQO	Negligible
R13	0.02	0.07	0%	≤75% of AQO	Negligible
R14	0.01	0.04	0%	≤75% of AQO	Negligible
R15	0.01	0.02	0%	≤75% of AQO	Negligible
R16	<0.01	0.01	0%	≤75% of AQO	Negligible
R17	<0.01	0.03	0%	≤75% of AQO	Negligible
R18	<0.01	0.01	0%	≤75% of AQO	Negligible
R19	<0.01	0.00	0%	≤75% of AQO	Negligible
R20	<0.01	0.00	0%	≤75% of AQO	Negligible
R21	0.01	0.00	0%	≤75% of AQO	Negligible
R22	<0.01	0.01	0%	≤75% of AQO	Negligible
R23	<0.01	0.01	0%	≤75% of AQO	Negligible
R24	0.01	0.02	0%	≤75% of AQO	Negligible
R25	0.01	0.03	0%	≤75% of AQO	Negligible
R26	0.01	0.05	0%	≤75% of AQO	Negligible
R27	<0.01	0.02	0%	≤75% of AQO	Negligible
R28	0.01	0.02	0%	≤75% of AQO	Negligible
R29	0.01	0.03	0%	≤75% of AQO	Negligible
R30	0.01	0.03	0%	≤75% of AQO	Negligible
R31	0.01	0.03	0%	≤75% of AQO	Negligible
R32	0.01	0.01	0%	≤75% of AQO	Negligible
R33	<0.01	0.00	0%	≤75% of AQO	Negligible
R34	<0.01	0.01	0%	≤75% of AQO	Negligible
CR1	0.06	0.25	0%	≤75% of AQO	Negligible
CR2	0.05	0.22	0%	≤75% of AQO	Negligible
CR3	0.06	0.21	0%	≤75% of AQO	Negligible
CR4	0.01	0.04	0%	≤75% of AQO	Negligible
CR5	0.01	0.04	0%	≤75% of AQO	Negligible

+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM₁₀ exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

APPENDIX D - REPORT TERMS & CONDITIONS

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