



I

Land & Development Advisory Ltd

AGEAS BOWL

Air Quality Assessment



Land & Development Advisory Ltd

AGEAS BOWL

Air Quality Assessment

TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. 70073579

OUR REF. NO. 001

DATE: MAY 2022

WSP

WSP.com

QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft for Ecologists	Final		
Date	12/05/2022	26/05/2022		
Prepared by	Caroline Odbert	Caroline Odbert		
Signature				
Checked by	Joanna Rochfort	Joanna Rochfort		
Signature				
Authorised by	Joanna Rochfort	Joanna Rochfort		
Signature				
Project number	70073579			
Report number	001	002		
File reference				

CONTENTS

EXECUTIVE SUMMARY	1
2. INTRODUCTION	3
3. LEGISLATION, POLICY & GUIDANCE	4
3.1. AIR QUALITY LEGISLATION & POLICY	4
3.2. PLANNING POLICY	7
3.3. GUIDANCE	10
4. SCOPE & METHODOLOGY	13
4.1. SCOPE	13
4.2. METHODOLOGY	13
4.3. SIGNIFICANCE CRITERIA	23
4.4. LIMITATIONS & ASSUMPTIONS	25
5. BASELINE CONDITIONS	26
5.1. EBC'S REVIEW & ASSESSMENT OF AIR QUALITY	26
5.2. LOCAL EMISSION SOURCES	26
5.3. BACKGROUND AIR QUALITY DATA	26
5.4. LOCAL AUTHORITY AIR QUALITY MONITORING DATA	29
5.5. MODELLED CURRENT BASELINE CONCENTRATIONS	30
6. ASSESSMENT OF IMPACTS	32
6.1. CONSTRUCTION PHASE	32
6.2. OPERATION PHASE	35
7. MITIGATION & RESIDUAL EFFECTS	41
7.1. CONSTRUCTION PHASE	41

7.2.	OPERATIONAL PHASE	44
8.	CONCLUSIONS	46

TABLES

Table 1 – Relevant Air Quality Objectives and Standards (AQS, 2007)	5
Table 2 – Critical Levels relevant to Vegetation and Ecosystems (APIS, 2018)	16
Table 3 – Relevant Critical Loads*	17
Table 4 – Deposition Velocities applied (taken from AQTAG(06))	21
Table 5 - Impact Descriptors for Individual Receptors	23
Table 6 - Background Concentrations ($\mu\text{g}/\text{m}^3$)	27
Table 7 – Baseline Ecological Conditions for Nutrient Nitrogen Deposition and NH_3 Concentrations	28
Table 8 - Local Authority Air Quality Monitoring Data	29
Table 9 - Potential Dust Emission Magnitude	33
Table 10 - Sensitivity of the Study Area	34
Table 11 - Summary Dust Risk Table to Define Site Specific Mitigation	34

FIGURES

Figure 1 – Location of Human Health Receptors	48
Figure 2 – Ecologically Designated Sites	49
Figure 3 – Location of Assessment Ecological Receptors	50
Figure 4 – Location of Assessment Ecological Receptors	51
Figure 5 – Location of Assessment Ecological Receptors	52

APPENDICES

APPENDIX A GLOSSARY



APPENDIX B IAQM CONSTRUCTION ASSESSMENT METHODOLOGY

APPENDIX C TRAFFIC DATA

APPENDIX D MODEL VERIFICATION

APPENDIX E MODELLED RECEPTORS

APPENDIX F MODEL RESULTS

APPENDIX G WIND ROSE

EXECUTIVE SUMMARY

WSP has been commissioned by Land & Development Advisory Ltd to undertake an air quality assessment to support the planning application for the proposed development of Ageas Bowl, Eastleigh. The proposals are for a mixed-use development across five 'character areas' comprising 185 dwellings, a 71-bedroom independent living facility, 142-bedroom hotel, well-being centre, new pavilion building and improvements to the existing stadium.

This report presents the findings of the assessment, which addresses the potential air quality impacts during both the construction and operational phases of the proposed development. For both phases the type, source and significance of potential impacts were identified, and the measures that should be employed to minimise these proposed.

The assessment of construction phase impacts associated with fugitive dust and fine particulate matter (PM₁₀ and PM_{2.5}) emissions has been undertaken in line with the relevant Institute of Air Quality Management guidance. This identified that there is a Medium Risk of dust soiling impacts and a Low Risk of increases in particulate matter concentrations due to construction activities on human health receptors. There will also be a Medium Risk to ecological receptors during earthworks and construction. However, through good site practice and the implementation of suitable mitigation measures, the effect of dust and particulate matter releases would be significantly reduced. The residual effects of the construction phase on air quality are considered to be negligible.

The assessment of the potential air quality impacts associated with traffic generated by the operational phase of the proposed development has been completed in line with published methodologies and technical guidance.

In relation to the human health receptors, the Proposed Development would cause negligible changes in annual mean NO₂, PM₁₀ and PM_{2.5} concentrations in relation to the human health air quality objectives. The impacts of the Proposed Development on local air quality are considered to be negligible for all pollutants. There are not expected to be any exceedances of the relevant air quality objectives with the site.

With regard to the potential impacts of the Proposed Development 'alone' on nearby ecological receptors, there are predicted to be increases in annual mean NO_x and NH₃ of more than 1% within the River Itchen SAC up to 10m from the edge of the A27. Nutrient Nitrogen (N) Deposition rates are also predicted to increase by more than 1% of the relevant Critical Load within the River Itchen SAC and the Telegraph Woods SINC up to 20 m from the roadside. Where this occurs in conjunction with an exceedance of the Critical Level/Load, the results have been passed onto the Project's Ecologist to evaluate the results in relation to the potential for impacts on the integrity of the ecologically designated sites.

In relation to the potential impacts of the Proposed Development 'in-combination' with other plans and projects, two scenarios have been presented.

In the highly conservative scenario, which assumes no off-setting from future improvements in vehicle emissions and background concentrations, there are predicted to be changes which equate to 1% (or more) of the Critical Level for NO_x and exceedances of the Critical Level at several locations within the Solent and Southampton Water Ramsar/SPA, the River Itchen SAC, Moorgreen

Meadows SSSI, Netley Common LNR and one of the AW sites. For Nutrient N Deposition, there are predicted to be increases which equate to 1% (or more) of the relevant Critical Load within the Solent and Southampton Water Ramsar/SPA, the River Itchen SAC and SSSI, Moorgreen Meadows SSSI, Netley Common LNR, Wildern LNR, Telegraph Woods SINC and the AW sites. In relation to annual mean NH_3 concentrations, there are predicted to be changes which equate to 1% (or more) of the relevant Critical Level at a large proportion of the modelled receptors, however, at the majority of the locations the relevant Critical Level of $3\mu\text{g}/\text{m}^3$ is not exceeded. Concentrations are predicted to increase by more than 1% and exceed the Critical Level in 2027 at locations with the River Itchen SAC, Moorgreen Meadows SSSI and two modelled receptors within the AW sites.

- 1.1.1. Taking into account future improvements in vehicle emissions and background concentrations between 2019 and 2027, there are predicted to decreases in annual mean NO_x concentrations and nutrient N deposition at all modelled receptors. There are increases in annual mean NH_3 concentrations which equate to 1% (or more) at several locations with the ecologically designated sites when considering the impacts of the Proposed Development 'in-combination', as both background NH_3 and traffic emissions of NH_3 are predicted to increase in the future. Within the following designated ecological sites, the increases are predicted to equate to 1% (or more) and the relevant Critical Level is predicted to be exceeded: River Itchen SAC, locations within the Moorgreen Meadows SSSI and within one of AW sites.
- 1.1.2. Where the predicted changes above 1% occur in annual mean NO_x and NH_3 and nutrient N deposition in conjunction with an exceedance of the Critical Level/Load, the results have been passed onto the Project's Ecologist to evaluate the results in relation to the potential for impacts on the integrity of the ecologically designated sites.

2. INTRODUCTION

- 2.1.1. WSP has been commissioned by Land & Development Ltd to carry out an assessment of the potential air quality impacts arising from the proposed development at Ageas Bowl, hereafter referred to as the 'Proposed Development' or 'Application Site'.
- 2.1.2. The Application Site lies within the administrative boundary of Eastleigh Borough Council (EBC) and is situated to the east of the city of Southampton. It is bordered to the north by Botley Road, to the east by the M27 Motorway, to the west by existing residential dwellings and to the south by a golf club. The Application Site is approximately 15.9 ha in size and currently comprises the cricket ground, wellbeing centre, parking area and hotel complex.
- 2.1.3. The Proposed Development includes both upgrading the existing facilities within the Application Site and undertaking further development across five 'character areas'. The development proposals are for a mixed-use development including 185 dwellings, a 71-bedroom independent living facility (Use Class C2), 142-bedroom hotel (Use Class C1), well-being centre (Use Class E / F2), new pavilion building and improvements to existing stadium, new vehicular access, car parking, pedestrian circulation and processional ramp, together with tree planting, landscaping, SuDs and biodiversity enhancements.
- 2.1.4. This report presents the findings of an assessment of the potential air quality impacts of the Proposed Development during both the construction and operational phases on nearby sensitive receptors (human and ecological). For both phases, the type, source and significance of potential impacts are identified, and the measures that should be employed to minimise these described.
- 2.1.5. This report also considers the potential exposure of future residents of the Proposed Development to local pollution concentrations given the Application Site is located in an urban setting surrounded by heavily trafficked roads.
- 2.1.6. A glossary of terms used in this report is provided in Appendix A.

3. LEGISLATION, POLICY & GUIDANCE

3.1. AIR QUALITY LEGISLATION & POLICY

3.1.1. A summary of the relevant air quality legislation and policy is provided below.

UK AIR QUALITY STRATEGY

- 3.1.2. The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS)¹. The AQS provides a framework for reducing air pollution in the UK with the aim of meeting the requirements of European Union legislation².
- 3.1.3. The AQS also sets standards and objectives for nine key air pollutants to protect health, vegetation and ecosystems. These are benzene (C₆H₆), 1,3 butadiene (C₄H₆), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), particulate matter (PM₁₀ and PM_{2.5}), sulphur dioxide (SO₂), ozone (O₃), and polycyclic aromatic hydrocarbons (PAHs).
- 3.1.4. The air quality standards are levels recommended by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO) with regards to current scientific knowledge about the effects of each pollutant on health and the environment.
- 3.1.5. The air quality objectives are policy-based targets set by the Government, which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.
- 3.1.6. The standards and objectives for the pollutants relevant to this assessment are given in Table 1 below.

¹ Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2)

² The UK formally left the EU on 31st January 2020 and new air quality legislation for the UK will be brought forward in due course. The Air Quality (Miscellaneous Amendment and Revocation of Retained Direct EU Legislation) (EU Exit) Regulations 2018 (SI 2018/1407) (see Regulation 5) makes changes to retained direct EU legislation relating to air quality, to ensure that it continues to operate effectively.

Table 1 – Relevant Air Quality Objectives and Standards (AQS, 2007)

Pollutant	Concentration ($\mu\text{g}/\text{m}^3$)	Measured As	Exceedances Allowed
Nitrogen dioxide (NO_2)	200	1-hour mean	18
	40	Annual mean	-
Particulate matter (PM_{10})	40	Annual mean	-
	50	24-hour mean	35
Particulate matter ($\text{PM}_{2.5}$) *	20	Annual mean	-
Nitrogen oxides (NO_x)	30	Annual mean	-

* Local Authorities are required to work towards reducing emissions/concentrations of particulate matter within their administrative area, however, there is no statutory objective given in the AQS for $\text{PM}_{2.5}$ at this time, only a framework.

- 3.1.7. NO_2 and particulate matter (PM_{10} and $\text{PM}_{2.5}$) are the pollutants of most concern in the UK in relation to human health and are substantially influenced by emissions from road traffic. For NO_2 and PM_{10} , there are both long-term (annual mean) and short-term standards. In the case of NO_2 , the short-term standard is for a 1-hour averaging period, whereas for PM_{10} it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants, for example temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road.
- 3.1.8. Ambient concentrations of oxides of nitrogen (NO_x), comprising mainly nitrogen monoxide and NO_2 , are of concern in relation to protected ecological sites which have features that are sensitive to changes in NO_x . An objective for annual mean NO_x concentrations of $30\mu\text{g}/\text{m}^3$ has been set within the UK AQS for the protection of sensitive vegetation.
- 3.1.9. The AQS contains a framework for considering the effects of a finer group of particles known as ' $\text{PM}_{2.5}$ ' as there is increasing evidence that this size of particles can be more closely associated with observed adverse health effects than PM_{10} . However, there is no statutory objective given in the AQS for $\text{PM}_{2.5}$.

AIR QUALITY REGULATIONS

- 3.1.10. Many of the objectives in the AQS have been made statutory in England with the Air Quality (England) Regulations 2000³ and the Air Quality (England) (Amendment) Regulations 2002⁴ for the purpose of Local Air Quality Management (LAQM).
- 3.1.11. These Regulations require that likely exceedances of the AQS objectives are assessed in relation to:

"...the quality of air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present..."

³ The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

⁴ The Air Quality (England) (Amendment) Regulations 2002- Statutory Instrument 2002 No.3043

- 3.1.12. The Air Quality Standards Regulations 2010⁵ transpose the European Union Ambient Air Quality Directive (2008/50/EC) into law in England. This Directive sets legally binding limit values for concentrations in outdoor air of major air pollutants that impact public health such as PM₁₀, PM_{2.5} and NO₂. The limit values for NO₂ and PM₁₀ are the same concentration levels as the relevant AQS objectives and the limit value for PM_{2.5} is a concentration of 25µg/m³. However, Regulation 2 of the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020⁶ updates the Air Quality Standards Regulations 2010 to include a limit value for PM_{2.5} of 20 µg/m³ from 2020. At the time that the Air Quality Standards Regulations 2010 were made the limit value for this pollutant was under review by the European Commission. The limit value of 20 µg/m³ has been used within this assessment.

CLEAN AIR STRATEGY

- 3.1.13. Defra published the Government's Clean Air Strategy in 2019⁷. This sets out measures, which aim to reduce emissions from all sources of air pollution, making air healthier to breathe, protecting nature and boosting the economy. The Strategy also proposes tough new goals to cut public exposure to airborne particulate matter, as per the recommendation made by the World Health Organisation.
- 3.1.14. Furthermore, the Strategy confirms that the Government will set new legislation to 'create a stronger and a more coherent framework for action to tackle air pollution. This will be underpinned by new England-wide powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to take action in areas with an air pollution problem. These will support the creation of Clean Air Zones to lower emissions from all sources of air pollution, backed up with clear enforcement mechanism.' New enforcement powers will also be given at a national and local level, across all sectors of society.

ENVIRONMENTAL PROTECTION ACT 1990 - CONTROL OF DUST AND PARTICULATES ASSOCIATED WITH CONSTRUCTION

- 3.1.15. Section 79 of the Environmental Protection Act 1990 gives the following definitions of statutory nuisance relevant to dust and particles:
- "Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance"; and*
- "Any accumulation or deposit which is prejudicial to health or a nuisance".*
- 3.1.16. Following this, Section 80 says that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.
- 3.1.17. There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist. Nuisance is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred.

⁵ The Air Quality Standards Regulations 2010 - Statutory Instrument 2010 No. 1001

⁶ The Environmental (Miscellaneous Amendments) (EU Exit) Regulations 2020 - Statutory Instrument 2020 No.000

⁷ Defra (January, 2019). Clean Air Strategy 2019.

ENVIRONMENT ACT 1995

- 3.1.18. Under Part IV of the Environment Act 1995, local authorities must review and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the air quality objectives defined in the Regulations. Where the objectives are not likely to be achieved, an authority is required to designate an Air Quality Management Area (AQMA). For each AQMA the local authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality and show how it intends to work towards achieving air quality objectives in the future.

THE ENVIRONMENT ACT 2021

- 3.1.19. The Environment Act 2021 was published in November 2021 and provides a new framework for environmental protection within the UK. It aims to ensure that environmental standards are maintained and that improvements are achieved (specifically in relation to air quality, water, waste and resources, nature and biodiversity) and bridges the gaps in legislation resulting from the UK's departure from the EU.
- 3.1.20. The Environment Act 2021 does not replace the Environment Act 1995, but it does make amendments in order to strengthen environmental protections. In relation to air quality, The Environment Act 2021 includes a legally binding duty on Government to bring forward at least two new air quality targets into secondary legislation by 31 October 2022. Target objectives under consideration for air quality include:
- Reducing the annual mean concentrations of PM_{2.5} in ambient air (as required by Clause 2); and
 - Reducing population exposure to PM_{2.5}.

3.2. PLANNING POLICY

- 3.2.1. A summary of the national and local planning policy relevant to the Proposed Development and air quality is provided below.

NATIONAL PLANNING POLICY

National Planning Policy Framework

- 3.2.2. The Government's overall planning policies for England are described in the National Planning Policy Framework⁸. The core underpinning principle of the Framework is the presumption in favour of sustainable development, defined as:
- *'... meeting the needs of the present without compromising the ability of future generations to meet their own needs'*.
- 3.2.3. One of the three overarching objectives of the NPPF is that the planning system should seek *'to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.'*
- 3.2.4. In relation to air quality, the following paragraphs in the document are relevant:

⁸ Ministry of Housing, Communities and Local Government (July 2021) *National Planning Policy Framework*.

- Paragraph 55, which states *‘Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition.’*;
- Paragraph 104, which relates to the need to consider transport related issues at the earliest stages of plan making and development proposals, so that *‘...c) opportunities to promote walking, cycling and public transport use are identified and pursued; d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains...’*;
- Paragraph 105, which states *‘...Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health....’*;
- Paragraph 174, which states *‘Planning policies and decisions should contribute to and enhance the natural and local environment by: ...e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans...’*;
- Paragraph 185, which states *‘Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development....’*;
- Paragraph 186, which states *‘Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.’*; and
- Paragraph 188, which states *‘The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.’*

LOCAL PLANNING POLICY

Eastleigh Borough Local Plan 2016-2036

- 3.2.5. EBC's Local Plan was adopted on 25 April 2022⁹ and sets out the Council's policies and plans to guide future development (from 2016) up to 2036. It outlines three strategic priorities, which are as follows:
- **A Green Borough:** tackling congestion; developing green infrastructure; providing an excellent environment for all; and minimising waste and managing resources.
 - **A Healthy Community:** enabling healthier lifestyles/wellbeing and tackling deprivation.
 - **A Prosperous Place:** increased provision and more diverse mix of housing; ensuring appropriate infrastructure including employment land; enabling the right skills and employment mix; and reinvigorating town and local centres.
- 3.2.6. These priorities have been used as the basis for the vision, objectives and policies included within the Local Plan which also makes a number of references to the challenges faced by EBC with respect to air quality (notably, Green Borough Issue G9 – Addressing air quality and other forms of pollution).
- 3.2.7. The Local Plan contains a number of policies directly relevant to air quality and the Proposed Development including:
- **Policy DM8 – Pollution** which states: *'Development will not be permitted if it is likely to cause loss of amenity or impact on public health or other unacceptable environmental impacts through a. air pollution (including odours or particulate emissions).... Development susceptible to particular forms of pollution will not be permitted a) where it will be affected by such pollution, unless measures can be taken that adequately mitigate the polluting effects; or b) where it would inhibit existing economic or other activities giving rise to acceptable polluting effects.'*
 - **Policy WE4 - Land at Ageas Bowl and Tennis Centre, Botley Road, West End** which states: *'Development will be supported where it facilitates the site's important role in meeting sporting needs in the Borough and wider area; complements the high quality design and open setting of the site; and protects the settlement gap...development will be permitted if it meets all of the following criteria... h) proposals must be accompanied by satisfactory arrangements for vehicular access and must include provision for improved facilities for pedestrians, cyclists and public transport... k) there will be no adverse impact on the adjacent Telegraph Woods SINC with appropriate environmental buffers from development'.*

⁹ Eastleigh Borough Council (EBC) *Eastleigh Borough Local Plan 2016-2036 (April 2022)*. Available at: <https://www.eastleigh.gov.uk/media/11234/eastleigh-borough-local-plan.pdfgh-local-plan.pdf> Accessed 26/04/2022

3.3. GUIDANCE

- 3.3.1. A summary of the publications referred to in the undertaking of this assessment is provided below.

Local Air Quality Management Review and Assessment Technical Guidance

- 3.3.2. The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their review and assessment work¹⁰. This guidance, referred to in this document as LAQM.TG(16), has been used where appropriate in the assessment presented herein.

Land-use Planning & Development Control: Planning for Air Quality

- 3.3.3. Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have published guidance¹¹ that offers comprehensive advice on: when an air quality assessment may be required; what should be included in an assessment; how to determine the significance of any air quality impacts associated with a development; and, the possible mitigation measures that may be implemented to minimise these impacts.

Guidance on the Assessment of Dust from Demolition and Construction

- 3.3.4. This document¹² published by the IAQM was produced to provide guidance to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM₁₀ impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measures appropriate to the level of risk identified.

National Planning Practice Guidance – Air Quality

- 3.3.5. This guidance¹³ provides a number of guiding principles on how the planning process can take into account the impact of new development on air quality and explains how much detail air quality assessments need to include for proposed developments, and how impacts on air quality can be mitigated. It also provides information on how air quality is taken into account by Local Authorities in both the wider planning context of Local Plans and neighbourhood planning, and in individual cases where air quality is a consideration in a planning decision.

Natural England's Internal Guidance

- 3.3.6. In June 2018, Natural England published guidance¹⁴ on their approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations. The document draws upon Annex F of the Highways England Guidance Design Manual for Roads and

¹⁰ Defra (2021) Part IV The Environment Act 1995 and Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management Technical Guidance LAQM.TG(16)

¹¹ Environmental Protection UK and Institute of Air Quality Management (Version 1.2 Updated January 2017). Land Use Planning & Development Control: Planning for Air Quality

¹² Institute of Air Quality Management (Version 1.1 Updated June 2016). Guidance on the Assessment of Dust from Demolition and Construction

¹³ Ministry of Housing, Communities & Local Government (March 2014). National Planning Practice Guidance

¹⁴ Natural England (June 2018) Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations

Bridges (which has since been withdrawn) but takes into account the Wealden Judgement and need to assess 'in-combination' effects on habitats sites as a result of air pollution.

- 3.3.7. The guidance provides a framework around the assessment of road traffic emissions and subsequent effects on Habitats sites. Notably:
- Step 1 – Does the proposal give rise to emissions which are likely to reach a Habitats site;
 - Step 2 – Are there qualifying features within 200m of a road sensitive to air pollution;
 - Step 3 – Could the sensitive qualifying features of the site be exposed to emissions; and
 - Step 4 – Application of the Screening Thresholds.
 - Step 4a: apply the threshold alone;
 - Step 4b: apply the threshold in-combination with emissions from other road traffic plans and projects; and
 - Step 4c: apply the threshold in-combination with emissions from other non-road plans and projects.
 - Step 5: Advise on the need for Appropriate Assessment where thresholds are exceeded, either alone or in-combination.
- 3.3.8. The relevant thresholds in relation to Step 4 are as follows:
- Changes in AADT of 1000 vehicles a day (or more); and/or
 - Changes of 1% of the relevant Critical Load and/or Level as a result of the Plan/Project.
- 3.3.9. It should be noted that the guidance does not specifically cover nationally significant sites such as Sites of Special Scientific Interest (SSSIs), which are covered by a different regulatory framework. However, it does state that the general principles for air quality assessment outlined for Habitats sites are likely to be equally relevant for this and other designations.

IAQM's Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites

- 3.3.10. This document¹⁵ published by the IAQM provides advice to air quality practitioners on the assessment of air quality impacts associated with developments on designated sites. Whilst primarily focussed on assessments required in support of Habitat Regulations Assessments, which relates to sites of European importance, the guidance can also be used to inform assessment of sites designated for their national and/or local importance.

JNCC Guidance on Decision-making Thresholds

- 3.3.11. In December 2021, JNCC published guidance¹⁶ around assessing air pollution effects on ecological sites, including the introduction of Decision Making Thresholds (DMT) which can, in some instances, rule out the need to consider 'in-combination effects'. This builds upon the guidance previously issued by both the Institute of Air Quality Management (IAQM) and Natural England. Importantly, Section 5.3 states:
- *"All planning decisions are made in accordance with the relevant strategic land use plans (and any supplementary planning documents) which will have been subject to prior assessment under the Habitats Regulations. The Regulations therefore anticipate that a plan HRA will have already*

¹⁵ IAQM (2020) *A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (version 1.1)*

¹⁶ Joint Nature Conservation Committee (December 2021), JNCC Report No. 696, Decision-making Thresholds for Air Pollution

identified (and addressed) any concerns in respect of the overall changes in traffic flow for European sites as a consequence of the plan being adopted. Where a project is subject to HRA and a previous HRA has been undertaken in respect of a higher-level plan (under which the project comes forward), Government guidance encourages competent authorities to adopt elements of that earlier assessment where they are satisfied that:

- *There's no new information or evidence that may lead to a different conclusion;*
- *The assessments already done are relevant, thorough and correct*
- *The conclusions are rigorous and robust there's no new case law that changes the way an HRA should be carried out or interpreted.*
- *Where these criteria are met, there is no need for further assessment effort with regard to the effects of road traffic emissions at project level HRA for development provided for within a plan. It is therefore unlikely that a need for individual project HRAs for road traffic emissions will arise with any degree of frequency as a matter of course. It is certainly not the case that the frequency of individual project HRAs in respect of traffic emissions will correspond to the rate at which new development proposals come forward generally."*

- 3.3.12. The guidance introduces the application of a DMT (a change in traffic due to the Proposed Development which equates to 0.15% of existing traffic in terms of Annual Average Daily Traffic flow). If this is not exceeded then effects from the Development can be screened out, irrespective of the 'in-combination' change and no further assessment is required.

4. SCOPE & METHODOLOGY

4.1. SCOPE

4.1.1. The scope of the assessment has been determined in the following way:

- Review of EBC's latest review and assessment reports¹⁷ and air quality data for the area surrounding the Application Site, including data from EBC, Defra¹⁸, the Environment Agency (EA)¹⁹;
- Desk study to confirm the locations of nearby existing human receptors that may be sensitive to changes in local air quality, and a review of the masterplan for the Proposed Development to establish the location of new sensitive receptors;
- Review of MAGIC's webpages²⁰ to identify designated ecological sites which fall 200m of a road which may experience significant changes in traffic due to the Proposed Development, both 'alone' and 'in-combination' with other plans and projects;
- A review of APIS²¹ to determine the sensitivity of the identified designated sites to changes in air quality (NO_x and ammonia (NH₃) concentrations and nitrogen (N) deposition) and relevant Critical Levels and Loads to be applied to the assessment; and
- Review of the traffic data provided by WSP.

4.1.2. The scope of the assessment includes consideration of the potential impacts on local air quality resulting from:

- Dust and particulate matter generated by on-site activities during the construction phase;
- Increases in pollutant concentrations as a result of exhaust emissions arising from construction traffic and plant; and
- Increases in pollutant concentrations as a result of exhaust emissions arising from traffic generated by the Proposed Development once operational and subsequent effects on nearby sensitive receptors (human and ecological).

4.1.3. In addition, air quality within the Proposed Development for future residents/users will be considered given the location of the Application Site within an urban area, close to the M27 Motorway.

4.2. METHODOLOGY

CONSTRUCTION PHASE

4.2.1. Dust comprises particles typically in the size range 1-75 micrometres (µm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials. The larger dust particles fall out of the atmosphere quickly after initial release and therefore tend to be deposited in close proximity to the source of emission. Dust therefore, is unlikely to cause long-term or widespread changes to local air quality; however, its deposition on property and cars can cause

¹⁷ Eastleigh Borough Council (June 2020), 2020 Air Quality Annual Status Report (ASR)

¹⁸ Defra Local Air Quality Management (LAQM) Support Pages. Available at: <http://laqm.defra.gov.uk/> Accessed March 2022

¹⁹ <https://data.gov.uk/dataset/cfd94301-a2f2-48a2-9915-e477ca6d8b7e/pollution-inventory> Accessed March 2022

²⁰ [Magic Map Application \(defra.gov.uk\)](https://magic.defra.gov.uk/) Accessed Feb 2022

²¹ http://www.apis.ac.uk/overview/pollutants/overview_nh3.htm (Accessed March 2022)

‘soiling’ and discolouration. This may result in complaints of nuisance through amenity loss or perceived damage caused, which is usually temporary.

- 4.2.2. The smaller particles of dust (less than 10µm in aerodynamic diameter) are known as particulate matter (PM₁₀) and represent only a small proportion of total dust released; this includes a finer fraction, known as PM_{2.5} (with an aerodynamic diameter less than 2.5µm). As these particles are at the smaller end of the size range of dust particles they remain suspended in the atmosphere for a longer period of time than the larger dust particles, and can therefore be transported by wind over a wider area. PM₁₀ and PM_{2.5} are small enough to be drawn into the lungs during breathing, which in sensitive members of the public could have a potential impact on health. However, it is worth noting that, according to the IAQM guidance, the majority of fugitive particulate emissions arising from construction sites are expected to relate to the coarser fractions (i.e. PM_{2.5-10}) with just 10-15% expected to comprise PM_{2.5}. The IAQM guidance therefore focusses on PM₁₀ for the purposes of assessment.
- 4.2.3. An assessment of the likely significant impacts on local air quality due to the generation and dispersion of dust and PM₁₀ during the construction phase has been undertaken using: the relevant assessment methodology published by the IAQM; the available information for this phase of the Proposed Development provided by the Client and Project Team; and professional judgement.
- 4.2.4. The IAQM methodology assesses the risk of potential dust and PM₁₀ impacts from the following four sources: demolition; earthworks; general construction activities and track-out. It takes into account the nature and scale of the activities undertaken for each source and the sensitivity of the area to an increase in dust and PM₁₀ levels to assign a level of risk. Risks are described in terms of there being a low, medium or high risk of dust impacts. Once the level of risk has been ascertained, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined. A summary of the IAQM assessment methodology is provided in Appendix B.
- 4.2.5. In addition to impacts on local air quality due to on-site construction activities, exhaust emissions from construction vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the Application Site and in the vicinity of the Application Site itself. As information on the number of vehicles and plant associated with the construction phase was not available at the time of writing, a qualitative assessment of their impact on local air quality has been undertaken using professional judgement and by considering the following:
- The number and type of construction traffic and plant likely to be generated by this phase of the Development;
 - The number and proximity of sensitive receptors (human and ecological) to the Application Site and along the likely routes to be used by construction vehicles; and
 - The likely duration of the construction phase and the nature of the construction activities undertaken.

OPERATIONAL PHASE

- 4.2.6. Changes in traffic during the operational phase of the Proposed Development has the potential to effect air quality at nearby sensitive receptors (human and ecological).
- 4.2.7. Of the pollutants included in the AQS, concentrations of NO₂ and particulate matter (PM₁₀ and PM_{2.5}) have been considered within the assessment of potential impacts on sensitive human receptors as

road traffic is a major source of these pollutants and their concentrations tend to be close to, or in exceedance of, the objectives in urban locations, such as the Application Site.

- 4.2.8. In relation to potential impacts on sensitive ecological receptors, changes in annual mean NO_x , and NH_3 concentrations have been considered as have changes in nutrient N deposition. Further details regarding the nature of these changes and potential effects on sensitive ecological receptors are provided below.

NO_x and NH_3 Concentrations and Critical Levels

- 4.2.9. Emissions of NO_x from vehicles using the local road network, both now and in the future, can have both a direct and indirect effect on sensitive ecological receptors.
- 4.2.10. NO_x may directly enter a plant via the stomata (as NO or NO_2), where it can have phytotoxic effects. Lower plants such as lichens and bryophytes are particularly vulnerable to direct damage from NO_x ²², as they often receive the majority of their nitrogen inputs directly from the atmosphere; many of such species are adapted to living in low-nutrient habitats with no soil, such as on rocks or trees. NO_x can also deposit onto soil and, following transformation, enrich the soil as a nitrate, leading to eutrophication, as discussed later. The role of NO_x in causing direct harm to vegetation vs its potential role as a precursor to nitrogen deposition is not distinguished in the Air Quality (England) Regulations.
- 4.2.11. The negative effects of NH_3 on vegetation occur through direct damage and death of sensitive species, increase in vulnerabilities to environmental conditions (drought, desiccation and frost) or pest and pathogen attack, and reduced root growth and mycorrhizal infection leading to reduced nutrient uptake²³. Ammonia can put under-storey species at risk (such as mosses and lichens) though shading from the increases in dominant over-storey nitrophiles. This is compounded as nitrogen enrichment favours fast growing, taller species with rapid N assimilation rates leading to changes in species assemblages to favour N loving species.
- 4.2.12. Critical Levels provide an estimate of exposure to some important airborne pollutants, below which significant harmful effects are not expected to occur. These levels have been adopted by the European Union and the United Nations Economic Commissions for Europe (UNECE) and are used as regulatory standards. The relevant Critical Levels for oxides of nitrogen (NO_x) and ammonia (NH_3) relating to the protection of vegetation and ecosystems for this assessment are summarised in Table 2.

²² <http://www.apis.ac.uk/node/1071>

²³ http://www.apis.ac.uk/overview/pollutants/overview_nh3.htm (Accessed 27/11/20)

Table 2 – Critical Levels relevant to Vegetation and Ecosystems (APIS, 2018)

Pollutant	Objective		Averaging period
Nitrogen oxides (NO _x)	30µg/m ³		Annual mean
	75µg/m ³		24-hour mean
Ammonia (NH ₃)	3µg/m ³ (with uncertainty of 2-4 µg/m ³)	Higher Plants	Annual mean

- 4.2.13. There is limited published evidence for any directly toxic effect of NO_x and NH₃ on animals and therefore direct effects on animals are not usually included in ecological impact assessments, which focus on the effects on vegetation. The effects on animals are sometimes indirectly included in an assessment where species are dependent on particular habitats for their survival; an assessment may therefore focus on effects on supporting habitat²⁴.

N Deposition and Critical Loads

- 4.2.14. In addition to the direct effect of gaseous emissions, vegetation and ecosystems can also be affected by N deposition. The impacts of increased N deposition can vary, dependant on the existing habitat (e.g. whether it is nutrient rich or nutrient poor), however can include changes in species composition (especially in nutrient poor ecosystems with a shift towards species associated with higher nitrogen availability), reduction in species richness, increases in plant production, a decrease or loss of species better adapted to low-nutrient conditions and increases in nitrate leaching. N deposition can also contribute to the acidification of habitats, although the effects are less pronounced than comparable levels of sulphur deposition.
- 4.2.15. In the UK, Critical Loads are used to assess the potential impact of changes in N deposition at designated wildlife sites as a result of new development. Critical Loads have been established for a range of habitat types, reflecting the variation in ecosystem response, and have been based on empirical evidence, mainly observations from experiments and gradient studies. These include assessments of 'dose-response relationships' whereby the effects of experimentally altering levels of nitrogen deposition on a range of habitats are observed and assessed.
- 4.2.16. Site Relevant Critical Loads for have been obtained from APIS²⁵ for the SACs, SPAs and SSSIs considered within this assessment. There are no Site Relevant Critical Loads for the LNR, SINCR and AW sites in the study area, and therefore the indicative Critical Load for the habitats present in these sites have been taken from the APIS Critical Load range document²⁶ and used for this assessment. The Site Relevant Critical Loads for the ecological sites considered in this assessment are presented in Table 3.

²⁴ English Nature Research Reports Number 580. The ecological effects of diffuse air pollution from road transport. A report prepared for English Nature by Keeley Bignal, Mike Ashmore and Sally Power (2004).

²⁵ APIS (2021) <http://www.apis.ac.uk/srcf>. Accessed April 2022

²⁶ [Guidance on the application of nutrient nitrogen critical load ranges in air pollution casework \(apis.ac.uk\)](https://www.apis.ac.uk/guidance)

Table 3 – Relevant Critical Loads*

Designation	Habitat Type (EUNIS Code)	Critical Load (CL) range (kgN/ha/yr)	Recommended values to use at screening stage of assessment (kgN/ha/yr)
Solent and Southampton Water Ramsar and SPA	B1.4 Coastal Stable due Grasslands (acid type)	8-10	8
	B1.4 Coastal Stable due Grasslands (calcareous type)	10-15	10
	B1.3 Shifting Coastal Dunes	10-20	10
	A2.54, A2.55, A2.5 Pioneer low-mid, mid-upper salt marshes	20-30	30
River Itchen SAC	F4.11 Dwarf Shrub Heath	10-20	10
River Itchen SSSI	G1 Broadleaved deciduous woodland	10-20	10
	D4.1 Rich Fens	15-30	15
	E2.2 Low and medium altitude hay meadows	20-30	20
	F4.11 Northern wet heath	10-20	10
Moorgreen Meadows SSSI	G1 Broadleaved deciduous woodland	10-20	10
	E3.51 Moist and wet oligotrophic grasslands	15-25	15
	D4.1 Rich Fens	15-30	15
	E2.2 Low and medium altitude hay meadows	20-30	20
Lee-on-Solent to Itchen Estuary SSSI	A2.54, A2.55, A2.5 Pioneer low-mid, mid-upper salt marshes	20-30	30
Chessel Bay Local Nature Reserve (LNR)	See Lee-on Solent SSSI and River Itchen SSSI	-	-
Netley Common LNR	F4.2 Heathland	10-20	10
	Mixed Woodland	-	10
Wildern LNR	Mixed Woodland	-	10
Ancient Woodland	Mixed Woodland	-	10

Designation	Habitat Type (EUNIS Code)	Critical Load (CL) range (kgN/ha/yr)	Recommended values to use at screening stage of assessment (kgN/ha/yr)
Telegraph Woods Site of Importance for Nature Conservation (SINC)	Mixed Woodland	-	10

*Where more than one habitat is present, the lowest relevant Critical Load has been applied to provide a conservative assessment.

- 4.2.17. In recent years, greater attention has been given to ammonia emissions from road vehicles and their potentially significant contribution to total N deposition within the vicinity of roads²⁷. The role of NH₃ to total N deposition has, therefore, been accounted for within this assessment. Further details regarding NH₃ emissions from road traffic including assumptions regarding future NH₃ emissions applied within the modelling are provided below.

Modelling Methodology

- 4.2.18. For the prediction of impacts due to emissions arising from road traffic during the operation of the Proposed Development, the dispersion model ADMS Roads (version 5.0.0.1) has been used. This model uses detailed information regarding traffic flows on the local road network, surface roughness, and local meteorological conditions to predict pollutant concentrations at specific receptor locations, as determined by the user.
- 4.2.19. Meteorological data, such as wind speed and direction, is used by the model to determine pollutant transportation and levels of dilution by the wind. Meteorological data used in the model was obtained from the Met Office observing station at Southampton Airport for 2019. This station is considered to provide representative data for the assessment and is located approximately 4 km northwest of the Development Site.
- 4.2.20. A summary of the traffic data and pollutant emission factors used in the assessment can be found in Appendix C. It includes details of the Annual Average Daily Traffic (AADT) flows, vehicle speeds (kph) and the percentage of Heavy Duty Vehicles (HDVs) for the local road network in all assessment years considered. Traffic speeds were reduced at junctions in line with guidance provided in LAQM.TG(16), and using professional judgement.
- 4.2.21. For the assessment, three scenarios were modelled, as follows:
- 2019 – Model Verification and Baseline;
 - 2027 – Without Development; and
 - 2027 – With Development.
- 4.2.22. 2019 is considered to be the most recent year for which monitoring data and meteorological data are both available, where there has been no influence from the Covid pandemic, to enable verification of the model results, and so this year has been used as the baseline year for this assessment. 2019 traffic data has also been used with 2027 emissions data for the purposes of the 'in-combination'

²⁷ Air Quality Consultants (February 2020) *Ammonia Emissions from Roads for Assessing Impacts on Nitrogen-sensitive Habitats*. Available at: <https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?quid=3aa4ec2e-ee4e-4908-bc7a-aeb0231b4b37>. Accessed 09/09/20)

assessment (see Paragraph 6.2.9). 2027 is the anticipated opening year of the Proposed Development.

- 4.2.23. The traffic flows for the ‘without development’ scenario include flows for committed developments in the locality of the Application Site but does not include any contribution to road traffic from the Proposed Development itself. The traffic flows for the ‘with development’ scenario comprise contributions to road traffic from the Proposed Development itself and the nearby committed developments.

Vehicle Emission Factors

- 4.2.24. Vehicle emission factors for use in the assessment have been obtained using the ‘Emissions Factors Toolkit’ (EFT) version 11.0 (published in November 2021) available on the Defra website²⁸. The EFT allows for the calculation of emission factors arising from road traffic for all years between 2018 and 2050²⁹. For the predictions of future year emissions, the toolkit takes into account factors such as anticipated advances in vehicle technology and changes in vehicle fleet composition, such that vehicle emissions are assumed to reduce over time.
- 4.2.25. Emissions of NH₃ were estimated using Air Quality Consultants Ltd’s ‘Calculator for Road Emissions of Ammonia’ (CREAM V1A)³⁰. The calculator takes into account fleet composition data and projections from the National Atmospheric Emissions Inventory (NAEI) in January 2020, in particular how the changing vehicle fleet (and use of Selective Catalytic Reduction (SCR) technologies in diesel vehicles) may increase NH₃ emissions from road traffic in future years.

Selection of Background Concentrations

- 4.2.26. Background pollutant concentrations used in the assessment have been taken from the national maps provided on the Defra website³¹, where background concentrations of those pollutants included within the AQS have been mapped at a grid resolution of 1x1km for the whole of the UK. Estimated concentrations are available for all years between 2018 and 2030. The maps assume that background concentrations will improve (i.e. reduce) over time, in line with the predicted reduction in vehicle emissions and emissions from other sources.
- 4.2.27. It should be noted that for NO_x and PM₁₀, the background maps present both the ‘total’ estimated background concentrations and the individual contributions from a range of emission sources (for example, motorways, aircraft, domestic heating etc.). When detailed modelling of an individual sector is required as part of an air quality assessment, the respective contribution can be subtracted from the overall background estimate to avoid the potential for ‘double-counting’. For this assessment, traffic data for the M27 motorway have been included in the modelling within the following grid squares;

- 445500, 115500;
- 447500, 115500;
- 447500, 113500;

²⁸ <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>

²⁹ 2031-2050 emission outputs are only limited to England not including London.

³⁰ Air Quality Consultants (2020) Calculator for Road Emissions of Ammonia CREAM V1A

³¹ <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>

- 447500, 114500;
- 448500, 111500;
- 448500, 113500.

Therefore, contributions from the 'Motorway In' sector have been removed from the background concentrations for these grid squares.

- 4.2.28. The nutrient N deposition rates and NH₃ concentrations for the 5km grid squares containing the identified ecological sites have been obtained from the APIS website. The deposition rates and concentrations, which are provided as a three-year average for 2017-2019, have been factored forward to 2027 (i.e. to match the same future year as the emission factors) based on the trend data provided for the 'Business As Usual' (BAU) case within JNCC's Nitrogen Futures document³². This assumes that in the UK there will be a decrease in nutrient N deposition of 1.04% per year, due to emission reduction commitments already in place, and an increase in NH₃ concentrations of 0.08% per year because of increases in emissions of this pollutant from agricultural activities and anaerobic digestion plant. It is not possible to subtract individual contributions from the nutrient N deposition rates and NH₃ concentrations and as such there may be an element of double-counting and the results presented will be a worst-case scenario.
- 4.2.29. Further details on the background concentrations applied to the assessment are provided in Section Four of this report.

Model Verification

- 4.2.30. The ADMS Roads dispersion model has been widely validated for this type of assessment and is considered to be fit for purpose. Model validation undertaken by the software developer will not have included validation in the vicinity of the Development.
- 4.2.31. To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process of verification aims to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results, and was carried out following the methodology specified in Chapter 7, Section 4, of LAQM.TG(16).
- 4.2.32. Details of the verification factor calculations are presented in Appendix D. A factor of 1.8 was obtained during the verification process, which indicated that the model was under-predicting. This factor was subsequently applied to the model road-NO_x outputs prior to conversion to annual mean NO₂ concentrations.
- 4.2.33. As local roadside monitoring data are not available for PM₁₀ or PM_{2.5}, the modelled road-PM₁₀ and road-PM_{2.5} components have been adjusted by the verification factor obtained for NO_x.
- 4.2.34. Similarly, it has not been possible to verify NH₃ emissions from road traffic as no suitable local monitoring data is available to enable this. However, NH₃ emissions used within the modelling have been obtained from CREAM which have been verified against monitoring (and so represent on-road emissions data which minimises, as far as possible, uncertainty trying to be removed through model verification).

³² JNCC (October 2020) JNCC Report No. 665 – Nitrogen Futures. Available at <https://data.jncc.gov.uk/data/04f4896c-7391-47c3-ba02-8278925a99c5/JNCC-Report-665-FINAL-WEB.pdf>

Processing of the Modelling Results

- 4.2.35. The verified modelled road-NO_x outputs were converted to annual mean NO₂ concentrations utilising the NO_x to NO₂ calculator (version 8.1, released August 2020) provided by Defra³³.
- 4.2.36. The verified modelled road contributions of PM₁₀ and PM_{2.5} (verified using the NO_x verification factor) were added to the relevant estimated background concentrations obtained from Defra's webpages.
- 4.2.37. The number of days with PM₁₀ concentrations greater than 50µg/m³ was then estimated using the relationship with the annual mean concentration described in LAQM.TG(16). LAQM.TG(16) advises that exceedances of the 1 hour mean NO₂ objective are unlikely to occur where annual mean concentrations are below 60µg/m³, and it provides guidance on the approach that should be taken if either measured or predicted annual mean NO₂ concentrations are 60µg/m³ or above.
- 4.2.38. Once processed, the predicted concentrations were compared against the relevant air quality objective levels for NO₂, PM₁₀ and PM_{2.5} set out in Table 1 for the protection of human health.

Calculation of Nutrient N Deposition Rates

- 4.2.39. The calculation of nutrient N deposition has been undertaken with reference to the methodologies contained within the IAQM's designated sites guidance.
- 4.2.40. The deposition velocities provided in Table 4 below have been used to calculate the dry deposition rates of Nutrient Nitrogen and NH₃ at the ecological sites and have been derived from AQTAG(06)³⁴. The deposition velocities were applied to the road contributions of annual mean NO₂ and NH₃ concentrations to calculate the road contribution of nutrient N deposition at the relevant vegetation types present. The road contributions were then added to the relevant APIS background deposition rates in order to calculate the total nutrient N deposition at each modelled receptor.

Table 4 – Deposition Velocities applied (taken from AQTAG(06))

Pollutant	Vegetation Type	Deposition Velocity
Nutrient N Deposition	Low Vegetation (e.g. grassland)	0.0015 m/s
	High Vegetation (e.g. forest)	0.003 m/s
NH ₃ Deposition	Low Vegetation (e.g. grassland)	0.020 m/s
	High Vegetation (e.g. forest)	0.030 m/s

Selection of Sensitive Receptors

- 4.2.41. Sensitive locations are places where the public or sensitive ecological habitats may be exposed to pollutants resulting from activities associated with the Proposed Development. These will include locations sensitive to an increase in dust deposition and PM₁₀ exposure as a result of on-site

³³ <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc>

³⁴ Environment Agency (2011) AQTAG06 Technical Guidance on detailed modelling approach for an appropriate assessment for emissions to air.

construction activities, and locations sensitive to exposure to gaseous pollutants emitted from the exhausts of construction and operational traffic associated with the Proposed Development.

CONSTRUCTION PHASE

- 4.2.42. The IAQM assessment is undertaken where there are: 'human receptors' within 350m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or 'ecological receptors' within 50m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s). It is within these distances that the impacts of dust soiling and increased particulate matter in the ambient air will have the greatest impact on local air quality at sensitive receptors.

OPERATIONAL PHASE

- 4.2.43. In terms of locations that are sensitive to pollutants emitted from engine exhausts, these will include:

- Places where members of the public are likely to be regularly present over the period of time prescribed in the AQS. For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short-term standard (i.e. 15 minute mean or 1 hour mean) may be relevant. At a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long-term standard (such as 24 hour mean or annual mean) may be more appropriate. Box 1.1 of LAQM.TG(16) provides examples of the locations where the air quality objectives should/should not apply.
- Designated ecological sites (SACs, SPAs) and Ramsar sites, which are covered by the Habitats Regulations, and SSSIs, Areas of Special Scientific Interest (ASSIs), National Nature Reserves (NNRs), LNRs, Local Wildlife Sites (LWSs) and areas of ancient woodland (AW) where they are located within 200m of an 'affected' road and there is an identified sensitivity to changes in air quality.

- 4.2.44. To complete the assessment of operational phase impacts on human health, a number of 'receptors' representative of locations of relevant public exposure were identified at which pollution concentrations were predicted. Receptors have been located adjacent to the roads that are likely to experience the greatest change in traffic flows or composition, and therefore NO₂ and particulate matter concentrations, as a result of the Proposed Development. The locations of the human health receptors are shown on Figure 1 and listed in Appendix E

- 4.2.45. In terms of ecological receptors, the criteria within the IAQM's Designated Sites Guidance have been applied to determine the designated ecological sites which fall within 200m of an 'affected road', as determined by specific changes to the traffic flow and composition on a road due to a proposal. The following ecologically designated sites are located within 200m of an 'affected road' and are shown on Figure 2:

- Solent and Southampton Water Ramsar and SPA;
- River Itchen SAC and SSSI;
- Moorgreen Meadows SSSI;
- Lee-on-Solent to Itchen Estuary SSSI;
- Chessel Bay LNR;
- Netley Common LNR;
- Wildern LNR (just Hogsty Copse area);
- Several AW sites including; Marlhill Copse, Dummars Copse, Bushey/Withybed Copses; and

▪ Telegraph Woods SINC.

Therefore, concentrations of NO_x, Nutrient Nitrogen Deposition and NH₃ have been predicted at a number of transects, at intervals of 10m, back from the affected roads within the ecologically designated sites.

4.2.46. The locations of the assessment receptors are shown on Figure 3, Figure 4 and Figure 5.

4.2.47. The IAQM guidance highlights that concentrations should not be predicted too close to the roadway, as predictions may not be reliable and may not represent areas of relevance. Therefore, the increases that occur at 0 m from the roadside will be discounted from this assessment.

4.3. SIGNIFICANCE CRITERIA

CONSTRUCTION PHASE

4.3.1. The IAQM assessment methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity with appropriate mitigation measures in place. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.

4.3.2. For the assessment of the impact of exhaust emissions from plant used on-site and construction vehicles accessing and leaving the Site on local concentrations of NO₂ and particulate matter, the significance of residual effects has been determined using professional judgement and the principles outlined in the EPUK/IAQM guidance, which are described below.

OPERATIONAL PHASE

Human Health Receptors

4.3.3. The approach provided in the EPUK/IAQM guidance has been used within this assessment to assist in describing the air quality effects of additional emissions from traffic generated by the Proposed Development once operational.

4.3.4. This guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion, as summarised in Table 5.

Table 5 - Impact Descriptors for Individual Receptors

Long term average concentration at receptors in assessment year	% Change in Concentration Relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial

103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial
Notes AQAL = Air Quality Assessment Level, which for this assessment related to the UK Air Quality Strategy objectives. Where the %change in concentrations is <0.5%, the change is described as 'Negligible' regardless of the concentration. When defining the concentration as a percentage of the AQAL, 'without scheme' concentration should be used where there is a decrease in pollutant concentration and the 'with scheme;' concentration where there is an increase. Where concentrations increase, the impact is described as adverse, and where it decreases as beneficial.				

- 4.3.5. The EPUK/IAQM guidance notes that the criteria in Table 5 should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for. The EPUK/IAQM guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:
- The existing and future air quality in the absence of the development;
 - The extent of current and future population exposure to the impacts; and
 - The influence and validity of any assumptions adopted when undertaking the prediction of impacts.
- 4.3.6. The EPUK/IAQM guidance states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the impacts. The guidance does not include criteria for determining the significance of the effect on hourly mean NO₂ concentrations or daily mean PM₁₀ concentrations. The significance of effects of hourly mean NO₂ and daily mean PM₁₀ concentrations arising from the operational phase has therefore been determined qualitatively using professional judgement and the principles described above.
- 4.3.7. The EPUK/IAQM guidance says that *'Where the air quality is such that an air quality objective at the building facade is not met, the effect on residents or occupants will be judged as significant, unless provision is made to reduce their exposure by some means. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.'*

Ecological Receptors

- 4.3.8. It is usually the role of a suitably qualified ecologist, rather than an air quality specialist, to determine whether predicted impacts on air quality within a designated ecological site would result in a significant effect on the habitats present within the site. However, screening criteria can be used by the air quality specialists to identify when predicted impacts are unlikely to result in significant effect, thereby not requiring further assessment or specific mitigation.
- 4.3.9. For this assessment, in describing the potential impacts on annual mean NO_x and NH₃ concentrations, and nutrient N deposition rates, reference has been made to guidance contained within the IAQM's Designated Sites Guidance. As mentioned in the IAQM guidance for NO_x

concentrations, the *‘UNECE Working Group on Effects strongly recommend the use of annual mean value, as the long term effects of NO_x are thought to be more significant than the short term effects’*. Therefore, the 24-hour mean NO_x concentrations have not been assessed.

- 4.3.10. Where the predicted change, due to either the Proposed Development ‘alone’ or ‘in-combination’ is ≤1% of the relevant Critical Level or Critical Load, the impacts can be considered ‘non-significant’. Where the predicted impacts are greater than 1%, this does not mean that the Proposed Development will give rise to significant adverse effects at the designated ecological site. Use of the 1% criteria is simply used as a trigger for identifying when the impacts will require further assessment and evaluation by an ecologist.

4.4. LIMITATIONS & ASSUMPTIONS

- 4.4.1. As suitable information for the construction phase of the Proposed Development was not available professional judgement has been used in the completion of this part of the assessment.
- 4.4.2. There are uncertainties associated with both measured and predicted concentrations. The model (ADMS Roads) used in this assessment relies on input data (including predicted traffic flows), which also have uncertainties associated with them. The model itself simplifies complex physical systems into a range of algorithms. In addition, local micro-climatic conditions may affect the concentrations of pollutants that the ADMS Roads model will not take into account.
- 4.4.3. In order to reduce the uncertainty associated with predicted concentrations, model verification has been carried out following guidance set out in LAQM.TG(16). As the model has been verified against local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations.
- 4.4.4. The uncertainty surrounding the future trends of both nutrient N deposition and NH₃ concentrations within the UK has been addressed by factoring forward future concentrations using trend data for the Business as Usual Case (BAU) presented within the JNCC’s Nitrogen Futures document (see paragraph 4.2.28). The future predictions of nutrient N deposition and NH₃ concentrations are therefore considered to provide a robust and conservative assessment of potential impacts.

5. BASELINE CONDITIONS

5.1. EBC'S REVIEW & ASSESSMENT OF AIR QUALITY

- 5.1.1. EBC has designated four AQMAs within their administrative area as a consequence of their Review and Assessment work. The closest AQMA, High Street Botley, is located 2.1 km south-east of the Proposed Development and has been designated due to historical exceedances of the AQS objective for annual mean NO₂ concentrations.
- 5.1.2. EBC published its Air Quality Action Plan (AQAP) in 2020 covering the period 2020 to 2025³⁵. This details a number of measures proposed to reduce concentrations of NO₂ within its administrative area. Key actions include:
- Upgrading EBC's continuous monitoring equipment;
 - Using an innovative low-cost monitoring system to link vehicle movements to air quality in real time. Funded by the DEFRA Air Quality Grant Scheme 2018-19;
 - Create a walking and cycling strategy to promote and encourage travel by these methods;
 - Implement a requirement for taxis to meet specified Euro standards in order to be licensed in Eastleigh Borough; and
 - Promote the use of electric vehicles by investigating incentives and developing a network of publicly available electric vehicle charge points across the Borough in both public and business locations.

5.2. LOCAL EMISSION SOURCES

- 5.2.1. The Application Site is located in an area where air quality is mainly influenced by emissions from road transport, particularly the M27 Motorway, Charles Watts Way (A334), High Street/Botley Road (B3035) and Moorhill Road/Church Hill (A27).
- 5.2.2. There are no industrial pollution sources in the immediate vicinity of the Application Site that will influence the local air quality.

5.3. BACKGROUND AIR QUALITY DATA

- 5.3.1. Table 6 summarises the background pollutant concentrations of NO_x, NO₂, PM₁₀ and PM_{2.5} for 2019 and 2027 that were utilised in the assessment. All of the annual mean background concentrations are well below the relevant objectives and Critical Level (applies to NO_x only).

³⁵ Eastleigh Borough Council (February 2020), Eastleigh Borough Council Air Quality Action Plan

Table 6 - Background Concentrations ($\mu\text{g}/\text{m}^3$)

Grid Square (centre on O.S. Grid Reference)	NO _x		NO ₂		PM ₁₀		PM _{2.5}	
	2019	2027	2019	2027	2019	2027	2019	2027
443500, 112500	28.2	26.7	-	-	-	-	-	-
443500, 113500	28.2	22.0	20.8	15.7	15.6	14.4	11.1	10.3
444500, 112500	26.2	21.0	-	-	-	-	-	-
444500, 113500	26.7	20.6	20.3	14.8	15.8	14.7	11.4	10.5
444500, 115500	25.6	19.0	-	-	-	-	-	-
445500, 112500	-	-	19.5	14.0	15.6	14.5	11.4	10.5
445500, 113500	-	-	19.3	13.8	15.8	14.7	11.5	10.6
445500, 114500	23.8	18.2	18.2	13.4	16.0	14.9	11.6	10.8
445500, 115500	22.3	16.9	16.0	12.5	16.5	15.5	11.3	10.5
445500, 116500	25.9	19.4	-	-	-	-	-	-
446500, 111500	-	-	17.8	13.1	15.3	14.2	11.0	10.2
446500, 112500	-	-	18.6	13.4	15.4	14.3	11.1	10.2
446500, 113500	-	-	18.6	13.0	15.3	14.2	11.0	10.2
446500, 114500	-	-	17.9	12.7	15.0	13.9	10.8	9.9
446500, 115500	28.3	19.5	-	-	-	-	-	-
446500, 116500	21.9	16.4	-	-	-	-	-	-
447500, 110500	-	-	16.6	12.4	15.0	14.0	10.2	9.4
447500, 111500	22.8	17.1	17.2	12.7	14.3	13.3	10.1	9.3
447500, 112500	-	-	16.1	12.5	15.8	14.8	11.0	10.2
447500, 113500	23.2	17.3	16.7	12.8	14.8	13.7	10.3	9.4
447500, 114500	21.4	16.3	15.5	12.1	15.6	14.5	10.8	9.9
447500, 116500	20.1	15.1	-	-	-	-	-	-
448500, 110500	-	-	20.7	14.5	15.7	14.7	10.8	10.0

Grid Square (centre on O.S. Grid Reference)	NO _x		NO ₂		PM ₁₀		PM _{2.5}	
	2019	2027	2019	2027	2019	2027	2019	2027
448500, 111500	-	-	15.5	12.0	16.1	15.1	10.9	10.1
448500, 113500	23.9	17.5	17.1	12.9	16.6	15.6	11.3	10.4
448500, 114500	27.2	19.3	-	-	-	-	-	-

- 5.3.2. The APIS website provides information on pollutants and their impacts on habitats and species. This website has been used to obtain concentrations, current deposition rates and Critical Loads for nutrient N deposition and NH₃ at the designated ecological sites. Table 7 summarises the background pollutant concentrations that were utilised in the assessment. Two values are presented for nutrient N deposition, one relates to woodland habitats and one to shorter habitats e.g grassland.

Table 7 – Baseline Ecological Conditions for Nutrient Nitrogen Deposition and NH₃ Concentrations

Grid Square (centre on O.S. Grid Reference)	Nutrient N Deposition (kgN/ha/year)		Nutrient N Deposition – Woodland only (kgN/ha/year)		Ammonia (µg/m ³)	
	2019	2027	2019	2027	2019	2027
443500, 112500	17.0	15.7	-	-	1.5	1.5
443500, 113500	17.0	15.7	-	-	1.5	1.5
444500, 112500	17.0	15.7	-	-	1.5	1.5
444500, 113500	17.1	15.7	-	-	1.5	1.5
444500, 115500	16.8	15.4	26.9	24.7	1.4	1.4
445500, 114500	-	-	30.0	27.5	1.7	1.7
445500, 115500	17.6	16.2	28.6	26.3	1.6	1.7
445500, 116500	17.6	16.2	28.6	26.3	1.6	1.7
446500, 115500	-	-	28.6	26.3	1.6	1.7
446500, 116500	-	-	28.6	26.3	1.6	1.7
447500, 111500	18.5	17.0	30.0	27.5	1.7	1.7

Grid Square (centre on O.S. Grid Reference)	Nutrient N Deposition (kgN/ha/year)		Nutrient N Deposition – Woodland only (kgN/ha/year)		Ammonia ($\mu\text{g}/\text{m}^3$)	
	2019	2027	2019	2027	2019	2027
447500, 113500	-	-	30.0	27.5	1.7	1.7
447500, 114500	18.5	17.0	29.9	27.5	1.7	1.7
447500, 116500	-	-	28.6	26.3	1.6	1.7
448500, 113500	-	-	30.0	27.5	1.7	1.7
448500, 114500	18.5	17.0	29.9	27.5	1.7	1.7
Critical Load/Level	8-10		10		3	

- 5.3.3. The baseline nutrient N deposition rates are already above the relevant Critical Loads within the majority of the identified designated ecological sites. NH_3 concentrations are below the relevant Critical Level of $3\mu\text{g}/\text{m}^3$ within the designated sites.

5.4. LOCAL AUTHORITY AIR QUALITY MONITORING DATA

- 5.4.1. EBC undertake passive (diffusion tube) monitoring for NO_2 , with ten monitoring sites located within the general vicinity of the Proposed Development. The closest EBC monitoring location is site JW, located 580m north of the Application Site. Annual mean NO_2 concentrations measured at monitoring sites within 1.5km of the Application Site are provided in Table 8.

Table 8 - Local Authority Air Quality Monitoring Data

Site ID	Site Type	X	Y	Distance to site boundary (km)	Annual Mean NO_2 Concentration ($\mu\text{g}/\text{m}^3$)*					
					2015	2016	2017	2018	2019	2020**
UNC	Urban Background	448090	112635	1.2	28.3	34.6	29.5	27.7	24.8	19.4
JW	Roadside	447690	114912	0.6	-	27.9	24.8	24.7	21.3	16.5
SWA	Roadside	446170	114603	1.3	-	31.7	29.5	27.7	28.6	24.1

* 2020 ASR Eastleigh Borough Council **Downloaded from Eastleigh Borough Council website

- 5.4.2. The results indicate that the AQS objective for annual mean NO_2 concentrations was met at all monitoring sites within 1.5km of the Application Site in all years presented, where data was available. The results also show that there has been an overall gradual improvement in annual mean NO_2 concentrations over this time period. Concentrations in 2020 were significantly lower than other years, however, these lower concentrations are most likely a result of the Covid pandemic. In addition, the urban background location (UNC) NO_2 concentrations are not dissimilar

from the roadside locations. This is likely due to the location being within 100m of the M27 and being downwind of the road. Therefore, it is not expected that urban background locations in other locations will have NO₂ concentrations as high as those monitored at UNC.

5.5. MODELLED CURRENT BASELINE CONCENTRATIONS

- 5.5.1. Full results of the dispersion modelled are presented in Appendix F and a summary is provided below.

HUMAN HEALTH RECEPTORS

Annual Mean NO₂ Concentrations

- 5.5.2. The AQS objective for annual mean NO₂ concentrations is 40µg/m³. The results of the assessment show that in the 2019 baseline, concentrations are met at the majority of modelled receptors. Concentrations at Receptors R1 (Upmill Close) and R2 (Moorgreen Road) are predicted to exceed the annual mean NO₂ objective, with the highest predicted concentration of 43.4µg/m³ at Receptor R1. EBC's monitoring does not highlight any exceedances outside of the current AQMAs, these receptors are not located within any of the current AQMAs, which suggests there is a possibility that the model is over-predicting at these receptors.

Hourly Mean NO₂ Concentrations

- 5.5.3. The annual mean NO₂ concentrations predicted by the model were all below 60µg/m³, and therefore hourly mean NO₂ concentrations are unlikely to cause a breach of the hourly mean AQS objective.

Annual Mean PM₁₀ Concentrations

- 5.5.4. The AQS objective for annual mean PM₁₀ concentrations is a concentration of 40µg/m³. The results of the assessment show that in the 2019 baseline, concentrations at all of the modelled receptors are predicted to easily meet the objective. The highest concentration is 20.0µg/m³ predicted at Receptors R22 and R34 (The Old Forge and Gaters Mill, respectively). These results agree with the conclusions of the Review and Assessment work undertaken by EBC, which concluded that no AQMAs needed to be designated for this pollutant.

Daily Mean PM₁₀ Concentrations

- 5.5.5. The AQS objective for daily mean PM₁₀ concentrations is 50µg/m³ to be exceeded no more than 35 times a year. The results of the dispersion modelling indicate that the number of days of exceedance in the 2019 baseline is a maximum of 3 days, which is well below the AQS objective level.

Annual Mean PM_{2.5} Concentrations

- 5.5.6. Predicted annual mean concentrations of PM_{2.5} are well below the limit value of 20µg/m³ in the 2019 baseline scenario at all modelled receptors. The highest predicted concentration is 13.4 µg/m³, which is predicted at Receptors R1 and R25 (Upmill Close and Gaters Mill, respectively).

ECOLOGICAL RECEPTORS

Annual Mean NO_x Concentrations

- 5.5.7. The Critical Level for NO_x concentrations is 30µg/m³. The maximum annual mean NO_x concentration in the 2019 baseline scenario was 144.1 µg/m³ at Ecological Receptor 7 located in the River Itchen SAC at 10 m from the roadside. Annual mean NO_x concentrations are predicted to exceed 30 µg/m³ at the majority of the modelled ecological receptors, at some locations at all locations modelled along the transect. There are four locations where predicted concentrations are below 30µg/m³ along the entire modelled transect (Ecological Receptors 34, 46, 51 and 53).

Nutrient Nitrogen Deposition Rates

Grassland Habitat

- 5.5.8. The maximum total N deposition rate predicted in the 2019 baseline scenario was 37.6 kgN/ha/year at Ecological Receptor 7 in the River Itchen SAC at 10 m from the roadside. Total nutrient N deposition rates are predicted to exceed the relevant Critical Loads at all of the modelled receptors along all the transects.

Forest Habitat

- 5.5.9. The maximum total N deposition rate predicted in the 2019 baseline scenario was 66.4 kgN/ha/year at Ecological Receptor 23 within the Moorgreen Meadows SSSI, this was predicted at the edge of the SSSI, approximately 7 m from the road edge. Total nutrient N deposition rates are predicted to exceed the relevant Critical Load at all of the receptors along all of the transects modelled.

Annual Mean NH₃

- 5.5.10. The maximum annual mean NH₃ concentration predicted in the 2019 baseline scenario was 4.2µg/m³ at Ecological Receptor 23 within the Moorgreen Meadows SSSI, this was predicted at the edge of the SSSI, approximately 7 m from the road edge. At this location the Critical Level is exceeded up to 10 m into the SSSI, approximately 17 m from the road edge.
- 5.5.11. The Critical Level of 3µg/m³ is also exceeded at an additional 6 of the 55 modelled transects in the 2019 baseline. Within the River Itchen SAC this occurs up to 10 m from the roadside at Ecological Receptors 13 and 14 and then 20 m from the roadside at Ecological Receptors 7 and 8. At Ecological Receptor 15 (River Itchen SAC), there is an exceedance at the edge of the site, which is approximately 12 m from the roadside. At Ecological Receptor 42 within an AW site this occurs at the edge of the site which is approximately 17 m from the roadside.

6. ASSESSMENT OF IMPACTS

6.1. CONSTRUCTION PHASE

DUST AND PM₁₀ ARISING FROM ON-SITE ACTIVITIES

- 6.1.1. Construction activities that have the potential to generate and/or re-suspend dust and PM₁₀ include:
- Site clearance and preparation;
 - Preparation of temporary access/egress to the Application Site and haulage routes;
 - Earthworks;
 - Materials handling, storage, stockpiling, spillage and disposal;
 - Movement of vehicles and construction traffic within the Application Site;
 - Use of crushing and screening equipment/plant;
 - Exhaust emissions from site plant, especially when used at the extremes of their capacity and during mechanical breakdown;
 - Construction of buildings, roads and areas of hardstanding alongside fabrication processes;
 - Internal and external finishing and refurbishment; and
 - Site landscaping after completion.
- 6.1.2. The majority of the releases are likely to occur during the 'working week'. However, for some potential release sources (e.g. exposed soil produced from significant earthwork activities) in the absence of dust control mitigation measures, dust generation has the potential to occur 24 hours per day over the period during which such activities are to take place.

ASSESSMENT OF POTENTIAL DUST EMISSION MAGNITUDE

- 6.1.3. The IAQM assessment methodology has been used to determine the potential dust emission magnitude for the following four different dust and PM₁₀ sources: demolition; earthworks; construction; and trackout. The findings of the assessment are presented below.

Demolition

- 6.1.4. It is not anticipated demolition activities will occur at the Application Site as part of the construction phase of the Proposed Development. Therefore, consideration of the impact of this source on dust soiling and ambient PM₁₀ is not required.

Earthworks

- 6.1.5. The total area of the Application Site is approximately 159,000m² which falls within the IAQM range for large sites. The soil type is assumed to be moderately dusty (a mix of silt and sand) and the total material of material that will be moved is estimated to be between 20,000 and 100,000 tonnes. It is also estimated that more than 10 heavy earth moving vehicles will be active at any one time, and that the formation of bunds with a height of between 4 and 8m may occur. Although it is not expected that there will be more than 100,000 tonnes of material moved, this cannot be confirmed at this stage. Therefore, a conservative estimate of the potential dust emission magnitude is considered to be large for earthwork activities.

Construction

- 6.1.6. The total volume of buildings to be constructed on the Application Site is estimated to be between 25,000m³ and 100,000m³ with potentially dusty construction materials being used. In addition, on

site concrete batching will occur. Therefore, the potential dust emission magnitude is considered to be medium for construction activities.

Trackout

- 6.1.7. The number of HDVs associated with this phase of the Proposed Development is estimated to be 10 – 50 (>3.5t) outward movements in any one day, travelling over potentially dusty surface material. As the unpaved road length in the Application Site is likely to be >100m, it is considered that the potential dust emission magnitude of is large for trackout.
- 6.1.8. Table 9 provides a summary of the potential dust emission magnitude determined for each construction activity considered.

Table 9 - Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Earthworks	Large
Construction Activities	Medium
Trackout	Large

Assessment of Sensitivity of the Study Area

- 6.1.9. A windrose generated using the 2019 meteorological data from Southampton Airport is provided in Appendix G. This shows that the prevailing wind direction is from the southwest. Therefore, receptors located to northeast of the Application Site are the most likely to be affected by dust and particulate matter emitted and re-suspended during the construction phase.
- 6.1.10. Under low wind speed conditions, it is likely that the majority of dust would be deposited in the area immediately surrounding the source. The primary land uses in the vicinity of the Application Site are open space and commercial and residential development. To the northeast of the Application Site (i.e. within the direction of the prevailing wind), there is a mix of residential and commercial receptors. It is estimated that there are approximately five high sensitivity receptors within 20m of the Application Site boundary. Therefore, the sensitivity to dust soiling is medium.
- 6.1.11. The Application Site is bounded by established tall trees and vegetation, therefore, the deposition of dust from on-site activities is likely to be reduced at nearby residential and commercial receptors.
- 6.1.12. Annual mean PM₁₀ concentrations within the study area are below 24µg/m³ (based on DEFRA's estimated background concentrations). Therefore, as there are fewer than 100 high sensitivity receptors within 20m of the Application Site boundary (and construction routes), the receptor sensitivity for human health is 'low'.
- 6.1.13. The main construction routes are expected to be via Botley Road and the A334, which pass through commercial areas. Therefore, there should be limited construction traffic passing residential (i.e. high sensitivity) receptors.
- 6.1.14. For ecological receptors, the Telegraph Woods SINC is located adjacent to the red line boundary, this is considered as a medium sensitivity receptor. There are no ecological areas within 50m of an expected construction traffic route (up to 500m away from the Application Site by road).

- 6.1.15. Taking the above into account and following the IAQM assessment methodology, the sensitivity of the area to changes in dust and PM₁₀ has been derived for each of the construction activities considered. The results are shown in Table 10.

Table 10 - Sensitivity of the Study Area

Potential Impact	Sensitivity of the Surrounding Area		
	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium
Human Health	Low	Low	Low
Ecological	Medium	Medium	N/A

Risk of Impacts

- 6.1.16. The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation. Table 11 below provides a summary of the risk of dust impacts for the Proposed Development. The risk category identified for each construction activity has been used to determine the level of mitigation required.

Table 11 - Summary Dust Risk Table to Define Site Specific Mitigation

Potential Impact	Risk		
	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium
Human Health	Low	Low	Low
Ecological	Medium	Medium	N/A

Construction Vehicles & Plant

- 6.1.17. The greatest impact on air quality due to emissions from vehicles and plant associated with the construction phase will be in the areas immediately adjacent to the site access. It is anticipated that construction traffic will access the site via Botley Road and the A334. Due to the size of the Application Site, it is considered likely that the construction traffic will be low in comparison to the existing traffic flows on these roads.
- 6.1.18. Final details of the exact plant and equipment likely to be used on Site will be determined by the appointed contractor, it is considered likely to comprise dump trucks, tracked excavators, diesel generators, asphalt spreaders, rollers, compressors, and trucks. The number of plant and their location within the Site are likely to be variable over the construction period.
- 6.1.19. Based on the current local air quality in the area, the proximity of sensitive receptors to the roads likely to be used by construction vehicles, and the likely numbers of construction vehicles and plant that will be used, the impacts of construction vehicles and plants on local air quality are short-term, temporary therefore considered to be not significant according to the assessment significance criteria.

6.2. OPERATION PHASE

- 6.2.1. Full results of the dispersion modelling are presented in Appendix F and a summary is provided below.

HUMAN HEALTH RECEPTORS

Annual Mean NO₂ Concentrations

- 6.2.2. By 2027, the opening year of the Proposed Development, , predicted concentrations of annual mean NO₂ are well below the AQS objective of 40µg/m³ at all modelled receptors, both with and without the development. The highest concentration is predicted to occur at Receptor R1 where the concentrations are 25.5µg/m³ 'without development' and 25.6µg/m³ 'with development'. The greatest increase in concentrations due to the Proposed Development is 0.5µg/m³ at Receptors R5 (Botley Road) and R12 (High Street). The predicted changes in annual mean NO₂ concentrations at four of the existing receptors are between 1 and 5% of the relevant AQS objective, at the remaining receptors the predicted changes are less than 1%. As annual mean concentrations are less than 75% of the AQS objective, in accordance with the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Development on annual mean NO₂ concentrations is considered to be negligible.

Hourly Mean NO₂ Concentrations

- 6.2.3. The annual mean NO₂ concentrations predicted by the model were all below 60µg/m³, and therefore hourly mean NO₂ concentrations are unlikely to cause a breach of the hourly mean AQS objective. The impact of the Proposed Development on hourly mean NO₂ concentrations at existing sensitive receptors is considered to be negligible.

Annual Mean PM₁₀ Concentrations

- 6.2.4. Predicted concentrations of PM₁₀ are well below the annual mean objective at all receptors in each of the modelled scenarios. The highest concentration is predicted at Receptor R22 (The Old Forge), where a concentration of 19.3µg/m³ is predicted in 2027 in the 'with development' scenario. The predicted changes in annual mean PM₁₀ concentrations are all <1% of the relevant AQS objective. Therefore, based on the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Development on annual mean PM₁₀ concentrations is considered to be negligible.

Daily Mean PM₁₀ Concentrations

- 6.2.5. The AQS objective for daily mean PM₁₀ concentrations is 50µg/m³ to be exceeded no more than 35 times a year. The increased emissions associated with the Proposed Development result an increase of 1 day in the number of days experiencing concentrations greater than 50µg/m³ at two of the modelled receptors (R22 and R25) and no changes to the number of days for the remainder of the modelled receptors; the impact on daily mean PM₁₀ concentrations is thus also considered to be negligible.

Annual Mean PM_{2.5} Concentrations

- 6.2.6. Predicted annual mean concentrations of PM_{2.5} are all well below the limit value of 20µg/m³ in all modelled scenarios. The highest predicted concentration in the 'with development' scenario is 12.6µg/m³, which is predicted at Receptors R22 and R25. All changes in PM_{2.5} as a result of increased traffic associated with the Proposed Development are <1% of the relevant AQS objective

and therefore, based on the EPUK/IAQM guidance, the Proposed Development is considered to have a negligible impact on PM_{2.5} concentrations

Exposure of Future Residents

- 6.2.7. Concentrations at on-site receptors have not been explicitly modelled. Predicted concentrations of NO₂, PM₁₀ and PM_{2.5} at the nearest existing receptors to the Application Site boundary (R7, Dawsons Lane and R8 Brookfield) are all well below the relevant objectives. The Site is therefore considered suitable for its intended use.

ECOLOGICAL RECEPTORS

- 6.2.8. The Application Site has been allocated for development within the EBC Local Plan. As such, the potential of traffic impacts generated by the Application Site 'in-combination' with other development in the area on the Ramsar, SAC and SPA identified in this assessment would have been considered within the Habitats Regulations Assessment (HRA) prepared in support of the Local Plan. However, impacts on the SSSIs, LNR, SINCS and AW sites would not have been considered within the HRA and have therefore been considered in the assessment presented below. For completeness, results are also provided for the Ramsar, SAC and SPA.
- 6.2.9. The impact of the Proposed Development on the identified designated ecological sites has been considered both 'alone' and 'in-combination'. In order to identify potential 'in-combination' effects, two scenarios have been considered/compared:
- The change between the current 2019 baseline year and 2027 'with development' scenario allowing for future improvements in vehicle emissions and the forecast growth in traffic between now and the opening year of the Proposed Development; and
 - A highly conservative scenario which assumes no change in traffic between 2019 and the 2027 baseline case and instead applies the 2019 baseline case traffic data but utilising future year emissions. This scenario does not take account any offsetting of the future growth in traffic against forecast improvements in vehicle emissions that may occur in reality.
- 6.2.10. The IAQM guidance highlights that concentrations should not be predicted too close to the roadway, as predictions may not be reliable and may not represent areas of relevance. Therefore, the increases that occur at 0m from the roadside have been discounted from this assessment.

Impact of the Proposed Development 'alone'

Annual Mean NO_x Concentrations

- 6.2.11. The maximum change in predicted annual mean NO_x concentrations as a result of the increase in traffic from the Proposed Development 'alone' is 0.5 µg/m³, which is greater than 1% of the Critical Level. This increase is predicted at Ecological Receptor 21 at the edge of the River Itchen SAC at a distance of approximately 5 m from the roadside.
- 6.2.12. There are also predicted to be changes of 1% (or more) of the Critical Level up to 10 m from the road edge of the A27 at Ecological Receptors 13 (A27 side), 19 and 20 (River Itchen SAC).
- 6.2.13. Where the increases extend up to 10 m from the A27, the results have been passed onto the Project's Ecologist to evaluate the results in relation to the potential for impacts on the integrity of the ecologically designated sites due to the Proposed Development 'alone'.

Nutrient N Deposition

Grassland

- 6.2.14. The maximum change in predicted nutrient N deposition rates a result of the increase in traffic from the Development 'alone' is 0.3 kgN/ha/year at Ecological Receptor 21 within the River Itchen SAC at the edge of the designated site, approximately 5 m from the road edge, which is more than 1% of the Critical Load of 10kgN/ha/yr. At this location the Critical Level is exceeded up to 10 m into the SAC, approximately 15 m from the road edge.
- 6.2.15. There are also predicted to be changes in the nutrient N deposition rates which equate to 1% (or more) of the relevant Critical Load at Ecological Receptor 18 at a distance of 10m from the roadside and at Ecological Receptors 13, 19 and 20 at a distance of up to 20 m from the roadside.
- 6.2.16. Again, where predicted increases are above 1%, the potential for a significant impact from the Development 'alone' at these locations cannot be discounted. The total nutrient N deposition rate at these receptors is also predicted to be above the relevant Critical Loads both without and with the Proposed Development in place. The results for these locations have therefore, been passed onto the Project's Ecologist to evaluate the results in relation to the potential for impacts on the integrity of the designated ecological sites at these receptor locations due to the Proposed Development 'alone'.

Woodland

- 6.2.17. The maximum change in predicted nutrient N deposition rates a result of the increase in traffic from the Proposed Development 'alone' is 0.2 kgN/ha/year at Ecological Receptors 50, 51, 52 and 54 within the Telegraph Woods SINC at 10 m from the roadside, this equates to more than 1% of the relevant Critical Load of 10 kgN/ha/yr.
- 6.2.18. There are also predicted to be changes in the nutrient N deposition rates of 1% (or more) of the relevant Critical Load at Ecological Receptor 55 at 10 m from the roadside and Ecological Receptors 50, 51 and 52 with the Telegraph Woods SINC at a distance up to 20m from the roadside.
- 6.2.19. As before, where the increase is greater than 1%, the potential for a significant impact from the Proposed Development 'alone' at these locations cannot be discounted. In addition, the total nutrient N deposition rate at these receptors is predicted to be above the Critical Load of 10kgN/ha/yr both without and with the Proposed Development in place. The results for these locations have been passed onto the Project's Ecologist who has evaluated the results in relation to the potential for impacts on the integrity of the designated ecological sites due to the Proposed Development 'alone'.

Annual Mean NH₃ Concentrations (Grassland and Forest)

- 6.2.20. The maximum change in predicted annual mean NH₃ concentrations as a result of the increase in traffic from the Proposed Development 'alone' is 0.04µg/m³ at Ecological Receptor 21 at the edge of the designated site, approximately 5 m from the road edge, which equates to more than 1% of the Critical Level of 3µg/m³.
- 6.2.21. There are also predicted to be changes of 1% (or more) of the Critical Level at Ecological Receptors 19 and 20 within the River Itchen SAC at a distance of 10m from the roadside.
- 6.2.22. In 2027, the Critical Level for annual mean NH₃ concentrations of 3 µg/m³ is predicted to be met at all those locations where there are predicted to be changes of 1% (or more) of the Critical Level.

Therefore, no significant effects on ecological receptors are predicted as a result of the changes in annual mean NH_3 concentrations due to the Proposed Development 'alone' and no further assessment is considered necessary.

Ecological receptors – 'In-combination'

Annual Mean NO_x Concentrations

- 6.2.23. The maximum predicted increase in annual mean NO_x concentrations when considering the Proposed Development 'in-combination' with other plans and projects is $6.9 \mu\text{g}/\text{m}^3$, which equates to 22.9% of the Critical Level. This occurs at Ecological Receptor 23 at the edge of the Moorgreen Meadows SSSI. Of this, the Proposed Development 'alone' contributes $0.2 \mu\text{g}/\text{m}^3$ which is 0.7% of the Critical Level.
- 6.2.24. It should be noted that the predicted change to concentrations 'in-combination' is highly conservative and assumes no offsetting from improvements in vehicle emissions and background concentrations. In reality, there will be a decrease in both background concentrations and vehicle emissions and if these improvements are taken into account, the predicted decrease in NO_x concentrations between 2019 and 2027 range between 272.0% and 21.3% of the Critical Level, with the greatest reduction predicted to occur within the vicinity of the road edge.
- 6.2.25. Below provides a summary of those locations where there is predicted to a 1% (or more) change in concentrations and an exceedance of the Critical Level of $30 \mu\text{g}/\text{m}^3$ if no offsetting in improvements is assumed, which is highly unlikely to occur in reality:
- Solent and Southampton Water Ramsar/SPA: Ecological Receptor 4 at 5m from the roadside, Receptors 1, 3, 5 and 6 at 10 m from the roadside and Receptor 2 at 50 m from the roadside.
 - River Itchen SAC: Ecological Receptors 7, 10 and 16 at 100 m from the roadside, Receptor 14 at 90 m, Receptors 13 and 11 at 80 m from the roadside, Receptors 9 and 12 at 60 m from the roadside, Receptor 8 at 30 m (habitat only present up to 30 m from roadside) and Receptors 15, 20 and 21 at 20 m from the roadside.
 - Moorgreen Meadows SSSI: Ecological Receptors 23, 24, 25 (at all distances modelled) and Receptor 26 at 150 m from the roadside.
 - Netley Common LNR: Ecological Receptor 35 at 2 m from the roadside.
 - Ancient Woodland: Ecological Receptor 42 at 137 m from the roadside, Ecological Receptor 43 at 150 m from the roadside and Ecological Receptor 44 (at all distances modelled).
- 6.2.26. The results for these locations have been passed onto the Project's Ecologist who has evaluated the results in relation to the potential for impacts on the integrity of the designated ecological sites due to the Proposed Development 'in-combination' with other plans and projects.

Nutrient Nitrogen Deposition

Grassland

- 6.2.27. The maximum predicted increase in nutrient N deposition is $2.7 \text{ kgN}/\text{ha}/\text{year}$ when considering the Proposed Development 'in-combination' with other plans and projects, which is 27.3 % of the Critical Load of $10 \text{ kgN}/\text{ha}/\text{year}$. This occurs at Ecological Receptor 23 within the Moorgreen Meadows (where relevant habitat is present) at 7 m from the roadside. Again, of this only $0.1 \text{ kgN}/\text{ha}/\text{year}$ is contributed by the Proposed Development 'alone'.

- 6.2.28. As before, the change in concentrations is considered to be conservative, and when improvements in vehicle emissions and reductions in background concentrations are taken into account there are predicted decreases at all modelled receptors in nutrient N deposition which range between 18.2% and 7.2%.
- 6.2.29. Below provides a summary of those locations and distance from the roadside where there is predicted to a 1% (or more) change in concentrations and an exceedance of the relevant Critical Load if no offsetting in improvements is assumed, which is highly unlikely to occur in reality:
- Solent and Southampton Water Ramsar/SPA: Ecological Receptors 1 and 6 at 120 m from the roadside, Receptor 2 at all modelled distances, Receptor 3 at 100 m, Receptor 4 at 85 m from the roadside, Receptor 5 at 90 m from the roadside.
 - River Itchen SAC: along entire transects of all modelled receptors (Ecological Receptors 7 to 21, excluding Ecological Receptor 18 at 120 m from the roadside).
 - River Itchen SSSI: Ecological Receptor 22 at 100 m from the roadside.
 - Moorgreen Meadows: Ecological Receptor 23 (at 60 m from roadside where habitat is present), Ecological Receptors 24, 25, 26, 28, 29, 30 and 31 at all locations where relevant habitat is present.
 - Netley Common: Ecological Receptor 35 at 172 m from the roadside (only where relevant habitat is present)
- 6.2.30. The results for these locations have been passed onto the Project's Ecologist who has evaluated the results in relation to the potential for impacts on the integrity of the designated ecological sites due to the Proposed Development 'in-combination' with other plans and projects.

Woodland

- 6.2.31. The maximum predicted increase in nutrient N deposition is 2.4 kgN/ha/year when considering the Proposed Development 'in-combination' with other plans and projects, which is 23.6 % of the Critical Load of 10 kgN/ha/year. This occurs at Ecological Receptor 42 within the AW sites at 17 m from the roadside. Of this only 0.1 kgN/ha/year is contributed by the Proposed Development 'alone'.
- 6.2.32. As before, the change in concentrations is considered to be conservative, and when improvements in vehicle emissions and reductions in background concentrations are taken into account there are predicted to be decreases in nutrient N deposition at all modelled receptors, which range between 44.4% and 25.3%.
- 6.2.33. Below provides a summary of those locations and distance from the roadside where there is predicted to a 1% (or more) change in concentrations and an exceedance of the relevant Critical Load if no offsetting in improvements is assumed, which is highly unlikely to occur in reality:
- Moorgreen Meadows SSSI: along entire transects of all modelled receptors where woodland habitat is present (Ecological Receptors 23 to 32).
 - Netley Common LNR: along entire transects of all modelled receptors where woodland habitat is present (Ecological Receptors 35 and 36).
 - Wildern LNR: along entire transects of all modelled receptors (Ecological Receptors 37 and 38).
 - AW Sites: along entire transects of all modelled receptors (Ecological Receptors 39 to 48) and at Ecological Receptor 49 at 315 m from the roadside.
 - Telegraph Woods SINC: along entire transects of all modelled receptors (Ecological Receptors 50 to 55).

- 6.2.34. The results for these locations have been passed onto the Project's Ecologist who has evaluated the results in relation to the potential for impacts on the integrity of the designated ecological sites due to the Proposed Development 'in-combination' with other plans and projects.

Annual Mean NH₃ Concentrations (Grassland and Forest)

- 6.2.35. When considering the 'in-combination' changes between the current 2019 baseline year and the 2027 'with development' scenario, the maximum change in predicted annual mean NH₃ concentrations as a result of the increase in traffic is 1.0 µg/m³. This increase occurs at Ecological Receptor 23 within the Moorgreen Meadows SSSI at 7 m from the roadside, which is more than a 1% change in relation to the Critical Level of 3µg/m³. Of this only 0.01 µg/m³ is contributed by the Proposed Development 'alone'
- 6.2.36. When considering the 'in-combination' change between 2027 (with-development) and the 2019 baseline year (2019 traffic data using 2027 emissions), the maximum change in predicted annual mean NH₃ concentrations is 0.4 µg/m³. This increase equates to a change of more than 1% of the relevant Critical Level of 3µg/m³ and occurs at Ecological Receptors 7 and 8 within the River Itchen SAC at 10 m from the roadside and Ecological Receptor 23 within the Moorgreen Meadows SSSI at 7 m from the roadside. Of this only 0.01 µg/m³ is contributed by the Proposed Development 'alone'. There are predicted to be increases within this scenario due to the fact that NH₃ emissions are predicted to increase in the future rather than decrease like the other pollutants included within the assessment.
- 6.2.37. In both 'in-combination' scenarios, there are additional exceedances of 1 % (or more) of the relevant Critical Level when considering the Proposed Development 'in-combination' with other plans and projects, however, at the majority of these locations the Critical Level of 3 µg/m³ is not exceeded. Concentrations are predicted to increase by more than 1% in 2027 and exceed the Critical Level at the following locations for both 'in-combination scenarios':
- Ecological Receptors 7 (at 40 m), 8 (at 30 m), 13 and 14 (at 20 m), 15 (at 22 m) within the River Itchen SAC;
 - Ecological Receptors 23 (at 37 m) within the Moorgreen Meadows SSSI;
 - Ecological Receptors 42 (at 27 m) and 44 (at 23 m) within the Ancient Woodland sites.
- 6.2.38. Where the increases above 1% extend further than the roadside edge into the ecological habitats and the Critical Level of 3 µg/m³ is exceeded, the results have been passed onto the Project's Ecologist to evaluate in relation to potential for impacts on the integrity of the ecologically designated sites due to the Proposed Development 'in-combination' with other plans and projects.

7. MITIGATION & RESIDUAL EFFECTS

7.1. CONSTRUCTION PHASE

7.1.1. Based on the assessment results, mitigation will be required. Recommended mitigation measures are given below.

General Communication

- A stakeholder communications plan that includes community engagement before work commences on site should be developed and implemented.
- The name and contact details of person(s) accountable for air quality and dust issues should be displayed on the site boundary. This may be the environment manager/engineer or the site manager. The head or regional office contact information should also be displayed.

General Dust Management

- A Dust Management Plan (DMP), which may include measures to control other emissions, in addition to the dust and PM₁₀ mitigation measures given in this report, should be developed and implemented, and approved by the Local Authority.

Site Management

- All dust and air quality complaints should be recorded and causes identified. Appropriate remedial action should be taken in a timely manner with a record kept of actions taken including of any additional measures put in-place to avoid reoccurrence.
- The complaints log should be made available to the local authority on request.
- Any exceptional incidents that cause dust and/or air emissions, either on- or offsite should be recorded, and then the action taken to resolve the situation recorded in the log book.

Monitoring

- Daily on-site and off-site inspections should be undertaken, where receptors (including roads) are nearby to monitor dust. The inspection results should be recorded and made 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.
- Regular site inspections to monitor compliance with the DMP should be carried out, inspection results recorded, and an inspection log made available to the local authority when asked.
- The frequency of site inspections should be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Preparing and maintaining the site

- Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable.
- Where practicable, erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Where practicable, fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.

- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover appropriately.
- Where practicable, cover, seed or fence stockpiles to prevent wind whipping.

Operating vehicle/machinery and sustainable travel

- Ensure all vehicle operators 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.
- A maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas should be imposed (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).
- A Construction Logistics Plan should be produced to manage the sustainable delivery of goods and materials.
- A Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing) should be considered.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-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.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste management

- Avoid bonfires and burning of waste materials.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Where practicable, only remove the cover in small areas during work and not all at once.
- Stockpile surface areas should be minimised (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up.
- Where practicable, windbreak netting/screening should be positioned around material stockpiles and vehicle loading/unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the Application Site and the surroundings.
- Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of the prevailing wind direction.

- During dry or windy weather, material stockpiles and exposed surfaces should be dampened down using a water spray to minimise the potential for wind pick-up.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
- All construction plant and equipment should be maintained in good working order and not left running when not in use.

Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being in frequent use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Where practicable, hard surfaced haul routes should be installed, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10m from receptors where possible.

- 7.1.2. Detailed mitigation measures to control construction traffic should be discussed with EBC to establish the most suitable access and haul routes for the site traffic. The most effective mitigation will be achieved by ensuring that construction traffic does not pass along sensitive roads (residential roads, congested roads, via unsuitable junctions, etc.) where possible, and that vehicles are kept clean (through the use of wheel washers, etc.) and sheeted when on public highways. Timing of large-scale vehicle movements to avoid peak hours on the local road network will also be beneficial.

RESIDUAL EFFECTS

- 7.1.3. The residual effects of dust and PM₁₀ generated by construction activities following the application of the mitigation measures described above and good site practice is considered to be negligible.
- 7.1.4. The residual effects of emissions to air from construction vehicles and plant on local air quality is considered to be not significant.

7.2. OPERATIONAL PHASE

MITIGATION

Human Health receptors

- 7.2.1. The change in pollutant concentrations attributable to traffic emissions associated with the operation phase of the Proposed Development (i.e. impacts on local air quality) are negligible (themselves not warranting the need for mitigation).
- 7.2.2. Nonetheless, a Travel Plan has been produced for both the Residential and Workplace elements of the Proposed Development within which a number of mitigation measures will be implemented.
- 7.2.3. For the residential element, a Travel Plan Co-ordinator (TPC) will be appointed to take responsibility and management of the Travel Plan. The TPC will provide personalised travel planning to occupants and will develop a dedicated website with up-to-date information on sustainable travel modes including car-sharing and local facilities. Information boards will be located around the development and a bi-annual newsletter will be issued with event details and updates. Each new occupant will be provided with a Travel Information Pack (TIP) and taster vouchers for public transport. Electric vehicle charging points will be available within the development, as well as, the provision of one on-site car club vehicle and secured cycle parking across the development.
- 7.2.4. For the workplace element, the TPC will act as the main point of contact for workplace Travel Plan queries. Each new organisation will be required to appoint a Travel Plan Representative and a Travel Plan Steering Group will be formed. A travel information webpage will be available for use for employees and visitors to the site promoting sustainable travel modes with details of potential car sharing options and all new staff will be issued with a Travel Information Pack. Secured cycle parking will be available and changing facilities and lockers provided for staff to use.

Ecological Receptors

- 7.2.5. The changes in annual mean NO_x and nutrient N deposition as a result of the Development 'alone' are above the relevant screening criteria at a number of the modelled receptor locations.
- 7.2.6. The number of Ecological Receptors which are predicted to see changes in annual mean NO_x and NH₃ and nutrient N deposition is greatly increased when considering the Proposed Development 'in-combination' with other plans and projects. As the Application Site has been allocated for development within the EBC Local Plan, the potential 'in-combination' impacts on the Ramsar, SPA and SAC would have been considered within the Local Plan HRA³⁶. The Air Quality Assessment completed as part of the HRA process³⁷ concluded that there was potential for the local plan 'in-combination' with other plans and projects to have significant impacts on the River Itchen SAC and the Solent and Southampton Water SPA and Ramsar. However, the Local HRA concluded that *'significant effects through atmospheric pollution are not likely for...Solent and Southampton Water SPA/Ramsar, either alone or in combination with other plans and projects'* and *'there will be no adverse effect on the integrity of River Itchen SAC as a result of atmospheric pollution, either alone or in combination with other plans and projects'*.

³⁶ Urban Edge Environmental Consulting (June 2019) Habitats Regulations Assessment for the Eastleigh Borough Local Plan 2016-2036 HRA Report for the Submission Plan.

³⁷ Air Quality Consultants (June 2018) Air Quality Assessment: Ecological Sites, Eastleigh Borough Council

- 7.2.7. The results of the assessment completed for the Proposed Development and the implications of the predicted changes and any necessary mitigation will be evaluated and reported by the Project Ecologists³⁸.

RESIDUAL EFFECTS

Human Health Receptors

- 7.2.8. The Proposed Development is predicted to cause a negligible increase in NO₂, PM₁₀ and PM_{2.5} concentrations, and at nearby human health receptors total concentrations are expected to meet the statutory objectives both with and without the Proposed Development.
- 7.2.9. The residual effects of the Proposed Development on air quality at human health receptors will be negligible for all pollutants.

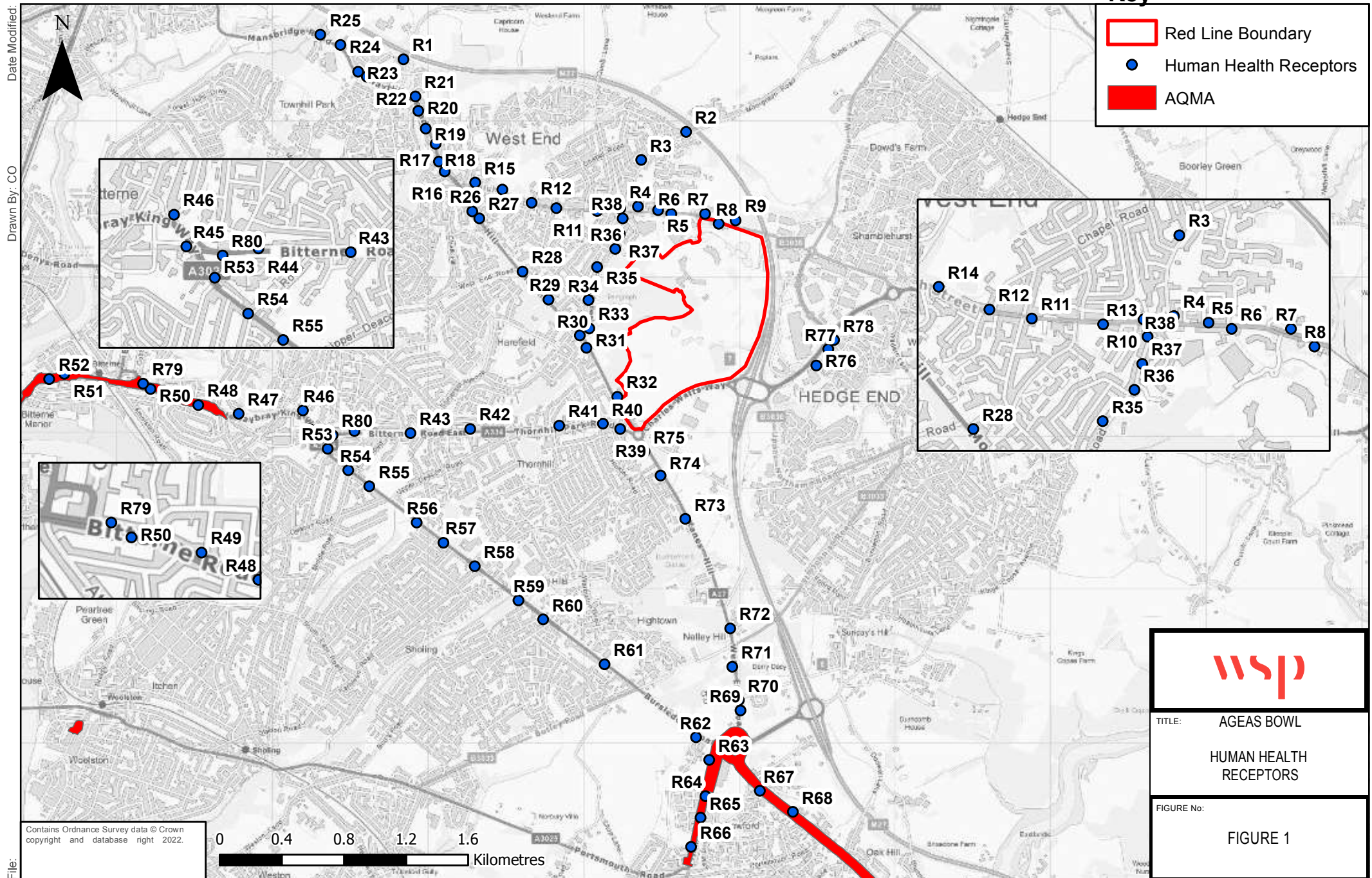
³⁸ Johns Associates (2022) Ageas Bowl Information to Support Appropriate Assessment and Johns Associates (2022) The Ageas Bowl: Mixed Use Development Ecological Impact Assessment.

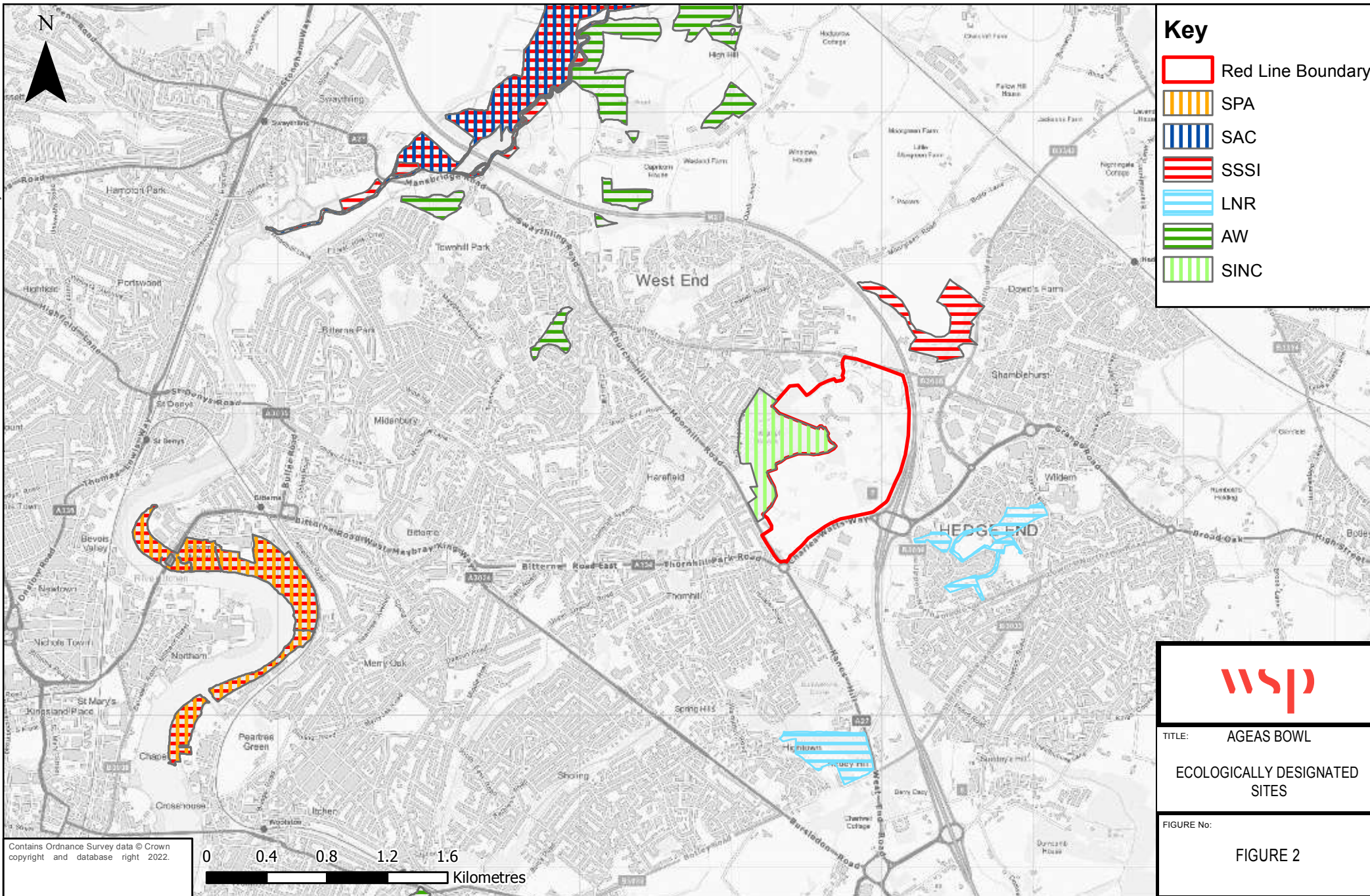
8. CONCLUSIONS

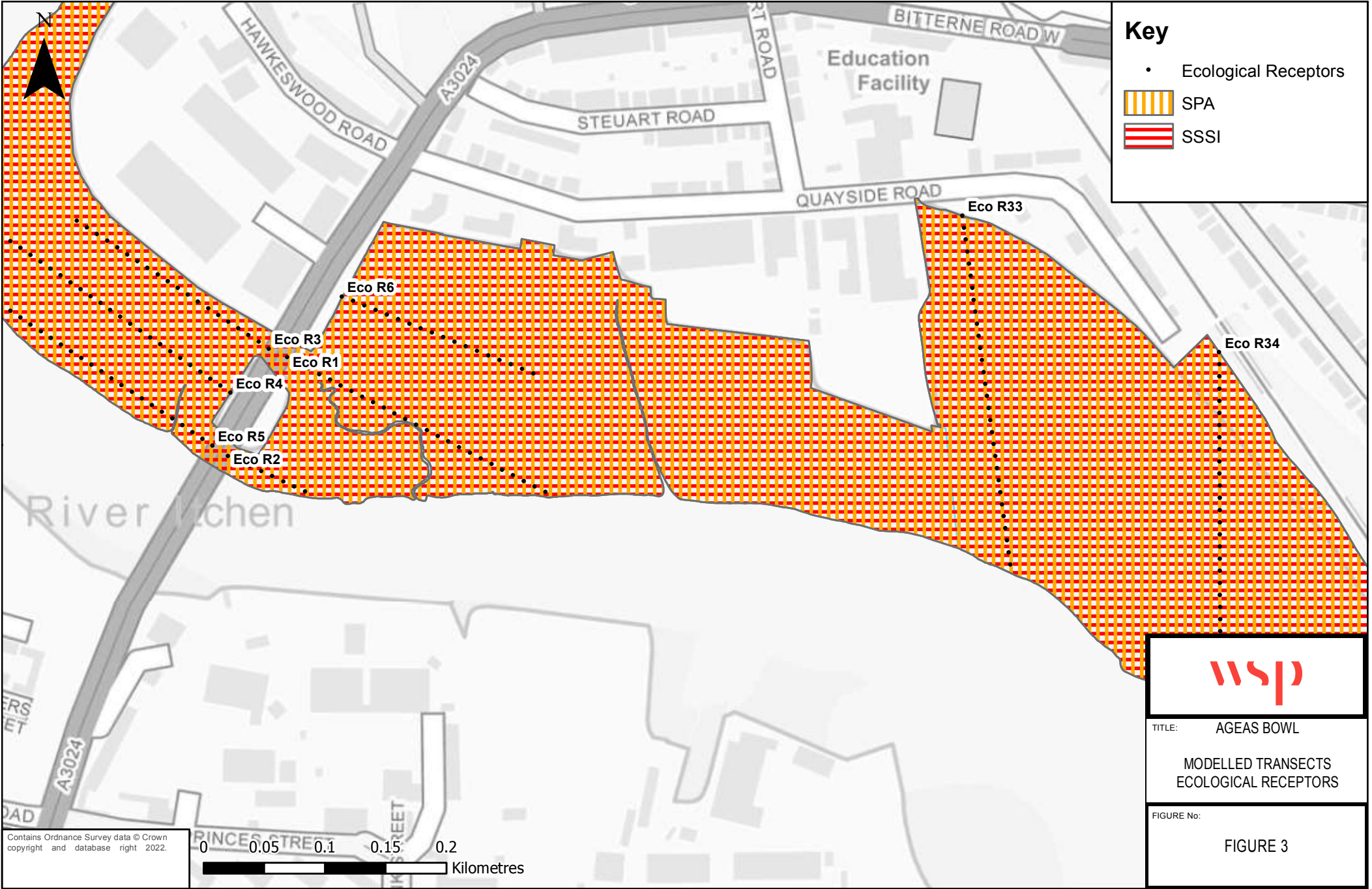
- 8.1.1. A qualitative assessment of the potential impacts on local air quality from construction activities has been carried out for this phase of the Proposed Development using the IAQM methodology. This identified that there is a Medium Risk of dust soiling impacts and a Low Risk of increases in particulate matter concentrations due to construction activities. In addition, there is a Medium Risk of dust soiling impacts during earthworks and the construction phase at the adjacent ecological receptors. However, through good site practice and the implementation of suitable mitigation measures, the effect of dust and PM₁₀ releases would be significantly reduced. The residual effects of dust and PM₁₀ generated by construction activities on air quality are therefore considered to be insignificant. The residual effects of emissions to air from construction vehicles and plant on local air quality will be negligible.
- 8.1.2. The results show that the Proposed Development would cause negligible changes in annual mean NO₂, PM₁₀ and PM_{2.5} concentrations in relation to the human health AQS objectives. The impacts of the Proposed Development on local air quality are considered to be negligible for annual mean NO₂ and PM₁₀ concentrations, hourly mean NO₂ and daily mean PM₁₀ concentrations according to the EPUK criteria. Concentrations across the Application Site are expected to be below the relevant human health AQS objectives.
- 8.1.3. In relation to the ecological receptors, the changes in annual mean NO_x are above 1% at several locations with the ecologically designated sites considering the impacts of the Proposed Development 'alone'. Within the River Itchen SAC there are predicted to be changes above 1% up to 10m from the edge of the A27 and the M27, these results have been passed onto the Project's Ecologist to evaluate the results in relation to the potential for impacts on the integrity of the ecologically designated sites due to the Proposed Development 'alone'.
- 8.1.4. Nutrient N deposition rates are also predicted to increase by 1% or more of the relevant Critical Load at several locations when considering the Proposed Development 'alone'. At several of the modelled receptors, there is predicted to be an increase of more than 1% up to 20 m from the roadside (River Itchen SAC and Telegraph Woods SNIC). Again, these results have been passed onto the Project's Ecologist to evaluate the results in relation to the potential for impacts on the integrity of the ecologically designated sites due to the Proposed Development 'alone'.
- 8.1.5. The changes in annual mean NH₃ are above 1% at several locations within the ecologically designated sites when considering the impacts of the Proposed Development 'alone'. Within the River Itchen SAC there are predicted to be changes which equate to more than 1% of the Critical Level up to 10m from the roadside. However, the Critical Level is predicted to be met all locations in 2027 and therefore no significant effects are predicted and no further assessment is required due to the potential effect of the Proposed Development 'alone'.
- 8.1.6. When considering worst case 'in-combination' impacts on the ecological receptors, there is predicted to be an increase in NO_x concentrations of 1 % (or more) of the Critical Level at locations within the Solent and Southampton Water Ramsar/SPA, the River Itchen SAC, Moorgreen Meadows SSSI, Netley Common LNR and one of the AW sites (Dummers Copse). It should be noted that for this worst case 'in-combination' scenario the predicted changes are considered to be highly conservative. If you take into account improvements in vehicle emissions and backgrounds

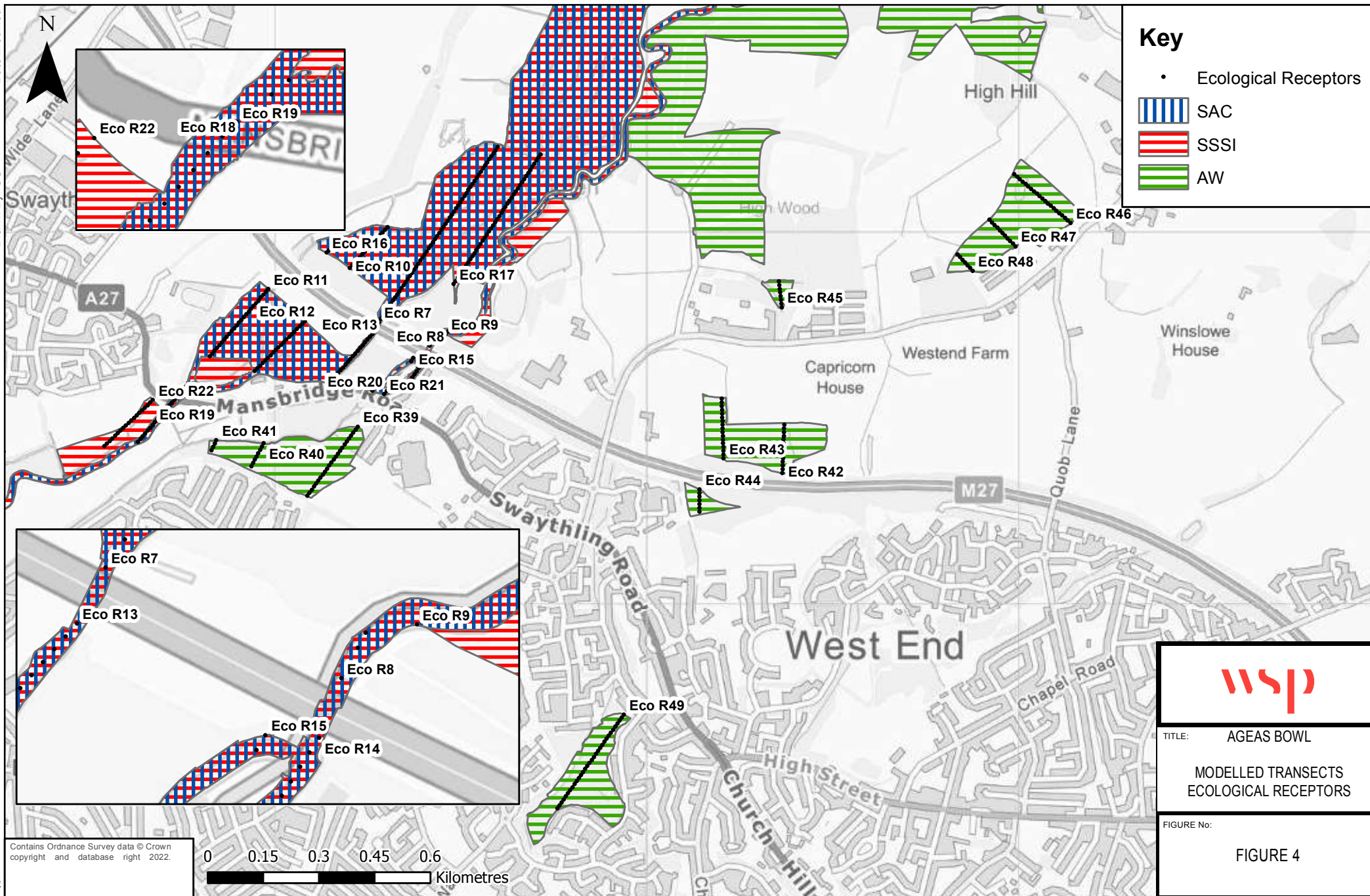
concentrations, there is predicted to be decreases in NO_x concentrations which equate to between 272.0 % and 21.3 % of the Critical Level.

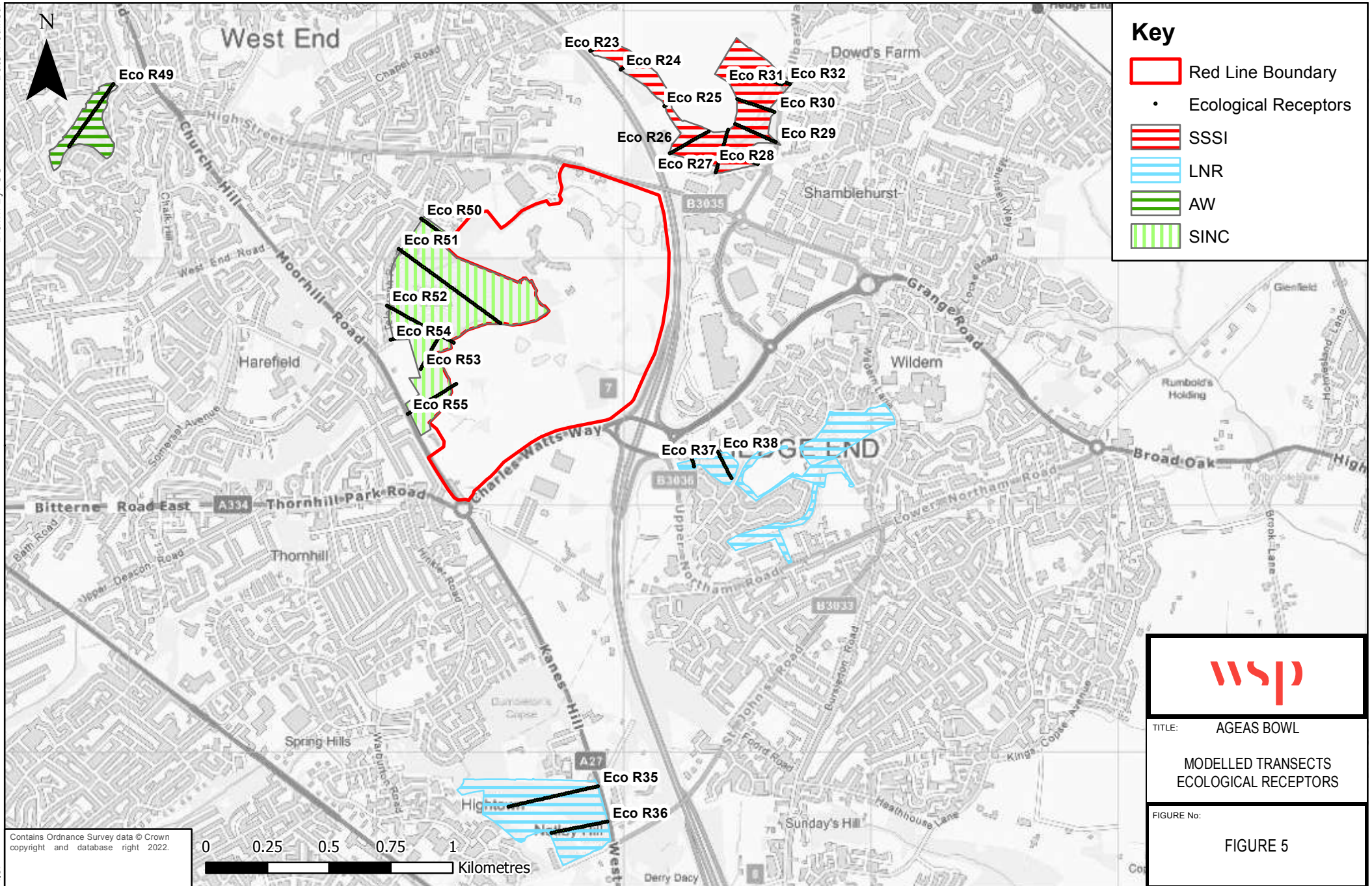
- 8.1.7. The worst case changes in nutrient N deposition 'in-combination' with other plans and projects are above 1% of the relevant CL at locations within the Solent and Southampton Water Ramsar/SPA, the River Itchen SAC, River Itchen SSSI, Moorgreen Meadows SSSI, Netley Common LNR, Wildern LNR, several AW sites and the Telegraph Woods SINC. Again, the changes are considered to be highly conservative and when improvements in vehicle emissions and backgrounds are taken into account, predicted decreases in nutrient N deposition are predicted at all receptors. These decreases range between 18.2% and 7.2% for the grassland habitats and 44.4 % to 25.3 % for the woodland habitats.
- 8.1.8. The changes in annual mean NH₃ are above 1% at several locations with the ecologically designated sites when considering the impacts of both the Proposed Development 'in-combination' scenarios, this occurs as both background and road traffic emissions of NH₃ are predicted to increase in the future. Increases are predicted to be 1 % (or more) of the relevant Critical Level and above the Critical Level within the River Itchen SAC, within the Moorgreen Meadows SSSI and within one of AW sites.
- 8.1.9. Where the predicted changes above 1% occur in annual mean NO_x and NH₃ and nutrient N deposition in conjunction with an exceedance of the Critical Level/Load, the results have been passed onto the Project's Ecologist to evaluate the results in relation to the potential for impacts on the integrity of the ecologically designated sites.











Appendix A

GLOSSARY



Term	Definition
AADT Annual Average Daily Traffic	A daily total traffic flow (24 hrs), expressed as a mean daily flow across all 365 days of the year.
Adjustment	Application of a correction factor to modelled results to account for uncertainties in the model
Accuracy	A measure of how well a set of data fits the true value.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year.
AQMA	Air Quality Management Area.
AURN	Automatic Urban and Rural (air quality monitoring) Network, managed by contractors on behalf of Defra
Conservative	Tending to over-predict the impact rather than under-predict.
Data capture	The percentage of all the possible measurements for a given period that were validly measured.
Defra	Department for Environment, Food and Rural Affairs.
Dust	Dust comprises particles typically in the size range 1-75 micrometres (μm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials
EBC	Eastleigh Borough Council
Emission rate	The quantity of a pollutant released from a source over a given period of time.
Exceedance	A period of time where the concentrations of a pollutant is greater than the appropriate air quality standard.
Fugitive emissions	Emissions arising from the passage of vehicles that do not arise from the exhaust system.
HDV/HGV	Heavy Duty Vehicle/Heavy Goods Vehicle.

Term	Definition
LAQM	Local Air Quality Management.
Minor roads	Non A roads of Motorways.
Model adjustment	Following model verification, the process by which modelled results are amended. This corrects for systematic error.
NH ₃	Ammonia
NO ₂	Nitrogen dioxide.
NO _x	Nitrogen oxides.
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
PM _{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
Road link	A length of road which is considered to have the same flow of traffic along it. Usually, a link is the road from one junction to the next.
Trackout	The transport of dust and dirt from the construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction / demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site.
µg/m ³ microgrammes per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1µg/m ³ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
Uncertainty	A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.

Appendix B

IAQM CONSTRUCTION ASSESSMENT METHODOLOGY



STEP 1 – SCREENING THE NEED FOR A DETAILED ASSESSMENT

An assessment will normally be required where there are:

- ‘Human receptors’ within 350m of the site boundary; or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or
- ‘Ecological receptors’ within 50m of the site boundary; or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is “negligible”.

STEP 2A – DEFINE THE POTENTIAL DUST EMISSION MAGNITUDE

The following are examples of how the potential dust emission magnitude for different activities can be defined. (Note that not all the criteria need to be met for a particular class). Other criteria may be used if justified in the assessment.

Table 2A: Definitions of Dust Emission Magnitudes

Dust Emission Magnitude	Activity
Large	Demolition >50,000m ³ building demolished, dusty material (e.g. concrete), on-site crushing/screening, demolition >20m above ground level
	Earthworks >10,000m ² site area, dusty soil type (e.g. clay), >10 earth moving vehicles active simultaneously, >8m high bunds formed, >100,000 tonnes material moved
	Construction >100,000m ³ building volume, on site concrete batching, sandblasting
	Trackout >50 HDVs out / day, dusty surface material (e.g. clay), >100m unpaved roads
Medium	Demolition 20,000 - 50,000m ³ building demolished, dusty material (e.g. concrete) 10-20m above ground level
	Earthworks 2,500 - 10,000m ² site area, moderately dusty soil (e.g. silt), 5-10 earth moving vehicles active simultaneously, 4m - 8m high bunds, 20,000 -100,000 tonnes material moved
	Construction 25,000 - 100,000m ³ building volume, dusty material e.g. concrete, on site concrete batching

Dust Emission Magnitude	Activity
	Trackout 10 - 50 HDVs out / day, moderately dusty surface material (e.g. clay), 50 -100m unpaved roads
Small	Demolition <20,000m ³ building demolished, non-dusty material (e.g metal cladding), <10m above ground level, work during wetter months
	Earthworks <2,500m ² site area, soil with large grain size (e.g. sand), <5 earth moving vehicles active simultaneously, <4m high bunds, <20,000 tonnes material moved, earthworks during wetter months
	Construction <25,000m ³ , non-dusty material (e.g. metal cladding or timber)
	Trackout <10 HDVs out / day, non-dusty soil, < 50m unpaved roads

STEP 2B – DEFINE THE SENSITIVITY OF THE AREA

The tables below present the IAQM assessment methodology to determine the sensitivity of the area to dust soiling, human health and ecological impacts respectively. The IAQM guidance provides guidance to allow the sensitivity of individual receptors to dust soiling and health effects to assist in the assessment of the overall sensitivity of the study area.

Table 2Ba: Sensitivity of the Area to Dust Soiling Effects

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

Table 2Bb: Sensitivity of the Area to Human Health Impacts

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

Table 2Bc: Sensitivity of the Area to Ecological Impacts

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

STEP 2C – DEFINE THE RISK OF IMPACTS

The dust emissions magnitude determined at Step 2A should be combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts without mitigation applied. For those cases where the risk category is 'negligible' no mitigation measures beyond those required by legislation will be required.

Table 2C: Risk of Dust Impacts

Sensitivity of surrounding area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks and Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible



STEP 3 –SITE SPECIFIC MITIGATION

Having determined the risk categories for each of the four activities it is possible to determine the site-specific measures to be adopted. These measures will be related to whether the site is considered to be a low, medium or high risk site. The IAQM guidance details the mitigation measures required for high, medium and low risk sites as determined in Step 2C.

STEP 4 – DETERMINE SIGNIFICANT EFFECTS

Once the risk of dust impacts has been determined in Step 2C and the appropriate dust mitigation measures identified in Step 3, the final step is to determine whether there are significant effects arising from the construction phase. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.

Appendix C

TRAFFIC DATA



2019 BASELINE

Road ID	Road Link	Speed (kph)	AADT	% HDV	NO _x Emission Factors (g/km/s)	PM ₁₀ Emission Factors (g/km/s)	PM _{2.5} Emission Factors (g/km/s)	NH ₃ Emission Factors (g/km/s)
1 NB	M27 (South of J7) NB	112	56,888	5.9	0.331	0.0158	0.0108	0.0149
1SB	M27 (South of J7) SB	112	58,070	5.5	0.338	0.0160	0.0109	0.0150
2 NB	M27 (North of J7) NB	112	65,326	6.9	0.381	0.0187	0.0127	0.0178
2 SB	M27 (North of J7) SB	112	65,439	6.1	0.380	0.0183	0.0125	0.0173
3	A334 Charles Watts Way	112	25,445	1.7	0.130	0.0106	0.0063	0.0073
4	A27 Moorhill Road (N of Telegraph Road Junction)	56	13,729	2.7	0.050	0.0056	0.0032	0.0041
5	A27 Moorhill Road (S of Telegraph Road Junction)	56	11,906	0.8	0.041	0.0046	0.0027	0.0033
6	A27 Church Hill	64	14,379	1.5	0.049	0.0057	0.0033	0.0041
7	A27 Swaythling Road	48	14,606	0.8	0.052	0.0057	0.0033	0.0041
8	A27 Mansbridge Road	56	15,473	1.0	0.053	0.0060	0.0035	0.0043
9	A334 Bitterne Road East/Thornhill Park Road	40	15,616	1.7	0.062	0.0063	0.0037	0.0045
10 NB	A3024 Maybray King Way NB	40	8,602	1.3	0.034	0.0034	0.0020	0.0024
10 SB	A3024 Maybray King Way SB	48	10,892	2.3	0.041	0.0044	0.0026	0.0032
11 EB	A3024 Bitterne Road West EB	48	13,661	2.7	0.053	0.0056	0.0033	0.0040
11 WB	A3024 Bitterne Road West WB	48	11,720	1.4	0.043	0.0047	0.0027	0.0033
12	Allington Lane	64	10,346	10.0	0.044	0.0051	0.0029	0.0037
13	Kanes Hill/West End Road	48	13,964	1.4	0.051	0.0055	0.0032	0.0040
14	Bursledon Road	40	14,806	2.1	0.060	0.0061	0.0035	0.0043
15	Hamble Lane	64	28,158	2.8	0.099	0.0115	0.0066	0.0083
16	Providence Hill	64	14,645	2.2	0.051	0.0059	0.0034	0.0043
17	A3024 to junction 8 of A26	96	39,554	3.7	0.163	0.0169	0.0098	0.0120

18	Telegraph Road	48	3,049	0.3	0.011	0.0012	0.0007	0.0008
19	B3035 High Street	40	10,063	1.8	0.040	0.0041	0.0024	0.0029
20	Botley Road (East of Marshall Drive)	64	11,482	0.8	0.038	0.0044	0.0025	0.0032
21	Botley Road (Between Marshall Drive and Moorgreen Rd)	48	10,965	0.7	0.039	0.0043	0.0025	0.0030
22	Botley Road (Between Moorgreen Road and Telegraph Road)	32	10,669	0.6	0.044	0.0042	0.0025	0.0030
23	B3342 Tollbar Way (north of roundabout)	64	14,857	2.7	0.057	0.0061	0.0035	0.0044
24	B3342 Tollbar Way (south of roundabout)	64	22,547	3.7	0.108	0.0098	0.0057	0.0068
25	Moorgreen Road	48	5,358	0.4	0.019	0.0021	0.0012	0.0015
26	Marshall Drive	32	4,046	0.5	0.017	0.0016	0.0009	0.0011

This table provides a summary of the traffic data and inputs for the main road links, for the modelling speeds were reduced at junctions in line with guidance provided in LAQM.TG(16).

2027 Without Development

Road ID	Road Link	Speed (kph)	AADT	% HDV	NO _x Emission Factors (g/km/s)	PM ₁₀ Emission Factors (g/km/s)	PM _{2.5} Emission Factors (g/km/s)	NH ₃ Emission Factors (g/km/s)
1 NB	M27 (South of J7) NB	112	63,682	5.9	0.149	0.0150	0.00934	0.0201
1SB	M27 (South of J7) SB	112	65,006	5.5	0.152	0.0151	0.00943	0.0203
2 NB	M27 (North of J7) NB	112	73,254	6.1	0.171	0.0173	0.01079	0.0233
2 SB	M27 (North of J7) SB	112	73,128	6.9	0.170	0.0177	0.01101	0.0238
3	A334 Charles Watts Way	112	28,484	1.7	0.061	0.0108	0.00599	0.0092
4	A27 Moorhill Road (N of Telegraph Road Junction)	56	15,369	2.7	0.024	0.0060	0.00329	0.0051
5	A27 Moorhill Road (S of Telegraph Road Junction)	56	13,328	0.8	0.021	0.0049	0.00271	0.0042
6	A27 Church Hill	64	16,096	1.5	0.024	0.0060	0.00333	0.0052
7	A27 Swaythling Road	48	16,350	0.8	0.026	0.0060	0.00335	0.0051
8	A27 Mansbridge Road	56	17,321	1.0	0.027	0.0064	0.00355	0.0055
9	A334 Bitterne Road East/Thornhill Park Road	40	17,482	1.7	0.031	0.0066	0.00369	0.0056
10 NB	A3024 Maybray King Way NB	40	9,629	1.3	0.017	0.0036	0.00201	0.0031
10 SB	A3024 Maybray King Way SB	48	12,193	2.3	0.020	0.0047	0.00260	0.0040
11 EB	A3024 Bitterne Road West EB	48	15,292	2.7	0.025	0.0060	0.00329	0.0051
11 WB	A3024 Bitterne Road West WB	48	13,120	1.4	0.021	0.0049	0.00273	0.0042
12	Allington Lane	64	11,582	10.0	0.019	0.0054	0.00293	0.0046
13	Kanes Hill/West End Road	48	15,632	1.4	0.026	0.0059	0.00326	0.0050
14	Bursledon Road	40	16,574	2.1	0.029	0.0064	0.00354	0.0054
15	Hamble Lane	64	31,521	2.8	0.048	0.0122	0.00674	0.0105
16	Providence Hill	64	16,394	2.2	0.025	0.0063	0.00345	0.0054
17	A3024 to junction 8 of A26	96	44,278	3.7	0.076	0.0176	0.00966	0.0151

18	Telegraph Road	48	3,413	0.3	0.005	0.0012	0.00069	0.0011
19	B3035 High Street	40	11,265	1.8	0.020	0.0043	0.00239	0.0036
20	Botley Road (East of Marshall Drive)	64	12,854	0.8	0.019	0.0047	0.00260	0.0040
21	Botley Road (Between Marshall Drive and Moorgreen Rd)	48	12,275	0.7	0.020	0.0045	0.00251	0.0038
22	Botley Road (Between Moorgreen Road and Telegraph Road)	32	11,943	0.6	0.022	0.0044	0.00247	0.0037
23	B3342 Tollbar Way (north of roundabout)	64	16,631	2.7	0.028	0.0065	0.00358	0.0055
24	B3342 Tollbar Way (south of roundabout)	64	25,240	3.7	0.051	0.0102	0.00567	0.0086
25	Moorgreen Road	48	5,998	0.4	0.010	0.0022	0.00122	0.0019
26	Marshall Drive	32	4,530	0.5	0.008	0.0017	0.00094	0.0014

This table provides a summary of the traffic data and inputs for the main road links, for the modelling speeds were reduced at junctions in line with guidance provided in LAQM.TG(16).

2027 With Development

Road ID	Road Link	Speed (kph)	AADT	% HDV	NO _x Emission Factors (g/km/s)	PM ₁₀ Emission Factors (g/km/s)	PM _{2.5} Emission Factors (g/km/s)	NH ₃ Emission Factors (g/km/s)
1 NB	M27 (South of J7) NB	112	64,018	5.9	0.150	0.01504	0.00938	0.0202
1SB	M27 (South of J7) SB	112	65,147	5.5	0.153	0.01515	0.00945	0.0203
2 NB	M27 (North of J7) NB	112	73,590	6.1	0.172	0.01738	0.01083	0.0233
2 SB	M27 (North of J7) SB	112	73,270	6.9	0.171	0.01771	0.01103	0.0239
3	A334 Charles Watts Way	112	29,156	1.7	0.062	0.01106	0.00612	0.0094
4	A27 Moorhill Road (N of Telegraph Road Junction)	56	15,788	2.7	0.025	0.00612	0.00338	0.0052
5	A27 Moorhill Road (S of Telegraph Road Junction)	56	13,748	0.8	0.021	0.00506	0.00280	0.0043
6	A27 Church Hill	64	16,096	1.5	0.024	0.00604	0.00333	0.0052
7	A27 Swaythling Road	48	17,198	0.8	0.028	0.00635	0.00352	0.0054
8	A27 Mansbridge Road	56	18,168	1.0	0.028	0.00673	0.00372	0.0057
9	A334 Bitterne Road East/Thornhill Park Road	40	17,901	1.6	0.031	0.00680	0.00378	0.0057
10 NB	A3024 Maybray King Way NB	40	9,842	1.3	0.017	0.00370	0.00206	0.0031
10 SB	A3024 Maybray King Way SB	48	12,401	2.3	0.020	0.00477	0.00264	0.0041
11 EB	A3024 Bitterne Road West EB	48	15,505	2.7	0.026	0.00604	0.00334	0.0051
11 WB	A3024 Bitterne Road West WB	48	13,328	1.4	0.022	0.00501	0.00278	0.0043
12	Allington Lane	64	11,582	10.0	0.019	0.00536	0.00293	0.0046
13	Kanes Hill/West End Road	48	15,708	1.4	0.026	0.00591	0.00327	0.0050
14	Bursledon Road	40	16,574	2.1	0.029	0.00638	0.00354	0.0054
15	Hamble Lane	64	31,521	2.8	0.048	0.01225	0.00674	0.0105
16	Providence Hill	64	16,469	2.2	0.025	0.00629	0.00346	0.0054
17	A3024 to junction 8 of A26	96	44,278	3.7	0.076	0.01759	0.00966	0.0151

18	Telegraph Road	48	3,908	0.2	0.006	0.00142	0.00079	0.0012
19	B3035 High Street	40	12,623	1.6	0.022	0.00479	0.00266	0.0041
20	Botley Road (East of Marshall Drive)	64	14,212	0.7	0.021	0.00521	0.00287	0.0044
21	Botley Road (Between Marshall Drive and Moorgreen Rd)	48	13,633	0.6	0.022	0.00501	0.00278	0.0042
22	Botley Road (Between Moorgreen Road and Telegraph Road)	32	13,301	0.5	0.025	0.00493	0.00275	0.0041
23	B3342 Tollbar Way (north of roundabout)	64	16,647	2.7	0.028	0.00648	0.00358	0.0055
24	B3342 Tollbar Way (south of roundabout)	64	26,194	3.6	0.053	0.01054	0.00587	0.0089
25	Moorgreen Road	48	6,014	0.4	0.010	0.00220	0.00122	0.0019
26	Marshall Drive	32	5,888	0.4	0.011	0.00217	0.00121	0.0018

This table provides a summary of the traffic data and inputs for the main road links, for the modelling speeds were reduced at junctions in line with guidance provided in LAQM.TG(16).

Appendix D

MODEL VERIFICATION



The comparison of modelled concentrations with local monitored concentrations is a process termed 'verification'. Model verification investigates the discrepancies between modelled and measured concentrations, which can arise due to the presence of inaccuracies and/or uncertainties in model input data, modelling and monitoring data assumptions. The following are examples of potential causes of such discrepancy:

- a) Estimates of background pollutant concentrations;
- b) Meteorological data uncertainties;
- c) Traffic data uncertainties;
- d) Model input parameters, such as 'roughness length'; and
- e) Overall limitations of the dispersion model.

NITROGEN DIOXIDE

Most nitrogen dioxide is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of the primary pollutant emissions of nitrogen oxides ($\text{NO}_x = \text{NO} + \text{NO}_2$), in line with the guidance provided within LAQM.TG(16).

The model has been run to predict the 2019 annual mean road- NO_x contribution at two roadside diffusion tubes within the modelled road network. The model outputs of road- NO_x have been compared with the 'measured' road- NO_x , which was determined from the NO_2 concentrations measured using diffusion tubes at the monitoring locations, utilising the NO_x from NO_2 calculator provided by Defra and the NO_2 background concentration (from the Defra background map). As discussed in the methodology section, the most recent suitable data available for model verification purposes is 2019 data.

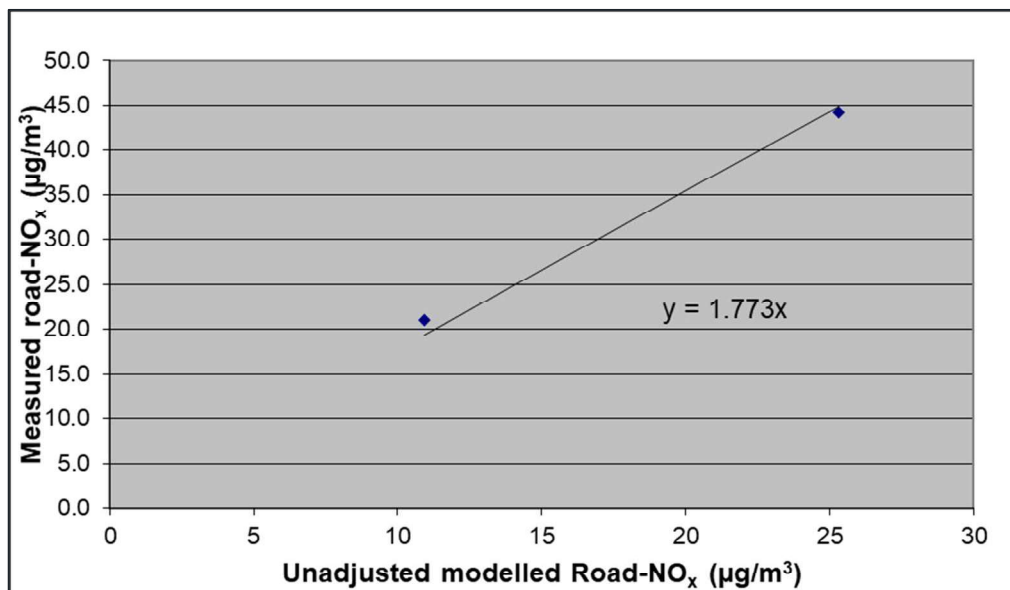
The table and figure below present the data used in the verification.

Table E1 – Data used in model verification

Monitoring Site	Measured Annual Mean NO_2 Concentration ($\mu\text{g}/\text{m}^3$)	Background NO_2 ($\mu\text{g}/\text{m}^3$)	Measured Road- NO_x ($\mu\text{g}/\text{m}^3$) (from $\text{NO}_x:\text{NO}_2$ calculator)	Modelled Road- NO_x ($\mu\text{g}/\text{m}^3$)	Ratio
HL2	38.2	16.6	44.2	25.3	1.745
SWA	28.6	17.9	21.0	10.9	1.923

The road- NO_x adjustment factor was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero (Figure E1). This factor was then applied to the modelled road- NO_x concentration for each monitoring site to provide adjusted modelled road- NO_x concentrations. The total nitrogen dioxide concentrations were then determined by inputting the adjusted modelled road- NO_x concentrations and the background NO_2 concentration into the NO_x to NO_2 calculator.

Figure E1: Comparison of Measured Road-NO_x with Unadjusted Modelled Road-NO_x



PM₁₀ AND PM_{2.5}

There are no local PM₁₀ or PM_{2.5} monitoring data against which the model could be verified. Consequently, the verification factor determined above for adjusting the road-NO_x contribution has been applied to the predicted road-PM₁₀ and road-PM_{2.5} contributions, consistent with guidance set out in LAQM.TG(16).

NH₃

It has not been possible to verify NH₃ emissions from road traffic as no suitable local monitoring data is available to enable this. However, NH₃ emissions used within the modelling have been obtained from CREAM which have been verified against monitoring (and so represent on-road emissions data which minimises, as far as possible, uncertainty trying to be removed through model verification)

MODEL UNCERTAINTY

An evaluation of model performance has been undertaken to establish confidence in model results. LAQM.TG(16) identifies a number of statistical procedures that are appropriate to evaluate model performance and assess the uncertainty. These include:

- Root mean square error (RMSE);
- Fractional bias (FB); and
- Correlation coefficient (CC).

These parameters estimate how the model results agree or diverge from the observations. These calculations can be carried out prior to, and after adjustment, or based on different options for adjustment, and can provide useful information on model improvement. A brief for explanation of each statistic is provided in Table E2, and further details can be found in Box 7.17 of LAQM.TG(16).

Table E2 – Methods for describing model uncertainty

Statistical Parameter	Comments	Ideal value
RMSE	RMSE is used to define the average error or uncertainty of the model. The units of RMSE are the same as the quantities compared. If the RMSE values are higher than 25% of the objective being assessed, it is recommended that the model inputs and verification should be revisited in order to make improvements. For example, if the model predictions are for the annual mean NO₂ objective of 40µg/m³, if an RMSE of 10µg/m³ or above is determined for a model it is advised to revisit the model parameters and model verification. Ideally an RMSE within 10% of the air quality objective would be derived, which equates to 4µg/m³ for the annual mean NO₂ objective.	0.01
Fractional Bias	It is used to identify if the model shows a systematic tendency to over or under predict. FB values vary between +2 and -2 and has an ideal value of zero. Negative values suggest a model over-prediction and positive values suggest a model under-prediction.	0.00
Correlation Coefficient	It is used to measure the linear relationship between predicted and observed data. A value of zero means no relationship and a value of 1 means absolute relationship. This statistic can be particularly useful when comparing a large number of model and observed data points.	1.00

To assess the uncertainty of a model, the RMSE is the simplest parameter to calculate providing an estimate of the average error of the model in the same units as the modelled predictions. It is also often easier to interpret the RMSE than the other statistical parameters and therefore it has been calculated in this assessment to understand the model uncertainty.

The RMSE value calculated after verification was 0.6 and therefore the final predictions are considered to be robust.

Appendix E

MODELLED RECEPTORS

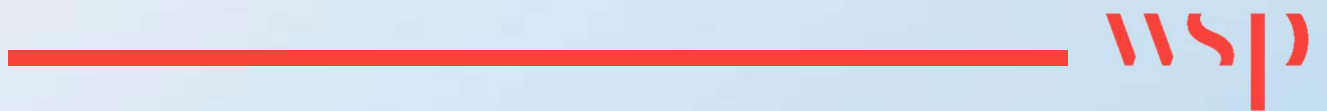


Table F1 – Human Health Receptors

Receptor	Description/ Address	Grid Reference		Height above Ground Level (m)
		X	Y	
R1	40 Upmill Close	445848	115390	1.5
R2	83 Moorgreen Rd	447665	114924	1.5
R3	37 Moorgreen Road	447377	114742	1.5
R4	29-41 Bamber Close	447357	114444	1.5
R5	2 Botley Road	447486	114419	1.5
R6	Arena	447570	114396	1.5
R7	Dawson Lodge	447789	114396	1.5
R8	Brookfield	447877	114331	1.5
R9	5 Shaw Road	447985	114353	1.5
R10	Belmere	447244	114431	1.5
R11	Glenside	446831	114434	1.5
R12	39 High Street	446674	114468	1.5
R13	Hilldene Community	447094	114413	1.5
R14	27 High Street	446486	114551	1.5
R15	34 Hatch Mead	446309	114597	1.5
R16	17 Swathling Road	446113	114670	1.5
R17	25 Swaythling Road	446076	114732	1.5
R18	The Gatehouse	446055	114847	1.5
R19	69 Swathling Road	445991	114945	1.5
R20	96 Swathling Road	445944	115057	1.5
R21	20b Barnsland Cotta	445926	115151	1.5
R22	The Old Forge	445613	115277	1.5

Receptor	Description/ Address	Grid Reference		Height above Ground Level (m)
		X	Y	
R23	Manor House (HC)	445558	115309	1.5
R24	Speedwell Court	445444	115483	1.5
R25	1 Gaters Mill	445315	115547	1.5
R26	Westhaven	446290	114412	1.5
R27	3 Churchill	446336	114368	1.5
R28	1 Moorhill Road	446615	114025	1.5
R29	1 Roselands	446781	113845	1.5
R30	Telegraph Cottage	446981	113613	1.5
R31	Ashton	447025	113535	1.5
R32	Thorneydown Bungalo	447224	113220	1.5
R33	82 Telegraph RoadL	447043	113659	1.5
R34	Redlynch	447039	113841	1.5
R35	36 Telegraph Road	447094	114054	1.5
R36	8 Telegraph Heights	447210	114171	1.5
R37	19a Westgate Mews	447239	114267	1.5
R38	2a Telegraph Road	447259	114367	1.5
R39	142 Thornhill Park	447242	113013	1.5
R40	128 Thornhill Park	447130	113047	1.5
R41	63 Thornhill Park	446849	113034	1.5
R42	681 Thornhill Park	446278	113013	1.5
R43	25 Nursery Gardens	445893	112985	1.5
R44	509 Thornhill Park	445533	112999	1.5
R45	451-453 Maybray Kin	445252	113007	3
R46	45 Pound Street	445203	113132	1.5
R47	76 Glenfield Cres	444789	113111	1.5

Receptor	Description/ Address	Grid Reference		Height above Ground Level (m)
		X	Y	
R48	310 Bitterne Road W	444529	113166	1.5
R49	217 Bitterne Road W	444391	113232	1.5
R50	226 Bitterne Road W	444222	113269	1.5
R51	99 Bitterne Road W	443668	113368	1.5
R52	62 Bitterne Road W	443571	113332	1.5
R53	33 Bursledon Road	445362	112886	1.5
R54	62 Bursledon Rd	445493	112746	1.5
R55	96 Bursledon Road	445630	112643	1.5
R56	180 Bursledon Road	445933	112412	1.5
R57	228 Bursledon Road	446105	112282	1.5
R58	300 Bursledon Road	446306	112130	1.5
R59	308 Spring Hills	446587	111911	1.5
R60	338 Bursledon Road	446746	111788	1.5
R61	454 Bursledon Road	447143	111500	1.5
R62	150 Bursledon Road	447730	111030	1.5
R63	11 Langtry Crescent	447816	110884	1.5
R64	Beaufort House	447790	110652	1.5
R65	Glenfield Hamble La	447760	110513	1.5
R66	5a Cranbury Gardens	447698	110324	1.5
R67	7 Millers View	448142	110686	1.5
R68	1 Brookfield	448354	110550	1.5
R69	The Stennings	448017	111203	1.5
R70	Hilltop	448006	111269	1.5
R71	Brambles	447964	111484	1.5
R72	Netley Hill Lodge	447951	111730	1.5

Receptor	Description/ Address	Grid Reference		Height above Ground Level (m)
		X	Y	
R73	Eversley	447661	112434	1.5
R74	The Haven	447502	112712	1.5
R75	Eddystone	447399	112868	1.5
R76	16 Downscroft Garde	448502	113420	1.5
R77	14 Berrywood Garden	448580	113526	1.5
R78	1 Berrywood Gdns	448617	113583	1.5
R79	1-18 Bitterne Road West	444174	113304	1.5
R80	2 Milbury Cresent	445393	112973	1.5

Appendix F

MODEL RESULTS



HUMAN HEALTH

ANNUAL MEAN NO₂ CONCENTRATIONS (µg/m³)

Receptor ID	Receptor Location	Annual Mean NO ₂ Concentrations (µg/m ³)					
		2019 Baseline	2027 Baseline	2027 With Dev	Change (µg/m ³)	% Change Relative to Objective	Impact
R1	40 Upmill Close	43.4	25.5	25.6	0.060	0	Negligible
R2	83 Moorgreen Rd	41.6	24.6	24.7	0.050	0	Negligible
R3	37 Moorgreen Road	23.2	15.8	15.8	0.030	0	Negligible
R4	29-41 Bamber Close	24.2	16.3	16.6	0.22	1	Negligible
R5	2 Botley Road	27.5	18.1	18.6	0.46	1	Negligible
R6	Arena	23.9	16.2	16.4	0.24	1	Negligible
R7	Dawson Lodge	25.9	17.1	17.4	0.29	1	Negligible
R8	Brookfield	25.6	16.9	17.1	0.20	1	Negligible
R9	5 Shaw Road	28.1	18.0	18.1	0.14	0	Negligible
R10	Belmere	26.5	17.5	17.9	0.43	1	Negligible
R11	Glenside	26.6	17.1	17.4	0.35	1	Negligible
R12	39 High Street	29.9	18.8	19.3	0.53	1	Negligible
R13	Hilldene Community	23.5	16.0	16.3	0.29	1	Negligible
R14	27 High Street	28.1	17.8	18.3	0.42	1	Negligible
R15	34 Hatch Mead	26.0	16.8	17.0	0.27	1	Negligible
R16	17 Swathling Road	29.7	18.8	19.0	0.24	1	Negligible
R17	25 Swaythling Road	33.9	21.1	21.4	0.35	1	Negligible
R18	The Gatehouse	29.9	18.8	19.1	0.23	1	Negligible
R19	69 Swathling Road	28.0	18.2	18.4	0.17	0	Negligible
R20	96 Swathling Road	26.7	17.7	17.9	0.16	0	Negligible
R21	20b Barnsland Cotta	28.3	18.4	18.6	0.16	0	Negligible
R22	The Old Forge	34.5	21.8	22.1	0.31	1	Negligible
R23	Manor House (HC)	33.9	21.5	21.8	0.30	1	Negligible
R24	Speedwell Court	31.1	19.8	19.9	0.16	0	Negligible

R25	1 Gaters Mill	36.2	22.5	22.8	0.29	1	Negligible
R26	Westhaven	29.9	18.9	18.9	0.030	0	Negligible
R27	3 Churchill	29.7	18.7	18.8	0.030	0	Negligible
R28	1 Moorhill Road	27.2	17.4	17.4	0.090	0	Negligible
R29	1 Roselands	27.8	17.6	17.7	0.10	0	Negligible
R30	Telegraph Cottage	29.9	18.6	18.8	0.16	0	Negligible
R31	Ashton	23.5	16.2	16.3	0.090	0	Negligible
R32	Thorneydown Bungalow	24.0	16.4	16.5	0.080	0	Negligible
R33	82 Telegraph Road	22.7	15.8	15.9	0.17	0	Negligible
R34	Redlynch	21.0	14.9	15.0	0.11	0	Negligible
R35	36 Telegraph Road	19.9	14.2	14.3	0.12	0	Negligible
R36	8 Telegraph Heights	20.5	14.5	14.6	0.15	0	Negligible
R37	19a Westgate Mews	21.4	15.0	15.2	0.20	0	Negligible
R38	2a Telegraph Road	22.6	15.5	15.8	0.26	1	Negligible
R39	142 Thornhill Park	27.0	18.0	18.1	0.11	0	Negligible
R40	128 Thornhill Park	26.8	17.9	18.0	0.10	0	Negligible
R41	63 Thornhill Park	28.0	17.7	17.8	0.090	0	Negligible
R42	681 Thornhill Park	27.5	17.5	17.6	0.090	0	Negligible
R43	25 Nursery Gardens	27.6	18.1	18.1	0.080	0	Negligible
R44	509 Thornhill Park	30.6	19.7	19.8	0.11	0	Negligible
R45	451-453 Maybray Kin	25.3	16.8	16.9	0.040	0	Negligible
R46	45 Pound Street	26.5	17.4	17.5	0.060	0	Negligible
R47	76 Glenfield Cres	29.9	19.6	19.7	0.070	0	Negligible
R48	310 Bitterne Road W	31.3	20.4	20.5	0.080	0	Negligible
R49	217 Bitterne Road W	34.3	22.0	22.1	0.10	0	Negligible
R50	226 Bitterne Road W	31.0	20.2	20.3	0.070	0	Negligible
R51	99 Bitterne Road W	36.5	23.7	23.8	0.10	0	Negligible
R52	62 Bitterne Road W	32.0	21.4	21.5	0.080	0	Negligible
R53	33 Bursledon Road	31.5	20.0	20.1	0.010	0	Negligible

R54	62 Bursledon Rd	29.1	18.8	18.8	0.010	0	Negligible
R55	96 Bursledon Road	28.2	18.4	18.4	0.010	0	Negligible
R56	180 Bursledon Road	27.8	18.1	18.2	0.010	0	Negligible
R57	228 Bursledon Road	27.7	18.0	18.0	0.010	0	Negligible
R58	300 Bursledon Road	27.9	18.1	18.1	0.00	0	Negligible
R59	308 Spring Hills	24.8	16.5	16.5	0.010	0	Negligible
R60	338 Bursledon Road	24.3	16.3	16.3	0.010	0	Negligible
R61	454 Bursledon Road	28.2	18.1	18.1	0.010	0	Negligible
R62	150 Bursledon Road	24.0	16.0	16.0	0.00	0	Negligible
R63	11 Langtry Crescent	26.0	16.9	16.9	0.00	0	Negligible
R64	Beaufort House	36.5	22.5	22.5	0.00	0	Negligible
R65	Glenfield Hamble La	33.1	20.7	20.7	0.010	0	Negligible
R66	5a Cranbury Gardens	33.8	21.0	21.0	0.010	0	Negligible
R67	7 Millers View	27.8	18.0	18.0	0.010	0	Negligible
R68	1 Brookfield	29.4	18.9	18.9	0.020	0	Negligible
R69	The Stennings	25.7	17.0	17.0	0.020	0	Negligible
R70	Hilltop	27.7	18.1	18.1	0.020	0	Negligible
R71	Brambles	26.1	17.0	17.0	0.020	0	Negligible
R72	Netley Hill Lodge	29.3	18.7	18.7	0.020	0	Negligible
R73	Eversley	25.0	16.9	16.9	0.030	0	Negligible
R74	The Haven	24.1	16.4	16.5	0.030	0	Negligible
R75	Eddystone	23.2	16.0	16.0	0.030	0	Negligible
R76	16 Downscroft Garde	26.1	17.1	17.2	0.080	0	Negligible
R77	14 Berrywood Garden	25.9	17.0	17.1	0.080	0	Negligible
R78	1 Berrywood Gdns	25.5	16.8	16.9	0.070	0	Negligible
R79	1-18 Bitterne Road West	34.7	22.2	22.3	0.10	0	Negligible
R80	2 Milbury Crescent	28.5	18.5	18.6	0.070	0	Negligible

Results rounded to 1.d.p

ANNUAL MEAN PM₁₀ CONCENTRATIONS (µg/m³)

Receptor ID	Receptor Location	Annual Mean PM ₁₀ Concentrations (µg/m ³)					
		2019 Baseline	2027 Baseline	2027 With Dev	Change (µg/m ³)	% Change Relative to Objective	Impact
R1	40 Upmill Close	19.7	18.5	18.5	0.015	0	Negligible
R2	83 Moorgreen Rd	18.6	17.4	17.4	0.013	0	Negligible
R3	37 Moorgreen Road	16.7	15.6	15.6	0.011	0	Negligible
R4	29-41 Bamber Close	16.9	15.8	15.9	0.079	0	Negligible
R5	2 Botley Road	17.7	16.8	17.0	0.20	0	Negligible
R6	Arena	16.9	15.9	16.0	0.10	0	Negligible
R7	Dawson Lodge	17.1	16.0	16.1	0.11	0	Negligible
R8	Brookfield	17.0	16.0	16.0	0.086	0	Negligible
R9	5 Shaw Road	17.1	16.1	16.1	0.062	0	Negligible
R10	Belmere	17.3	16.3	16.4	0.16	0	Negligible
R11	Glenside	16.5	15.5	15.6	0.14	0	Negligible
R12	39 High Street	17.2	16.2	16.4	0.22	1	Negligible
R13	Hilldene Community	16.9	15.9	16.0	0.12	0	Negligible
R14	27 High Street	16.8	15.8	16.0	0.17	0	Negligible
R15	34 Hatch Mead	16.4	15.3	15.4	0.11	0	Negligible
R16	17 Swathling Road	17.3	16.3	16.4	0.11	0	Negligible
R17	25 Swaythling Road	18.2	17.3	17.5	0.16	0	Negligible
R18	The Gatehouse	17.2	16.3	16.4	0.10	0	Negligible
R19	69 Swathling Road	17.7	16.6	16.7	0.072	0	Negligible
R20	96 Swathling Road	18.3	17.3	17.3	0.069	0	Negligible
R21	20b Barnsland Cotta	18.4	17.4	17.5	0.068	0	Negligible
R22	The Old Forge	20.0	19.1	19.3	0.15	0	Negligible
R23	Manor House (HC)	19.9	18.9	19.1	0.14	0	Negligible
R24	Speedwell Court	18.8	17.7	17.8	0.071	0	Negligible
R25	1 Gaters Mill	20.0	19.1	19.2	0.13	0	Negligible

R26	Westhaven	17.5	16.5	16.5	0.011	0	Negligible
R27	3 Churchill	17.4	16.5	16.5	0.010	0	Negligible
R28	1 Moorhill Road	16.8	15.8	15.9	0.040	0	Negligible
R29	1 Roselands	17.1	16.1	16.1	0.046	0	Negligible
R30	Telegraph Cottage	17.1	16.0	16.1	0.055	0	Negligible
R31	Ashton	16.0	15.0	15.0	0.036	0	Negligible
R32	Thorneydown Bungalow	16.1	15.1	15.1	0.035	0	Negligible
R33	82 Telegraph RoadL	15.8	14.7	14.8	0.068	0	Negligible
R34	Redlynch	15.5	14.4	14.5	0.047	0	Negligible
R35	36 Telegraph Road	16.3	15.2	15.2	0.050	0	Negligible
R36	8 Telegraph Heights	16.3	15.3	15.4	0.061	0	Negligible
R37	19a Westgate Mews	16.5	15.5	15.6	0.085	0	Negligible
R38	2a Telegraph Road	16.7	15.6	15.7	0.098	0	Negligible
R39	142 Thornhill Park	16.6	15.6	15.7	0.040	0	Negligible
R40	128 Thornhill Park	16.6	15.6	15.7	0.041	0	Negligible
R41	63 Thornhill Park	17.0	16.0	16.0	0.039	0	Negligible
R42	681 Thornhill Park	17.0	16.0	16.1	0.039	0	Negligible
R43	25 Nursery Gardens	17.2	16.2	16.2	0.035	0	Negligible
R44	509 Thornhill Park	17.9	16.9	17.0	0.050	0	Negligible
R45	451-453 Maybray Kin	16.9	15.8	15.8	0.015	0	Negligible
R46	45 Pound Street	17.2	16.1	16.1	0.024	0	Negligible
R47	76 Glenfield Cres	17.7	16.7	16.8	0.027	0	Negligible
R48	310 Bitterne Road W	18.1	17.1	17.1	0.033	0	Negligible
R49	217 Bitterne Road W	18.8	17.8	17.8	0.043	0	Negligible
R50	226 Bitterne Road W	18.0	17.0	17.0	0.032	0	Negligible
R51	99 Bitterne Road W	18.8	17.9	17.9	0.046	0	Negligible
R52	62 Bitterne Road W	17.9	16.9	17.0	0.035	0	Negligible
R53	33 Bursledon Road	17.9	17.0	17.0	0.006	0	Negligible
R54	62 Bursledon Rd	17.5	16.4	16.4	0.003	0	Negligible

R55	96 Bursledon Road	17.3	16.3	16.3	0.003	0	Negligible
R56	180 Bursledon Road	17.2	16.2	16.2	0.002	0	Negligible
R57	228 Bursledon Road	17.1	16.1	16.1	0.002	0	Negligible
R58	300 Bursledon Road	17.1	16.1	16.1	0.002	0	Negligible
R59	308 Spring Hills	16.5	15.5	15.5	0.002	0	Negligible
R60	338 Bursledon Road	16.4	15.4	15.4	0.002	0	Negligible
R61	454 Bursledon Road	16.4	15.4	15.4	0.002	0	Negligible
R62	150 Bursledon Road	15.5	14.5	14.5	0.002	0	Negligible
R63	11 Langtry Crescent	16.8	15.8	15.8	0.002	0	Negligible
R64	Beaufort House	19.4	18.6	18.6	0.002	0	Negligible
R65	Glenfield Hamble La	18.7	17.9	17.9	0.002	0	Negligible
R66	5a Cranbury Gardens	18.9	18.1	18.1	0.001	0	Negligible
R67	7 Millers View	17.1	16.1	16.1	0.006	0	Negligible
R68	1 Brookfield	17.5	16.6	16.6	0.009	0	Negligible
R69	The Stennings	17.9	16.9	17.0	0.007	0	Negligible
R70	Hilltop	18.4	17.4	17.4	0.010	0	Negligible
R71	Brambles	15.8	14.8	14.8	0.007	0	Negligible
R72	Netley Hill Lodge	16.4	15.4	15.5	0.010	0	Negligible
R73	Eversley	17.3	16.3	16.3	0.009	0	Negligible
R74	The Haven	17.2	16.1	16.2	0.009	0	Negligible
R75	Eddystone	17.0	15.9	15.9	0.011	0	Negligible
R76	16 Downscroft Garde	17.9	16.9	16.9	0.028	0	Negligible
R77	14 Berrywood Garden	17.9	16.9	16.9	0.031	0	Negligible
R78	1 Berrywood Gdns	17.9	16.8	16.8	0.030	0	Negligible
R79	1-18 Bitterne Road West	18.9	17.9	18.0	0.045	0	Negligible
R80	2 Milbury Crescent	17.3	16.2	16.2	0.030	0	Negligible

Results rounded to 1.d.p

DAILY MEAN PM₁₀ (NO. OF DAYS OF EXCEEDANCE)

Receptor ID	Receptor Location	Days with PM ₁₀ Concentrations >50µg/m ³				
		2019 Baseline	2027 Baseline	2027 With Dev	Change (days)	Impact
R1	40 Upmill Close	3	2	2	0	Negligible
R2	83 Moorgreen Rd	2	1	1	0	Negligible
R3	37 Moorgreen Road	1	0	0	0	Negligible
R4	29-41 Bamber Close	1	0	0	0	Negligible
R5	2 Botley Road	1	1	1	0	Negligible
R6	Arena	1	0	0	0	Negligible
R7	Dawson Lodge	1	0	0	0	Negligible
R8	Brookfield	1	0	0	0	Negligible
R9	5 Shaw Road	1	0	0	0	Negligible
R10	Belmere	1	0	0	0	Negligible
R11	Glenside	1	0	0	0	Negligible
R12	39 High Street	1	0	0	0	Negligible
R13	Hilldene Community	1	0	0	0	Negligible
R14	27 High Street	1	0	0	0	Negligible
R15	34 Hatch Mead	0	0	0	0	Negligible
R16	17 Swathling Road	1	0	0	0	Negligible
R17	25 Swaythling Road	2	1	1	0	Negligible
R18	The Gatehouse	1	0	0	0	Negligible
R19	69 Swathling Road	1	1	1	0	Negligible
R20	96 Swathling Road	2	1	1	0	Negligible
R21	20b Barnsland Cotta	2	1	1	0	Negligible
R22	The Old Forge	3	2	3	1	Negligible
R23	Manor House (HC)	3	2	2	0	Negligible
R24	Speedwell Court	2	1	1	0	Negligible

R25	1 Gaters Mill	3	2	3	1	Negligible
R26	Westhaven	1	1	1	0	Negligible
R27	3 Churchill	1	0	0	0	Negligible
R28	1 Moorhill Road	1	0	0	0	Negligible
R29	1 Roselands	1	0	0	0	Negligible
R30	Telegraph Cottage	1	0	0	0	Negligible
R31	Ashton	0	0	0	0	Negligible
R32	Thorneydown Bungalow	0	0	0	0	Negligible
R33	82 Telegraph Road	0	0	0	0	Negligible
R34	Redlynch	0	0	0	0	Negligible
R35	36 Telegraph Road	0	0	0	0	Negligible
R36	8 Telegraph Heights	0	0	0	0	Negligible
R37	19a Westgate Mews	1	0	0	0	Negligible
R38	2a Telegraph Road	1	0	0	0	Negligible
R39	142 Thornhill Park	1	0	0	0	Negligible
R40	128 Thornhill Park	1	0	0	0	Negligible
R41	63 Thornhill Park	1	0	0	0	Negligible
R42	681 Thornhill Park	1	0	0	0	Negligible
R43	25 Nursery Gardens	1	0	0	0	Negligible
R44	509 Thornhill Park	1	1	1	0	Negligible
R45	451-453 Maybray Kin	1	0	0	0	Negligible
R46	45 Pound Street	1	0	0	0	Negligible
R47	76 Glenfield Cres	1	1	1	0	Negligible
R48	310 Bitterne Road W	1	1	1	0	Negligible
R49	217 Bitterne Road W	2	1	1	0	Negligible
R50	226 Bitterne Road W	1	1	1	0	Negligible
R51	99 Bitterne Road W	2	1	1	0	Negligible
R52	62 Bitterne Road W	1	1	1	0	Negligible
R53	33 Bursledon Road	1	1	1	0	Negligible

R54	62 Bursledon Rd	1	0	0	0	Negligible
R55	96 Bursledon Road	1	0	0	0	Negligible
R56	180 Bursledon Road	1	0	0	0	Negligible
R57	228 Bursledon Road	1	0	0	0	Negligible
R58	300 Bursledon Road	1	0	0	0	Negligible
R59	308 Spring Hills	1	0	0	0	Negligible
R60	338 Bursledon Road	0	0	0	0	Negligible
R61	454 Bursledon Road	0	0	0	0	Negligible
R62	150 Bursledon Road	0	0	0	0	Negligible
R63	11 Langtry Crescent	1	0	0	0	Negligible
R64	Beaufort House	3	2	2	0	Negligible
R65	Glenfield Hamble La	2	1	1	0	Negligible
R66	5a Cranbury Gardens	2	1	1	0	Negligible
R67	7 Millers View	1	0	0	0	Negligible
R68	1 Brookfield	1	1	1	0	Negligible
R69	The Stennings	1	1	1	0	Negligible
R70	Hilltop	2	1	1	0	Negligible
R71	Brambles	0	0	0	0	Negligible
R72	Netley Hill Lodge	0	0	0	0	Negligible
R73	Eversley	1	0	0	0	Negligible
R74	The Haven	1	0	0	0	Negligible
R75	Eddystone	1	0	0	0	Negligible
R76	16 Downscroft Garde	1	1	1	0	Negligible
R77	14 Berrywood Garden	1	1	1	0	Negligible
R78	1 Berrywood Gdns	1	1	1	0	Negligible
R79	1-18 Bitterne Road West	2	1	1	0	Negligible
R80	2 Milbury Crescent	1	0	0	0	Negligible

ANNUAL MEAN PM_{2.5} CONCENTRATIONS (µg/m³)

Receptor ID	Receptor Location	Annual Mean PM _{2.5} Concentrations (µg/m ³)					
		2019 Baseline	2027 Baseline	2027 With Dev	Change (µg/m ³)	% Change Relative to Objective	Impact
R1	40 Upmill Close	13.4	12.3	12.3	0.009	0	Negligible
R2	83 Moorgreen Rd	12.7	11.7	11.7	0.008	0	Negligible
R3	37 Moorgreen Road	11.4	10.6	10.6	0.006	0	Negligible
R4	29-41 Bamber Close	11.6	10.7	10.7	0.045	0	Negligible
R5	2 Botley Road	12.0	11.2	11.3	0.110	1	Negligible
R6	Arena	11.6	10.7	10.8	0.057	0	Negligible
R7	Dawson Lodge	11.7	10.8	10.9	0.063	0	Negligible
R8	Brookfield	11.7	10.8	10.8	0.048	0	Negligible
R9	5 Shaw Road	11.8	10.9	10.9	0.034	0	Negligible
R10	Belmere	11.8	10.9	11.0	0.087	0	Negligible
R11	Glenside	11.7	10.8	10.9	0.079	0	Negligible
R12	39 High Street	12.1	11.2	11.3	0.124	1	Negligible
R13	Hilldene Community	11.6	10.7	10.8	0.065	0	Negligible
R14	27 High Street	11.9	11.0	11.1	0.097	0	Negligible
R15	34 Hatch Mead	11.6	10.7	10.8	0.060	0	Negligible
R16	17 Swathling Road	12.1	11.3	11.3	0.060	0	Negligible
R17	25 Swaythling Road	12.7	11.8	11.9	0.088	0	Negligible
R18	The Gatehouse	12.1	11.3	11.3	0.057	0	Negligible
R19	69 Swathling Road	12.7	11.8	11.8	0.040	0	Negligible
R20	96 Swathling Road	12.3	11.5	11.5	0.038	0	Negligible
R21	20b Barnsland Cotta	12.4	11.6	11.6	0.038	0	Negligible
R22	The Old Forge	13.3	12.5	12.6	0.082	0	Negligible
R23	Manor House (HC)	13.2	12.4	12.5	0.078	0	Negligible

R24	Speedwell Court	12.7	11.8	11.8	0.039	0	Negligible
R25	1 Gaters Mill	13.4	12.5	12.6	0.075	0	Negligible
R26	Westhaven	12.2	11.4	11.4	0.006	0	Negligible
R27	3 Churchill	12.2	11.4	11.4	0.005	0	Negligible
R28	1 Moorhill Road	11.9	11.0	11.0	0.022	0	Negligible
R29	1 Roselands	12.1	11.2	11.3	0.026	0	Negligible
R30	Telegraph Cottage	12.1	11.2	11.2	0.031	0	Negligible
R31	Ashton	11.0	10.1	10.2	0.020	0	Negligible
R32	Thorneydown Bungalow	11.0	10.2	10.2	0.019	0	Negligible
R33	82 Telegraph RoadL	10.9	10.0	10.0	0.038	0	Negligible
R34	Redlynch	10.7	9.8	9.9	0.026	0	Negligible
R35	36 Telegraph Road	11.2	10.3	10.4	0.028	0	Negligible
R36	8 Telegraph Heights	11.2	10.4	10.4	0.034	0	Negligible
R37	19a Westgate Mews	11.3	10.5	10.5	0.047	0	Negligible
R38	2a Telegraph Road	11.4	10.6	10.6	0.055	0	Negligible
R39	142 Thornhill Park	11.3	10.5	10.5	0.022	0	Negligible
R40	128 Thornhill Park	11.3	10.5	10.5	0.023	0	Negligible
R41	63 Thornhill Park	12.0	11.2	11.2	0.022	0	Negligible
R42	681 Thornhill Park	12.0	11.2	11.2	0.022	0	Negligible
R43	25 Nursery Gardens	12.3	11.5	11.5	0.019	0	Negligible
R44	509 Thornhill Park	12.7	11.8	11.9	0.028	0	Negligible
R45	451-453 Maybray Kin	12.1	11.3	11.3	0.008	0	Negligible
R46	45 Pound Street	12.3	11.4	11.4	0.013	0	Negligible
R47	76 Glenfield Cres	12.5	11.7	11.7	0.015	0	Negligible
R48	310 Bitterne Road W	12.7	11.9	11.9	0.018	0	Negligible
R49	217 Bitterne Road W	13.1	12.3	12.3	0.024	0	Negligible
R50	226 Bitterne Road W	12.7	11.8	11.8	0.018	0	Negligible

R51	99 Bitterne Road W	13.0	12.2	12.2	0.026	0	Negligible
R52	62 Bitterne Road W	12.5	11.6	11.7	0.019	0	Negligible
R53	33 Bursledon Road	12.7	11.9	11.9	0.003	0	Negligible
R54	62 Bursledon Rd	12.4	11.6	11.6	0.002	0	Negligible
R55	96 Bursledon Road	12.3	11.5	11.5	0.002	0	Negligible
R56	180 Bursledon Road	12.3	11.4	11.4	0.001	0	Negligible
R57	228 Bursledon Road	12.1	11.3	11.3	0.001	0	Negligible
R58	300 Bursledon Road	12.1	11.3	11.3	0.001	0	Negligible
R59	308 Spring Hills	11.8	10.9	10.9	0.001	0	Negligible
R60	338 Bursledon Road	11.7	10.9	10.9	0.001	0	Negligible
R61	454 Bursledon Road	11.3	10.5	10.5	0.001	0	Negligible
R62	150 Bursledon Road	10.8	9.9	9.9	0.001	0	Negligible
R63	11 Langtry Crescent	11.2	10.4	10.4	0.001	0	Negligible
R64	Beaufort House	12.7	11.9	11.9	0.001	0	Negligible
R65	Glenfield Hamble La	12.3	11.5	11.5	0.001	0	Negligible
R66	5a Cranbury Gardens	12.4	11.6	11.6	0.001	0	Negligible
R67	7 Millers View	11.6	10.8	10.8	0.003	0	Negligible
R68	1 Brookfield	11.9	11.0	11.0	0.005	0	Negligible
R69	The Stennings	12.0	11.1	11.1	0.004	0	Negligible
R70	Hilltop	12.2	11.4	11.4	0.006	0	Negligible
R71	Brambles	11.0	10.1	10.1	0.004	0	Negligible
R72	Netley Hill Lodge	11.3	10.5	10.5	0.006	0	Negligible
R73	Eversley	11.9	11.0	11.0	0.005	0	Negligible
R74	The Haven	11.8	11.0	11.0	0.005	0	Negligible
R75	Eddystone	11.7	10.8	10.8	0.006	0	Negligible
R76	16 Downscroft Garde	12.1	11.2	11.2	0.016	0	Negligible
R77	14 Berrywood Garden	12.1	11.2	11.2	0.017	0	Negligible



R78	1 Berrywood Gdns	12.0	11.1	11.2	0.016	0	Negligible
R79	1-18 Bitterne Road West	13.1	12.3	12.3	0.025	0	Negligible
R80	2 Milbury Cresent	12.3	11.5	11.5	0.017	0	Negligible

Results rounded to 1.d.p

ECOLOGICAL RECEPTORS

The assessment results for each of the modelled ecological receptors are presented below for the potential impacts of the Proposed Development 'alone' and 'in-combination'. In cases where the change relative to the Critical Level or Critical Load exceeds 1%, additional results are provided to show the distance from roadside at which the modelled change falls below the 1% threshold and/or where the Critical Level/Load are met.

DEVELOPMENT ALONE

Annual Mean NO_x Concentrations (µg/m³)

Receptor ID	Site	Annual Mean NO _x Concentrations				Critical Level (µg/m ³)	% Change Relative to Critical Level
		2019	2027 DM	2027 DS	Change (µg/m ³)		
SPA Eco R1_10	Solent and Southampton SPA	48.0	31.7	31.9	0.2	30	0.5
SPA Eco_R2_10	Solent and Southampton SPA	52.7	36.5	36.6	0.1	30	0.5
SPA Eco R3_10	Solent and Southampton SPA	46.5	30.9	31.0	0.1	30	0.4
SPA Eco R4_0	Solent and Southampton SPA	47.2	31.2	31.4	0.1	30	0.4
SPA Eco R5_10	Solent and Southampton SPA	51.1	35.6	35.8	0.1	30	0.4
SPA Eco R6_0	Solent and Southampton SPA	45.7	30.6	30.7	0.1	30	0.4
SAC Eco R7_10	River Itchen SAC	144.1	71.5	71.7	0.2	30	0.6
SAC Eco R8_10	River Itchen SAC	143.2	71.1	71.3	0.2	30	0.6
SAC Eco R9_0	River Itchen SAC	74.7	40.2	40.3	0.1	30	0.3
SAC Eco R10_0	River Itchen SAC	57.3	32.5	32.5	0.1	30	0.2
SAC Eco R11_0	River Itchen SAC	56.6	32.9	33.0	0.1	30	0.2
SAC Eco R12_0	River Itchen SAC	53.4	30.8	30.9	0.1	30	0.3
SAC Eco R13_10	River Itchen SAC	116.3	59.4	59.6	0.2	30	0.7
SAC Eco R13_170	River Itchen SAC	50.1	30.0	30.3	0.3	30	1.15
SAC Eco R14_10	River Itchen SAC	115.7	59.1	59.3	0.2	30	0.7
SAC Eco R15_0	River Itchen SAC	109.2	56.1	56.3	0.2	30	0.6
SAC Eco R16_0	River Itchen SAC	59.4	33.4	33.5	0.1	30	0.2
SAC Eco R17_0	River Itchen SAC	41.5	25.5	25.5	0.0	30	0.2
SAC Eco R18_10	River Itchen SAC	42.7	27.3	27.6	0.3	30	1.0
SAC Eco R19_10	River Itchen SAC	46.6	29.3	29.6	0.4	30	1.3

SAC Eco R19_20	River Itchen SAC	42.0	26.9	27.2	0.3	30	0.9
SAC Eco R20_10	River Itchen SAC	54.6	32.0	32.4	0.4	30	1.2
SAC Eco R20_20	River Itchen SAC	50.8	30.0	30.3	0.3	30	0.8
SAC Eco R21_0	River Itchen SAC	58.3	33.9	34.4	0.5	30	1.6
SAC Eco R21_10	River Itchen SAC	51.8	30.5	30.8	0.3	30	0.9
SSSI Eco R22_0	River Itchen SSSI	37.4	24.7	24.9	0.2	30	0.6
SSSI Eco R23_0	Moorgreen Meadows SSSI	160.8	78.9	79.2	0.2	30	0.7
SSSI Eco R24_0	Moorgreen Meadows SSSI	71.4	38.7	38.8	0.1	30	0.3
SSSI Eco R25_0	Moorgreen Meadows SSSI	56.0	32.2	32.3	0.1	30	0.3
SSSI Eco R26_0	Moorgreen Meadows SSSI	81.9	43.9	44.0	0.1	30	0.5
SSSI Eco R27_0	Moorgreen Meadows SSSI	48.1	28.7	28.8	0.1	30	0.4
SSSI Eco R28_0	Moorgreen Meadows SSSI	43.7	26.9	27.0	0.1	30	0.2
SSSI Eco R29_10	Moorgreen Meadows SSSI	48.1	29.1	29.2	0.1	30	0.2
SSSI Eco R30_0	Moorgreen Meadows SSSI	45.0	27.6	27.7	0.0	30	0.1
SSSI Eco R31_10	Moorgreen Meadows SSSI	45.0	27.6	27.7	0.0	30	0.1
SSSI Eco R32_10	Moorgreen Meadows SSSI	47.5	28.9	29.0	0.0	30	0.1
LNR Eco R33_0	Chessel Bay	32.0	23.8	23.8	0.0	30	0.1
LNR Eco R34_0	Chessel Bay	29.9	22.1	22.1	0.0	30	0.1
LNR Eco R35_0	Netley Common	50.0	30.3	30.4	0.1	30	0.2
LNR Eco R36_10	Netley Common	41.1	25.8	25.9	0.0	30	0.1
LNR Eco R37_0	Wildern	42.8	26.0	26.1	0.1	30	0.3
LNR Eco R38_0	Wildern	38.3	24.0	24.1	0.1	30	0.2
AW Eco R39_0	Ancient Woodland	35.3	22.8	22.8	0.1	30	0.2
AW Eco R40_0	Ancient Woodland	34.0	22.9	22.9	0.1	30	0.2
AW Eco R41_0	Ancient Woodland	33.2	22.5	22.6	0.1	30	0.2
AW Eco R42_0	Ancient Woodland	119.1	60.2	60.4	0.1	30	0.5
AW Eco R43_0	Ancient Woodland	88.5	46.4	46.5	0.1	30	0.3
AW Eco R44_0	Ancient Woodland	95.6	49.6	49.8	0.1	30	0.4
AW Eco R45_0	Ancient Woodland	39.3	24.4	24.4	0.0	30	0.1

AW Eco R46_0	Ancient Woodland	30.4	19.6	19.6	0.0	30	0.1
AW Eco R47_0	Ancient Woodland	36.4	23.1	23.2	0.0	30	0.1
AW Eco R48_0	Ancient Woodland	37.2	23.5	23.5	0.0	30	0.1
AW Eco R49_0	Ancient Woodland	30.1	21.1	21.2	0.0	30	0.1
SINC Eco R50_10	Telegraph Woods	30.2	20.5	20.7	0.2	30	0.8
SINC Eco R51_10	Telegraph Woods	29.9	20.3	20.6	0.2	30	0.8
SINC Eco R52_10	Telegraph Woods	32.3	21.7	22.0	0.3	30	0.9
SINC Eco R53_0	Telegraph Woods	29.9	20.5	20.5	0.1	30	0.2
SINC Eco R54_10	Telegraph Woods	32.7	21.9	22.1	0.2	30	0.8
SINC Eco R55_10	Telegraph Woods	38.8	25.0	25.2	0.2	30	0.6

Nutrient Nitrogen Deposition – Grassland (kgN/ha/yr)

Receptor ID	Site	Nutrient Nitrogen Deposition (kgN/ha/yr)				Critical Load (kgN/ha/yr)	% Change Relative to Critical Load
		2019	2027 DM	2027 DS	Change (kgN/ha/yr)		
SPA Eco R1_10	Solent and Southampton SPA	21.7	20.5	20.5	0.1	8	0.8
SPA Eco_R2_10	Solent and Southampton SPA	21.8	20.5	20.6	0.1	8	0.9
SPA Eco R3_10	Solent and Southampton SPA	21.4	20.1	20.1	0.1	8	0.8
SPA Eco R4_0	Solent and Southampton SPA	21.6	20.3	20.3	0.1	8	0.8
SPA Eco R5_10	Solent and Southampton SPA	21.4	20.1	20.2	0.1	8	0.8
SPA Eco R6_0	Solent and Southampton SPA	21.1	19.8	19.8	0.1	8	0.7
SAC Eco R7_10	River Itchen SAC	37.6	36.8	36.9	0.1	10	0.6
SAC Eco R8_10	River Itchen SAC	37.4	36.6	36.7	0.1	10	0.6
SAC Eco R9_0	River Itchen SAC	25.9	24.1	24.1	0.0	10	0.3
SAC Eco R10_0	River Itchen SAC	23.0	21.2	21.2	0.0	10	0.2
SAC Eco R11_0	River Itchen SAC	21.5	19.8	19.8	0.0	10	0.2
SAC Eco R12_0	River Itchen SAC	22.4	20.6	20.6	0.0	10	0.2
SAC Eco R13_10	River Itchen SAC	33.0	31.6	31.6	0.1	10	0.6
SAC Eco R13_150	River Itchen SAC	21.7	20.0	20.1	0.1	10	0.9
SAC Eco R13_160	River Itchen SAC	22.1	20.6	20.7	0.1	10	1.2

SAC Eco R13_170	River Itchen SAC	23.2	21.7	21.9	0.2	10	1.8
SAC Eco R14_10	River Itchen SAC	32.9	31.4	31.5	0.1	10	0.6
SAC Eco R15_0	River Itchen SAC	31.7	30.2	30.2	0.1	10	0.6
SAC Eco R16_0	River Itchen SAC	23.3	21.5	21.5	0.0	10	0.2
SAC Eco R17_0	River Itchen SAC	20.5	18.8	18.8	0.0	10	0.1
SAC Eco R18_10	River Itchen SAC	20.6	19.2	19.4	0.2	10	1.5
SAC Eco R18_20	River Itchen SAC	19.3	17.9	18.0	0.1	10	0.9
SAC Eco R19_10	River Itchen SAC	21.7	20.4	20.7	0.2	10	2.1
SAC Eco R19_20	River Itchen SAC	20.2	18.9	19.0	0.1	10	1.3
SAC Eco R19_30	River Itchen SAC	19.5	18.1	18.2	0.1	10	1.0
SAC Eco R20_10	River Itchen SAC	24.0	22.5	22.7	0.2	10	2.0
SAC Eco R20_20	River Itchen SAC	22.7	21.1	21.2	0.1	10	1.2
SAC Eco R20_30	River Itchen SAC	22.3	20.6	20.7	0.1	10	0.9
SAC Eco R21_0	River Itchen SAC	25.3	23.9	24.2	0.3	10	2.6
SAC Eco R21_10	River Itchen SAC	23.0	21.4	21.6	0.1	10	1.4
SAC Eco R21_20	River Itchen SAC	22.4	20.7	20.8	0.1	10	1.0
SSSI Eco R22_0	River Itchen SSSI	19.1	17.7	17.7	0.1	10	0.8
LNR Eco R33_0	Chessell Bay	17.6	16.2	16.2	0.0	8	0.1
LNR Eco R34_0	Chessell Bay	17.6	16.1	16.1	0.0	8	0.1

Nutrient Nitrogen Deposition – Woodland (kgN/ha/yr)

Receptor ID	Site	Nutrient Nitrogen Deposition (kgN/ha/yr)				Critical Load (kgN/ha/yr)	% Change Relative to Critical Load
		2019	2027 DM	2027 DS	Change (kgN/ha/yr)		
SSSI Eco R23_0	Moorgreen Meadows SSSI	66.4	62.6	62.7	0.1	10	0.9
SSSI Eco R24_0	Moorgreen Meadows SSSI	42.4	38.2	38.2	0.0	10	0.4
SSSI Eco R25_0	Moorgreen Meadows SSSI	36.8	33.2	33.2	0.0	10	0.3
SSSI Eco R26_0	Moorgreen Meadows SSSI	43.4	39.2	39.3	0.1	10	0.7
SSSI Eco R27_0	Moorgreen Meadows SSSI	34.9	31.6	31.6	0.1	10	0.6

SSSI Eco R28_0	Moorgreen Meadows SSSI	34.3	31.2	31.2	0.0	10	0.3
SSSI Eco R29_10	Moorgreen Meadows SSSI	36.6	33.6	33.7	0.0	10	0.2
SSSI Eco R30_0	Moorgreen Meadows SSSI	35.4	32.5	32.5	0.0	10	0.2
SSSI Eco R31_10	Moorgreen Meadows SSSI	35.6	32.7	32.7	0.0	10	0.2
SSSI Eco R32_10	Moorgreen Meadows SSSI	36.7	33.8	33.9	0.0	10	0.2
LNR Eco R35_0	Netley Common	39.9	37.1	37.1	0.0	10	0.5
LNR Eco R36_10	Netley Common	35.7	32.6	32.7	0.0	10	0.2
LNR Eco R37_0	Wildern	34.5	31.1	31.1	0.0	10	0.4
LNR Eco R38_0	Wildern	33.4	30.2	30.2	0.0	10	0.3
AW Eco R39_0	Ancient Woodland	31.8	28.8	28.8	0.0	10	0.4
AW Eco R40_0	Ancient Woodland	28.9	26.3	26.3	0.0	10	0.3
AW Eco R41_0	Ancient Woodland	28.7	26.2	26.2	0.0	10	0.3
AW Eco R42_0	Ancient Woodland	51.4	47.4	47.5	0.1	10	0.6
AW Eco R43_0	Ancient Woodland	43.5	39.5	39.5	0.0	10	0.4
AW Eco R44_0	Ancient Woodland	45.3	41.1	41.2	0.1	10	0.6
AW Eco R45_0	Ancient Woodland	31.3	28.4	28.4	0.0	10	0.1
AW Eco R46_0	Ancient Woodland	31.5	28.8	28.8	0.0	10	0.1
AW Eco R47_0	Ancient Woodland	30.6	27.8	27.8	0.0	10	0.1
AW Eco R48_0	Ancient Woodland	30.7	28.0	28.0	0.0	10	0.1
AW Eco R49_0	Ancient Woodland	31.4	28.7	28.7	0.0	10	0.2
SINC Eco R50_10	Telegraph Woods	32.4	29.6	29.7	0.2	10	1.7
SINC Eco R50_20	Telegraph Woods	31.9	29.1	29.2	0.1	10	1.0
SINC Eco R50_30	Telegraph Woods	31.7	28.9	29.0	0.1	10	0.8
SINC Eco R51_10	Telegraph Woods	32.3	29.6	29.7	0.2	10	1.7
SINC Eco R51_20	Telegraph Woods	31.9	29.1	29.2	0.1	10	1.0
SINC Eco R51_30	Telegraph Woods	31.7	28.9	29.0	0.1	10	0.8
SINC Eco R52_10	Telegraph Woods	32.6	29.9	30.1	0.2	10	1.9
SINC Eco R52_20	Telegraph Woods	32.1	29.4	29.5	0.1	10	1.2
SINC Eco R52_30	Telegraph Woods	31.9	29.2	29.2	0.1	10	0.9

SINC Eco R53_10	Telegraph Woods	31.6	28.8	28.9	0.0	10	0.3
SINC Eco R54_10	Telegraph Woods	32.7	29.9	30.0	0.2	10	1.6
SINC Eco R54_20	Telegraph Woods	32.2	29.4	29.5	0.1	10	1.0
SINC Eco R55_10	Telegraph Woods	35.4	32.6	32.8	0.1	10	1.4
SINC Eco R55_20	Telegraph Woods	33.7	30.9	31.0	0.1	10	0.9

Annual Mean NH₃ – Grassland (µg/m³)

Receptor ID	Site	Annual Mean NH ₃ Concentrations (µg/m ³)				Critical Level (µg/m ³)	% Change Relative to Critical Level
		2019	2027 DM	2027 DS	Change (µg/m ³)		
SPA Eco R1_10	Solent and Southampton SPA	2.1	2.2	2.2	0.01	3	0.4
SPA Eco_R2_10	Solent and Southampton SPA	2.1	2.2	2.3	0.01	3	0.4
SPA Eco R3_10	Solent and Southampton SPA	2.0	2.2	2.2	0.01	3	0.3
SPA Eco R4_0	Solent and Southampton SPA	2.0	2.2	2.2	0.01	3	0.3
SPA Eco R5_10	Solent and Southampton SPA	2.0	2.2	2.2	0.01	3	0.3
SPA Eco R6_0	Solent and Southampton SPA	2.0	2.1	2.1	0.01	3	0.3
SAC Eco R7_10	River Itchen SAC	4.0	4.9	4.9	0.01	3	0.3
SAC Eco R8_10	River Itchen SAC	4.0	4.8	4.9	0.01	3	0.3
SAC Eco R9_0	River Itchen SAC	2.6	2.9	2.9	0.005	3	0.2
SAC Eco R10_0	River Itchen SAC	2.2	2.4	2.4	0.003	3	0.1
SAC Eco R11_0	River Itchen SAC	1.9	2.1	2.1	0.003	3	0.1
SAC Eco R12_0	River Itchen SAC	2.1	2.3	2.3	0.004	3	0.1
SAC Eco R13_10	River Itchen SAC	3.4	4.0	4.0	0.01	3	0.3
SAC Eco R14_10	River Itchen SAC	3.4	4.0	4.0	0.01	3	0.3
SAC Eco R15_0	River Itchen SAC	3.3	3.8	3.8	0.01	3	0.3
SAC Eco R16_0	River Itchen SAC	2.3	2.5	2.5	0.003	3	0.1
SAC Eco R17_0	River Itchen SAC	1.9	2.0	2.0	0.002	3	0.1
SAC Eco R18_10	River Itchen SAC	1.9	2.0	2.0	0.02	3	0.8
SAC Eco R19_10	River Itchen SAC	2.0	2.2	2.2	0.03	3	1.1

SAC Eco R19_20	River Itchen SAC	1.8	2.0	2.0	0.02	3	0.7
SAC Eco R20_10	River Itchen SAC	2.4	2.6	2.7	0.03	3	1.1
SAC Eco R20_20	River Itchen SAC	2.2	2.4	2.4	0.02	3	0.7
SAC Eco R21_0	River Itchen SAC	2.6	2.8	2.9	0.04	3	1.4
SAC Eco R21_10	River Itchen SAC	2.3	2.5	2.5	0.02	3	0.8
SSSI Eco R22_0	River Itchen SSSI	1.7	1.8	1.8	0.01	3	0.4
LNR Eco R33_0	Chessell Bay	1.5	1.5	1.5	0.001	3	0.0
LNR Eco R34_0	Chessell Bay	1.5	1.5	1.5	0.001	3	0.0

Annual Mean NH₃ – Woodland (µg/m³)

Receptor ID	Site	Annual Mean NH ₃ Concentrations (µg/m ³)				Critical Level (µg/m ³)	% Change Relative to Critical Level
		2019	2027 DM	2027 DS	Change (µg/m ³)		
SSSI Eco R23_0	Moorgreen Meadows SSSI	4.2	5.0	5.1	0.009	3	0.3
SSSI Eco R24_0	Moorgreen Meadows SSSI	2.4	2.6	2.6	0.004	3	0.1
SSSI Eco R25_0	Moorgreen Meadows SSSI	2.0	2.2	2.2	0.003	3	0.1
SSSI Eco R26_0	Moorgreen Meadows SSSI	2.5	2.7	2.7	0.006	3	0.2
SSSI Eco R27_0	Moorgreen Meadows SSSI	1.9	2.0	2.0	0.005	3	0.2
SSSI Eco R28_0	Moorgreen Meadows SSSI	1.9	2.0	2.0	0.003	3	0.1
SSSI Eco R29_10	Moorgreen Meadows SSSI	2.1	2.3	2.3	0.002	3	0.1
SSSI Eco R30_0	Moorgreen Meadows SSSI	2.0	2.1	2.1	0.002	3	0.1
SSSI Eco R31_10	Moorgreen Meadows SSSI	2.0	2.2	2.2	0.00	3	0.05
SSSI Eco R32_10	Moorgreen Meadows SSSI	2.1	2.3	2.3	0.001	3	0.05
LNR Eco R35_0	Netley Common	2.4	2.6	2.6	0.004	3	0.1
LNR Eco R36_10	Netley Common	2.0	2.1	2.1	0.002	3	0.1
LNR Eco R37_0	Wildern	1.9	2.0	2.0	0.003	3	0.1
LNR Eco R38_0	Wildern	1.8	1.9	1.9	0.002	3	0.1
AW Eco R39_0	Ancient Woodland	1.8	1.9	1.9	0.003	3	0.1
AW Eco R40_0	Ancient Woodland	1.5	1.5	1.5	0.002	3	0.1
AW Eco R41_0	Ancient Woodland	1.5	1.5	1.5	0.003	3	0.1

AW Eco R42_0	Ancient Woodland	3.1	3.7	3.7	0.005	3	0.2
AW Eco R43_0	Ancient Woodland	2.6	2.9	2.9	0.004	3	0.1
AW Eco R44_0	Ancient Woodland	2.7	3.0	3.0	0.005	3	0.2
AW Eco R45_0	Ancient Woodland	1.8	1.8	1.8	0.001	3	0.0
AW Eco R46_0	Ancient Woodland	1.8	1.9	1.9	0.000	3	0.0
AW Eco R47_0	Ancient Woodland	1.7	1.8	1.8	0.001	3	0.0
AW Eco R48_0	Ancient Woodland	1.8	1.8	1.8	0.001	3	0.0
AW Eco R49_0	Ancient Woodland	1.7	1.7	1.8	0.002	3	0.1
SINC Eco R50_10	Telegraph Woods	1.8	1.8	1.9	0.017	3	0.6
SINC Eco R51_10	Telegraph Woods	1.8	1.8	1.9	0.017	3	0.6
SINC Eco R52_10	Telegraph Woods	1.8	1.9	1.9	0.019	3	0.6
SINC Eco R54_0	Telegraph Woods	2.1	2.2	2.2	0.060	3	2.0
SINC Eco R55_10	Telegraph Woods	2.0	2.2	2.2	0.014	3	0.5



'IN-COMBINATION'

Annual Mean NO_x Concentrations (µg/m³)

Receptor ID	Site	Annual Mean NO _x Concentrations			Change (µg/m ³)		% Change Relative to Critical Level		Critical Level (µg/m ³)
		2019	2019 (2027 EFs)	2027 DS	(2019 with 2027 EFs)	(2019)	(2019 with 2027 EFs)	(2019)	
SPA Eco R1_10	Solent and Southampton SPA	48.0	30.7	31.9	1.2	-16.2	3.9	-53.9	30
SPA Eco R1_20	Solent and Southampton SPA	41.9	28.0	28.8	0.8	-13.1	2.7	-43.8	30
SPA Eco_R2_10	Solent and Southampton SPA	52.7	35.4	36.6	1.2	-16.1	3.9	-53.6	30
SPA Eco_R2_60	Solent and Southampton SPA	39.2	29.5	29.9	0.4	-9.3	1.3	-31.1	30
SPA Eco R3_10	Solent and Southampton SPA	46.5	30.0	31.0	1.1	-15.5	3.6	-51.6	30
SPA Eco R3_20	Solent and Southampton SPA	40.6	27.4	28.1	0.7	-12.5	2.4	-41.7	30
SPA Eco R4_0	Solent and Southampton SPA	47.2	30.2	31.4	1.1	-15.8	3.7	-52.7	30
SPA Eco R4_10	Solent and Southampton SPA	40.9	27.5	28.2	0.7	-12.6	2.5	-42.1	30
SPA Eco R5_10	Solent and Southampton SPA	51.1	34.7	35.8	1.1	-15.4	3.6	-51.3	30
SPA Eco R5_20	Solent and Southampton SPA	40.6	27.4	28.1	0.7	-12.5	2.4	-41.7	30



SPA Eco R6_0	Solent and Southampton SPA	45.7	29.6	30.7	1.0	-15.0	3.4	-50.0	30
SPA Eco R6_0	Solent and Southampton SPA	41.0	27.6	28.3	0.8	-12.7	2.5	-42.2	30
SAC Eco R7_10	River Itchen SAC	144.1	65.7	71.7	6.0	-72.4	20.0	-241.4	30
SAC Eco R7_110	River Itchen SAC	51.1	28.3	29.7	1.4	-21.4	4.8	-71.2	30
SAC Eco R8_10	River Itchen SAC	143.2	65.4	71.3	6.0	-71.9	19.8	-239.7	30
SAC Eco R8_30	River Itchen SAC	50.3	28.0	29.4	1.4	-20.9	4.7	-69.6	30
SAC Eco R9_0	River Itchen SAC	74.7	37.7	40.3	2.6	-34.4	8.7	-114.6	30
SAC Eco R9_10	River Itchen SAC	68.3	35.2	37.5	2.3	-30.9	7.6	-102.8	30
SAC Eco R10_0	River Itchen SAC	57.3	30.8	32.5	1.7	-24.8	5.8	-82.5	30
SAC Eco R10_30	River Itchen SAC	50.3	28.0	29.4	1.4	-20.9	4.7	-69.6	30
SAC Eco R11_0	River Itchen SAC	56.6	31.4	33.0	1.6	-23.6	5.2	-78.8	30
SAC Eco R11_30	River Itchen SAC	48.8	28.3	29.5	1.2	-19.3	3.9	-64.5	30
SAC Eco R12_0	River Itchen SAC	53.4	29.3	30.9	1.6	-22.5	5.3	-75.0	30
SAC Eco R12_10	River Itchen SAC	50.4	28.1	29.5	1.4	-20.8	4.8	-69.5	30
SAC Eco R13_10	River Itchen SAC	116.3	54.8	59.6	4.8	-56.7	15.9	-189.0	30
SAC Eco R13_90	River Itchen SAC	49.6	27.9	29.3	1.4	-20.3	4.8	-67.8	30
SAC Eco R14_10	River Itchen SAC	115.7	54.6	59.3	4.7	-56.4	15.8	-188.1	30
SAC Eco R14_90	River Itchen SAC	51.1	28.5	30.0	1.5	-21.1	5.1	70.3	30



SAC Eco R15_0	River Itchen SAC	109.2	51.9	56.3	4.4	-52.9	14.7	-176.3	30
SAC Eco R15_10	River Itchen SAC	87.5	43.0	46.4	3.3	-42.1	11.0	-137.2	30
SAC Eco R16_0	River Itchen SAC	59.4	31.6	33.5	1.8	-25.9	6.1	-86.4	30
SAC Eco R16_40	River Itchen SAC	49.6	27.7	29.1	1.4	-20.5	4.5	-68.4	30
SAC Eco R17_0	River Itchen SAC	41.5	24.6	25.5	1.0	-16.0	3.2	-53.4	30
SAC Eco R18_10	River Itchen SAC	42.7	26.4	27.6	1.2	-15.1	3.9	-50.3	30
SAC Eco R19_10	River Itchen SAC	46.6	28.2	29.6	1.5	-17.0	4.9	-56.6	30
SAC Eco R20_10	River Itchen SAC	54.6	30.4	32.4	2.0	-22.2	6.6	-74.0	30
SAC Eco R20_30	River Itchen SAC	49.7	28.1	29.6	1.5	-20.1	5.2	-67.0	30
SAC Eco R21_0	River Itchen SAC	58.3	32.1	34.4	2.3	-23.9	7.7	-79.8	30
SAC Eco R21_20	River Itchen SAC	50.0	28.2	29.8	1.6	-20.2	5.3	-67.4	30
SSSI Eco R22_0	River Itchen SSSI	37.4	24.1	24.9	0.8	-12.6	2.6	-41.9	30
SSSI Eco R23_0	Moorgreen Meadows SSSI	160.8	72.3	79.2	6.9	-81.6	22.9	-272.0	30
SSSI Eco R23_70	Moorgreen Meadows SSSI	60.8	32.0	34.0	2.0	-26.8	6.6	-89.4	30
SSSI Eco R24_0	Moorgreen Meadows SSSI	71.4	36.3	38.8	2.5	-32.6	8.3	-108.8	30
SSSI Eco R24_90	Moorgreen Meadows SSSI	51.8	29.2	30.4	1.2	-21.4	4.2	-71.4	30
SSSI Eco R25_0	Moorgreen Meadows SSSI	56.0	30.9	32.3	1.5	-23.7	4.9	-79.0	30
SSSI Eco R25_20	Moorgreen Meadows SSSI	52.8	29.6	30.9	1.3	-21.9	4.3	-73.2	30
SSSI Eco R26_0	Moorgreen Meadows SSSI	81.9	41.2	44.0	2.8	-37.9	9.2	-126.2	30



SSSI Eco R26_110	Moorgreen Meadows SSSI	50.6	28.7	29.9	1.2	-20.7	4.0	-69.0	30
SSSI Eco R27_0	Moorgreen Meadows SSSI	48.1	27.7	28.8	1.1	-19.2	3.7	-64.1	30
SSSI Eco R28_0	Moorgreen Meadows SSSI	43.7	26.1	27.0	0.9	-16.7	2.9	-55.8	30
SSSI Eco R29_10	Moorgreen Meadows SSSI	48.1	28.1	29.2	1.1	-18.9	3.7	-63.1	30
SSSI Eco R30_0	Moorgreen Meadows SSSI	45.0	26.7	27.7	0.9	-17.3	3.1	-57.8	30
SSSI Eco R31_10	Moorgreen Meadows SSSI	45.0	26.7	27.7	0.9	-17.3	3.1	-57.6	30
SSSI Eco R32_10	Moorgreen Meadows SSSI	47.5	27.9	29.0	1.1	-18.5	3.5	-61.8	30
LNR Eco R33_0	Chessel Bay	32.0	23.6	23.8	0.2	-8.1	0.7	-27.2	30
LNR Eco R34_0	Chessel Bay	29.9	21.9	22.1	0.2	-7.8	0.6	-25.9	30
LNR Eco R35_0	Netley Common	50.0	28.9	30.4	1.5	-19.6	4.9	-65.4	30
LNR Eco R35_10	Netley Common	40.1	24.5	25.4	0.9	-14.7	3.1	-49.0	30
LNR Eco R36_10	Netley Common	41.1	24.9	25.9	1.0	-15.2	3.2	-50.6	30
LNR Eco R37_0	Wildern	42.8	25.1	26.1	1.0	-16.7	3.3	-55.7	30
LNR Eco R38_0	Wildern	38.3	23.3	24.1	0.8	-14.3	2.6	-47.5	30
AW Eco R39_0	Ancient Woodland	35.3	22.1	22.8	0.7	-12.5	2.3	-41.5	30
AW Eco R40_0	Ancient Woodland	34.0	22.5	22.9	0.5	-11.1	1.6	-36.9	30
AW Eco R41_0	Ancient Woodland	33.2	22.2	22.6	0.4	-10.6	1.4	-35.4	30
AW Eco R42_0	Ancient Woodland	119.1	55.9	60.4	4.5	-58.7	14.9	-195.7	30
AW Eco R42_130	Ancient Woodland	51.4	28.7	29.8	1.2	-21.6	3.8	-71.9	30



AW Eco R43_0	Ancient Woodland	88.5	43.5	46.5	3.0	-42.0	9.9	-140.1	30
AW Eco R43_120	Ancient Woodland	51.0	28.5	29.7	1.1	-21.3	3.8	-71.1	30
AW Eco R44_0	Ancient Woodland	95.6	46.4	49.8	3.4	-45.8	11.3	-152.7	30
AW Eco R44_60	Ancient Woodland	56.8	30.8	32.3	1.4	-24.6	4.8	-81.9	30
AW Eco R45_0	Ancient Woodland	39.3	23.9	24.4	0.5	-14.9	1.8	-49.6	30
AW Eco R46_0	Ancient Woodland	30.4	19.1	19.6	0.5	-10.7	1.7	-35.7	30
AW Eco R47_0	Ancient Woodland	36.4	22.7	23.2	0.4	-13.3	1.4	-44.3	30
AW Eco R48_0	Ancient Woodland	37.2	23.0	23.5	0.4	-13.7	1.5	-45.6	30
AW Eco R49_0	Ancient Woodland	30.1	20.8	21.2	0.4	-9.0	1.2	-29.8	30
SINC Eco R50_10	Telegraph Woods	30.2	20.0	20.7	0.7	-9.5	2.3	-31.7	30
SINC Eco R51_10	Telegraph Woods	29.9	19.9	20.6	0.7	-9.3	2.2	-31.2	30
SINC Eco R52_10	Telegraph Woods	32.3	21.2	22.0	0.7	-10.4	2.4	-34.5	30
SINC Eco R53_0	Telegraph Woods	29.9	20.1	20.5	0.4	-9.4	1.3	-31.3	30
SINC Eco R54_10	Telegraph Woods	32.7	21.4	22.1	0.7	-10.6	2.4	-35.4	30
SINC Eco R55_10	Telegraph Woods	38.8	24.2	25.2	1.0	-13.6	3.4	-45.5	30



Nutrient Nitrogen Deposition – Grassland (kgN/ha/yr)

Receptor ID	Site	Nutrient Nitrogen Deposition (kgN/ha/yr)			Change (kgN/ha/yr)		% Change Relative to Critical Load		Critical Load (kgN/ha/yr)
		2019	2019 (2027 EFs)	2027 DS	(2019 with 2027 EFs)	(2019)	(2019 with 2027 EFs)	(2019)	
SPA Eco R1_10	Solent and Southampton SPA	21.7	19.9	20.5	0.6	-1.2	7.3	-14.8	8
SPA Eco R1_10	Solent and Southampton SPA	17.7	16.2	16.3	0.1	-1.4	1.0	-17.7	8
SPA Eco_R2_10	Solent and Southampton SPA	21.8	20.0	20.6	0.6	-1.2	7.3	-14.7	8
SPA Eco_R2_70	Solent and Southampton SPA	18.1	16.6	16.7	0.1	-1.4	1.6	-17.6	8
SPA Eco R3_10	Solent and Southampton SPA	21.4	19.6	20.1	0.5	-1.2	6.7	-15.3	8
SPA Eco R3_110	Solent and Southampton SPA	17.7	16.2	16.3	0.1	-1.4	0.9	-17.7	8
SPA Eco R4_0	Solent and Southampton SPA	21.6	19.8	20.3	0.6	-1.2	7.0	-15.1	8
SPA Eco R4_90	Solent and Southampton SPA	17.7	16.2	16.3	0.1	-1.4	1.0	-17.7	8
SPA Eco R5_10	Solent and Southampton SPA	21.4	19.7	20.2	0.5	-1.2	6.7	-15.2	8
SPA Eco R5_100	Solent and Southampton SPA	17.7	16.2	16.3	0.1	-1.4	1.0	-17.7	8
SPA Eco R6_0	Solent and Southampton SPA	21.1	19.3	19.8	0.5	-1.2	6.2	-15.6	8
SPA Eco R6_120	Solent and Southampton SPA	17.7	16.2	16.3	0.1	-1.4	1.0	-17.7	8
SAC Eco R7_10	River Itchen SAC	37.6	34.5	36.9	2.4	-0.7	23.7	-7.2	10
SAC Eco R7_570	River Itchen SAC	18.7	17.0	17.1	0.1	-1.6	1.1	-15.6	10
SAC Eco R8_10	River Itchen SAC	37.4	34.3	36.7	2.4	-0.7	23.6	-7.3	10



SAC Eco R8_30	River Itchen SAC	28.8	25.9	27.1	1.2	-1.6	12.4	-16.5	10
SAC Eco R9_0	River Itchen SAC	25.9	23.2	24.1	0.9	-1.8	8.9	-18.0	10
SAC Eco R9_10	River Itchen SAC	24.8	22.3	23.0	0.8	-1.8	7.8	-17.9	10
SAC Eco R10_0	River Itchen SAC	23.0	20.6	21.2	0.6	-1.8	5.7	-18.0	10
SAC Eco R10_150	River Itchen SAC	20.0	18.1	18.3	0.2	-1.7	2.4	-16.6	10
SAC Eco R11_0	River Itchen SAC	21.5	19.3	19.8	0.5	-1.7	4.8	-17.1	10
SAC Eco R11_240	River Itchen SAC	18.4	16.7	16.9	0.2	-1.5	1.8	-14.9	10
SAC Eco R12_0	River Itchen SAC	22.4	20.1	20.6	0.5	-1.8	4.8	-18.0	10
SAC Eco R12_190	River Itchen SAC	18.7	17.0	17.2	0.2	-1.5	2.2	-15.1	10
SAC Eco R13_10	River Itchen SAC	33.0	30.1	31.6	1.6	-1.4	15.8	-13.5	10
SAC Eco R13_170	River Itchen SAC	23.2	21.1	21.9	0.8	-1.3	7.7	-12.9	10
SAC Eco R14_10	River Itchen SAC	32.9	29.9	31.5	1.6	-1.4	15.6	-13.8	10
SAC Eco R14_90	River Itchen SAC	22.2	20.0	20.5	0.5	-1.7	5.1	-17.2	10
SAC Eco R15_0	River Itchen SAC	31.7	28.8	30.2	1.4	-1.5	14.5	-14.8	10
SAC Eco R15_10	River Itchen SAC	28.0	25.2	26.3	1.1	-1.7	10.7	-17.4	10
SAC Eco R16_0	River Itchen SAC	23.3	20.9	21.5	0.6	-1.8	6.0	-18.0	10
SAC Eco R16_50	River Itchen SAC	21.5	19.3	19.7	0.4	-1.8	4.0	-17.6	10
SAC Eco R17_0	River Itchen SAC	20.5	18.5	18.8	0.3	-1.7	3.0	-17.0	10
SAC Eco R17_420	River Itchen SAC	18.6	17.0	17.1	0.1	-1.6	1.0	-15.5	10



SAC Eco R18_10	River Itchen SAC	20.6	18.8	19.4	0.6	-1.2	5.6	-11.6	10
SAC Eco R18_120	River Itchen SAC	17.7	16.1	16.2	0.1	-1.4	1.0	-14.5	10
SAC Eco R19_10	River Itchen SAC	21.7	19.9	20.7	0.7	-1.0	7.4	-10.2	10
SAC Eco R19_30	River Itchen SAC	19.5	18.1	18.2	0.4	-1.3	3.9	-13.2	10
SAC Eco R20_10	River Itchen SAC	24.0	21.8	22.7	0.9	-1.3	8.7	-13.0	10
SAC Eco R20_30	River Itchen SAC	22.3	20.1	20.7	0.6	-1.6	5.6	-16.1	10
SAC Eco R21_0	River Itchen SAC	25.3	23.1	24.2	1.1	-1.1	10.9	-10.7	10
SAC Eco R21_40	River Itchen SAC	22.2	20.0	20.5	0.5	-1.7	5.1	-17.0	10
SSSI Eco R22_0	River Itchen SSSI	19.1	17.4	17.7	0.3	-1.3	3.2	-13.3	10
SSSI Eco R22_90	River Itchen SSSI	17.7	16.1	16.2	0.1	-1.4	1.0	-14.4	10
LNR Eco R33_0	Chessell Bay	17.6	16.2	16.2	0.1	-1.4	0.8	-17.8	8
LNR Eco R34_0	Chessell Bay	17.6	16.1	16.1	0.1	-1.4	0.6	-17.9	8

Nutrient Nitrogen Deposition – Woodland (kgN/ha/yr)

Receptor ID	Site	Nutrient Nitrogen Deposition (kgN/ha/yr)			Change (kgN/ha/yr)		% Change Relative to Critical Load		Critical Load (kgN/ha/yr)
		2019	2019 (2027 EFs)	2027 DS	(2019 with 2027 EFs)	(2019)	(2019 with 2027 EFs)	(2019)	
SSSI Eco R23_0	Moorgreen Meadows SSSI	66.4	58.8	62.7	4.0	-3.6	39.6	-36.4	10
SSSI Eco R23_70	Moorgreen Meadows SSSI	39.7	34.8	35.7	0.9	-4.0	9.2	-40.0	10



SSSI Eco R24_0	Moorgreen Meadows SSSI	42.4	37.0	38.2	1.2	-4.2	11.9	-42.2	10
SSSI Eco R24_90	Moorgreen Meadows SSSI	35.8	31.8	32.3	0.5	-3.5	5.4	-34.8	10
SSSI Eco R25_0	Moorgreen Meadows SSSI	36.8	32.6	33.2	0.6	-3.6	6.4	-36.0	10
SSSI Eco R25_20	Moorgreen Meadows SSSI	36.0	31.9	32.5	0.6	-3.5	5.6	-35.1	10
SSSI Eco R26_0	Moorgreen Meadows SSSI	43.4	37.9	39.3	1.3	-4.1	13.3	-40.8	10
SSSI Eco R26_180	Moorgreen Meadows SSSI	34.1	30.5	30.8	0.4	-3.2	3.9	-32.3	10
SSSI Eco R27_0	Moorgreen Meadows SSSI	34.9	31.1	31.6	0.5	-3.3	4.9	-33.1	10
SSSI Eco R27_180	Moorgreen Meadows SSSI	33.3	29.9	30.2	0.3	-3.1	3.1	-31.0	10
SSSI Eco R28_0	Moorgreen Meadows SSSI	34.3	30.8	31.2	0.4	-3.1	4.2	-30.7	10
SSSI Eco R28_130	Moorgreen Meadows SSSI	33.8	30.3	30.6	0.4	-3.2	3.7	-31.6	10
SSSI Eco R29_10	Moorgreen Meadows SSSI	36.6	33.0	33.7	0.7	-2.9	6.8	-29.5	10
SSSI Eco R29_180	Moorgreen Meadows SSSI	33.0	29.7	30.0	0.3	-3.1	2.9	-30.5	10
SSSI Eco R30_0	Moorgreen Meadows SSSI	35.4	31.9	32.5	0.6	-2.9	5.5	-29.4	10
SSSI Eco R30_160	Moorgreen Meadows SSSI	32.7	29.4	29.7	0.3	-3.0	2.5	-30.0	10
SSSI Eco R31_10	Moorgreen Meadows SSSI	35.6	32.1	32.7	0.6	-2.9	5.7	-28.9	10
SSSI Eco R31_190	Moorgreen Meadows SSSI	32.4	29.2	29.4	0.2	-2.9	2.2	-29.5	10
SSSI Eco R32_10	Moorgreen Meadows SSSI	36.7	33.2	33.9	0.7	-2.8	6.9	-28.4	10
SSSI Eco R32_20	Moorgreen Meadows SSSI	34.7	31.4	31.8	0.5	-2.9	4.8	-29.0	10
LNR Eco R35_0	Netley Common	39.9	36.0	37.1	1.1	-2.8	10.6	-27.8	10



LNR Eco R35_370	Netley Common	31.2	28.4	28.5	0.1	-2.7	1.0	-27.3	10
LNR Eco R36_10	Netley Common	35.7	32.1	32.7	0.6	-3.0	5.7	-30.0	10
LNR Eco R36_230	Netley Common	31.5	28.6	28.7	0.1	-2.8	1.3	-27.8	10
LNR Eco R37_0	Wildern	34.5	30.7	31.1	0.4	-3.4	4.1	-33.6	10
LNR Eco R37_30	Wildern	34.1	30.4	30.8	0.4	-3.3	3.7	-33.0	10
LNR Eco R38_0	Wildern	33.4	29.9	30.2	0.3	-3.2	3.1	-31.6	10
LNR Eco R38_120	Wildern	32.6	29.3	29.5	0.2	-3.0	2.3	-30.4	10
AW Eco R39_0	Ancient Woodland	31.8	28.5	28.8	0.3	-3.0	3.0	-29.6	10
AW Eco R39_230	Ancient Woodland	30.2	27.4	27.5	0.1	-2.7	1.4	-27.0	10
AW Eco R40_0	Ancient Woodland	28.9	26.1	26.3	0.2	-2.6	1.9	-26.0	10
AW Eco R40_70	Ancient Woodland	28.5	25.8	26.0	0.1	-2.5	1.5	-25.4	10
AW Eco R41_0	Ancient Woodland	28.7	26.0	26.2	0.2	-2.5	1.8	-25.4	10
AW Eco R41_30	Ancient Woodland	28.5	25.9	26.0	0.2	-2.5	1.6	-25.3	10
AW Eco R42_0	Ancient Woodland	51.4	45.1	47.5	2.4	-4.0	23.6	-39.5	10
AW Eco R42_130	Ancient Woodland	34.1	30.3	30.8	0.5	-3.3	5.0	-33.1	10
AW Eco R43_0	Ancient Woodland	43.5	38.0	39.5	1.5	-4.0	14.7	-40.1	10
AW Eco R43_160	Ancient Woodland	33.2	29.6	30.0	0.4	-3.2	4.2	-31.7	10
AW Eco R44_0	Ancient Woodland	45.3	39.6	41.2	1.6	-4.2	15.8	-41.5	10
AW Eco R44_60	Ancient Woodland	35.4	31.2	31.9	0.6	-3.5	6.2	-35.3	10



AW Eco R45_0	Ancient Woodland	31.3	28.2	28.4	0.2	-2.8	2.4	-28.2	10
AW Eco R45_70	Ancient Woodland	30.8	27.8	28.0	0.2	-2.8	2.0	-27.6	10
AW Eco R46_0	Ancient Woodland	31.5	28.5	28.8	0.3	-2.8	2.7	-27.7	10
AW Eco R46_200	Ancient Woodland	29.9	27.2	27.3	0.1	-2.6	1.2	-26.4	10
AW Eco R47_0	Ancient Woodland	30.6	27.7	27.8	0.2	-2.7	1.7	-27.0	10
AW Eco R47_100	Ancient Woodland	30.2	27.4	27.5	0.1	-2.7	1.4	-26.8	10
AW Eco R48_0	Ancient Woodland	30.7	27.8	28.0	0.2	-2.7	1.9	-27.3	10
AW Eco R48_60	Ancient Woodland	30.4	27.6	27.7	0.2	-2.7	1.6	-27.0	10
AW Eco R49_0	Ancient Woodland	31.4	28.5	28.7	0.1	-2.7	1.4	-27.4	10
AW Eco R49_310	Ancient Woodland	30.9	28.2	28.3	0.1	-2.7	0.9	-26.6	10
SINC Eco R50_10	Telegraph Woods	32.4	29.4	29.7	0.4	-2.6	3.9	-26.3	10
SINC Eco R50_140	Telegraph Woods	31.4	28.5	28.6	0.1	-2.8	1.5	-27.6	10
SINC Eco R51_10	Telegraph Woods	32.3	29.3	29.7	0.4	-2.6	3.9	-26.0	10
SINC Eco R51_510	Telegraph Woods	31.5	28.6	28.7	0.1	-2.8	1.4	-28.0	10
SINC Eco R52_10	Telegraph Woods	32.6	29.6	30.1	0.4	-2.6	4.4	-25.8	10
SINC Eco R52_310	Telegraph Woods	31.4	28.5	28.7	0.1	-2.8	1.4	-27.6	10
SINC Eco R53_0	Telegraph Woods	31.6	28.7	28.9	0.2	-2.7	1.6	-27.5	10
SINC Eco R53_140	Telegraph Woods	31.4	28.5	28.7	0.1	-2.7	1.4	-27.5	10



SINC Eco R54_10	Telegraph Woods	32.7	29.6	30.0	0.4	-2.6	4.1	-26.5	10
SINC Eco R54_130	Telegraph Woods	31.5	28.6	28.7	0.1	-2.7	1.5	-27.4	10
SINC Eco R55_10	Telegraph Woods	35.4	32.1	32.8	0.7	-2.6	6.8	-26.3	10
SINC Eco R55_230	Telegraph Woods	31.5	28.6	28.8	0.1	-2.8	1.5	-27.7	10

Annual Mean NH₃ – Grassland (µg/m³)

Receptor ID	Site	Annual Mean NH ₃ Concentrations (µg/m ³)			Change (µg/m ³)		% Change Relative to Critical Level		Critical Level (µg/m ³)
		2019	2019 (2027 EFs)	2027 DS	2019 (2027 EFs)	2019	2019 (2027 EFs)	2019	
SPA Eco R1_10	Solent and Southampton SPA	2.1	2.2	2.2	0.1	0.2	3.1	6.0	3
SPA Eco_R2_10	Solent and Southampton SPA	2.1	2.2	2.3	0.1	0.2	3.2	6.1	3
SPA Eco R3_10	Solent and Southampton SPA	2.0	2.1	2.2	0.1	0.2	2.9	5.5	3
SPA Eco R4_0	Solent and Southampton SPA	2.0	2.1	2.2	0.1	0.2	3.0	5.7	3
SPA Eco R5_10	Solent and Southampton SPA	2.0	2.1	2.2	0.1	0.2	2.9	5.5	3
SPA Eco R6_0	Solent and Southampton SPA	2.0	2.1	2.1	0.1	0.2	2.7	5.2	3
SAC Eco R7_10	River Itchen SAC	4.0	4.5	4.9	0.4	0.8	12.7	28.3	3
SAC Eco R7_20	River Itchen SAC	3.3	3.6	3.9	0.3	0.6	8.7	19.3	3
SAC Eco R7_30	River Itchen SAC	2.9	3.2	3.4	0.2	0.4	6.6	14.8	3



SAC Eco R7_40	River Itchen SAC	2.7	2.9	3.1	0.2	0.4	5.4	12.1	3
SAC Eco R7_50	River Itchen SAC	2.5	2.7	2.8	0.1	0.3	4.5	10.2	3
SAC Eco R8_10	River Itchen SAC	4.0	4.5	4.9	0.4	0.8	12.6	28.1	3
SAC Eco R8_20	River Itchen SAC	3.3	3.6	3.9	0.3	0.6	8.6	19.1	3
SAC Eco R8_30	River Itchen SAC	2.9	3.2	3.3	0.2	0.4	6.6	14.6	3
SAC Eco R9_0	River Itchen SAC	2.6	2.7	2.9	0.1	0.3	4.7	10.5	3
SAC Eco R10_0	River Itchen SAC	2.2	2.3	2.4	0.1	0.2	2.9	6.6	3
SAC Eco R11_0	River Itchen SAC	1.9	2.0	2.1	0.1	0.2	2.4	5.7	3
SAC Eco R12_0	River Itchen SAC	2.1	2.2	2.3	0.1	0.2	2.4	5.7	3
SAC Eco R13_10	River Itchen SAC	3.4	3.8	4.0	0.2	0.6	8.1	20.1	3
SAC Eco R13_20	River Itchen SAC	2.9	3.1	3.3	0.2	0.4	5.8	13.9	3
SAC Eco R13_30	River Itchen SAC	2.6	2.8	2.9	0.1	0.3	4.6	10.7	3
SAC Eco R14_10	River Itchen SAC	3.4	3.8	4.0	0.2	0.6	8.1	19.9	3
SAC Eco R14_20	River Itchen SAC	2.9	3.1	3.3	0.2	0.4	5.8	13.8	3
SAC Eco R14_30	River Itchen SAC	2.6	2.8	2.9	0.1	0.3	4.6	10.8	3
SAC Eco R15_0	River Itchen SAC	3.3	3.6	3.8	0.2	0.5	7.5	18.3	3
SAC Eco R15_10	River Itchen SAC	2.8	3.0	3.2	0.2	0.4	5.5	13.0	3
SAC Eco R16_0	River Itchen SAC	2.3	2.4	2.5	0.1	0.2	3.1	7.1	3
SAC Eco R17_0	River Itchen SAC	1.9	2.0	2.0	0.0	0.1	1.5	3.6	3



SAC Eco R18_10	River Itchen SAC	1.9	2.0	2.0	0.1	0.2	3.0	5.4	3
SAC Eco R19_10	River Itchen SAC	2.0	2.1	2.2	0.1	0.2	3.9	7.0	3
SAC Eco R20_10	River Itchen SAC	2.4	2.5	2.7	0.1	0.3	4.6	8.5	3
SAC Eco R21_0	River Itchen SAC	2.6	2.7	2.9	0.2	0.3	5.6	10.3	3
SSSI Eco R22_0	River Itchen SSSI	1.7	1.7	1.8	0.1	0.1	1.7	3.3	3
LNR Eco R33_0	Chessel Bay	1.5	1.5	1.5	0.0	0.0	0.3	0.9	3
LNR Eco R34_0	Chessel Bay	1.5	1.5	1.5	0.0	0.0	0.2	0.8	3

Annual Mean NH₃ – Woodland (µg/m³)

Receptor ID	Site	Annual Mean NH ₃ Concentrations (µg/m ³)			Change (µg/m ³)		% Change Relative to Critical Level		Critical Level (µg/m ³)
		2019	2019 (2027 EFs)	2027 DS	2019 (2027 EFs)	2019	2019 (2027 EFs)	2019	
SSSI Eco R23_0	Moorgreen Meadows SSSI	4.2	4.7	5.1	0.4	0.9	13.3	29.8	3
SSSI Eco R23_10	Moorgreen Meadows SSSI	3.3	3.6	3.9	0.3	0.6	8.7	19.5	3
SSSI Eco R23_20	Moorgreen Meadows SSSI	2.9	3.1	3.3	0.2	0.4	6.4	14.5	3
SSSI Eco R23_30	Moorgreen Meadows SSSI	2.6	3.0	3.0	0.2	0.3	5.1	11.6	3
SSSI Eco R24_0	Moorgreen Meadows SSSI	2.4	2.5	2.6	0.1	0.3	3.7	8.5	3
SSSI Eco R25_0	Moorgreen Meadows SSSI	2.0	2.1	2.2	0.1	0.1	1.9	4.5	3
SSSI Eco R26_0	Moorgreen Meadows SSSI	2.5	2.6	2.7	0.1	0.3	4.1	9.4	3
SSSI Eco R27_0	Moorgreen Meadows SSSI	1.9	2.0	2.0	0.0	0.1	1.4	3.3	3



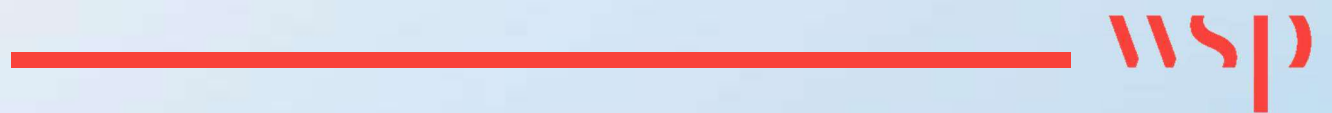
SSSI Eco R28_0	Moorgreen Meadows SSSI	1.9	2.0	2.0	0.0	0.1	1.3	2.9	3
SSSI Eco R29_10	Moorgreen Meadows SSSI	2.1	2.2	2.3	0.1	0.1	2.2	4.6	3
SSSI Eco R30_0	Moorgreen Meadows SSSI	2.0	2.1	2.1	0.1	0.1	1.8	3.7	3
SSSI Eco R31_10	Moorgreen Meadows SSSI	2.0	2.1	2.2	0.1	0.1	1.8	3.9	3
SSSI Eco R32_10	Moorgreen Meadows SSSI	2.1	2.2	2.3	0.1	0.1	2.3	4.8	3
LNR Eco R35_0	Netley Common	2.4	2.5	2.6	0.1	0.2	3.3	6.8	3
LNR Eco R36_10	Netley Common	2.0	2.1	2.1	0.1	0.1	1.8	3.8	3
LNR Eco R37_0	Wildern	1.9	1.9	2.0	0.0	0.1	1.2	2.8	3
LNR Eco R38_0	Wildern	1.8	1.9	1.9	0.0	0.1	0.9	2.1	3
AW Eco R39_0	Ancient Woodland	1.8	1.8	1.9	0.0	0.1	0.8	2.0	3
AW Eco R40_0	Ancient Woodland	1.5	1.5	1.5	0.0	0.0	0.5	1.4	3
AW Eco R41_0	Ancient Woodland	1.5	1.5	1.5	0.0	0.0	0.5	1.3	3
AW Eco R42_0	Ancient Woodland	3.1	3.4	3.7	0.2	0.5	7.7	17.5	3
AW Eco R42_10	Ancient Woodland	2.8	3.0	3.2	0.2	0.4	5.8	13.1	3
AW Eco R42_20	Ancient Woodland	2.6	2.7	2.9	0.1	0.3	4.6	10.5	3
AW Eco R43_0	Ancient Woodland	2.6	2.7	2.9	0.1	0.3	4.6	10.6	3
AW Eco R44_0	Ancient Woodland	2.7	2.9	3.0	0.1	0.3	4.9	11.5	3
AW Eco R44_10	Ancient Woodland	2.4	2.6	2.7	0.1	0.3	3.8	8.9	3
AW Eco R45_0	Ancient Woodland	1.8	1.8	1.8	0.0	0.1	0.7	1.8	3



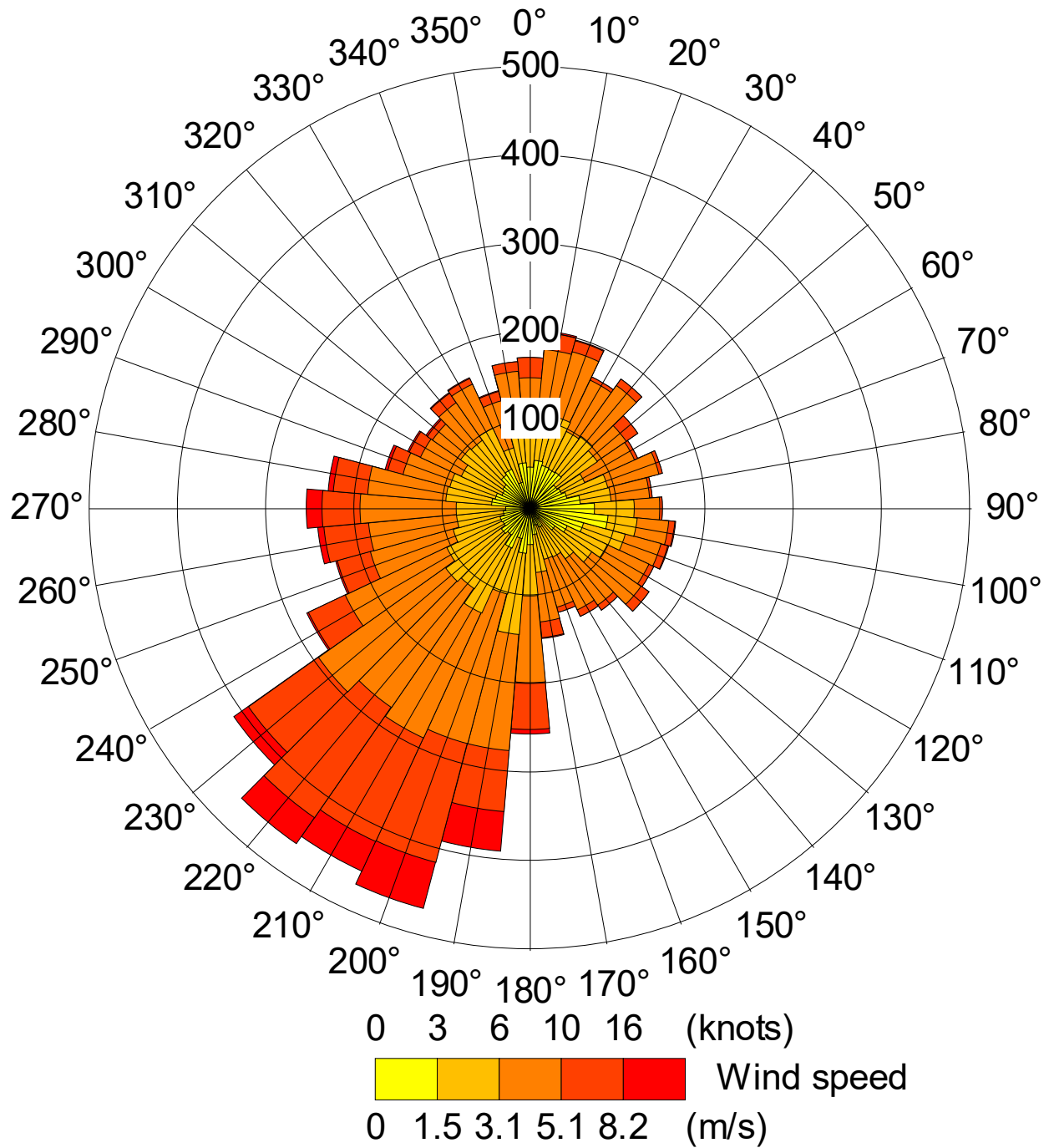
AW Eco R46_0	Ancient Woodland	1.8	1.9	1.9	0.0	0.1	0.9	2.0	3
AW Eco R47_0	Ancient Woodland	1.7	1.8	1.8	0.0	0.0	0.5	1.4	3
AW Eco R48_0	Ancient Woodland	1.8	1.8	1.8	0.0	0.0	0.5	1.5	3
AW Eco R49_0	Ancient Woodland	1.7	1.7	1.8	0.0	0.0	0.4	1.1	3
SINC Eco R50_10	Telegraph Woods	1.8	1.8	1.8	0.0	0.1	1.2	2.3	3
SINC Eco R51_10	Telegraph Woods	1.8	1.8	1.8	0.0	0.1	1.2	2.3	3
SINC Eco R52_10	Telegraph Woods	1.8	1.8	1.9	0.0	0.1	1.4	2.5	3
SINC Eco R53_0	Telegraph Woods	1.7	1.8	1.8	0.0	0.0	0.5	1.2	3
SINC Eco R54_10	Telegraph Woods	1.8	1.8	1.9	0.0	0.1	1.3	2.4	3
SINC Eco R55_10	Telegraph Woods	2.0	2.1	2.2	0.1	0.1	2.2	4.3	3

Appendix G

WIND ROSE



2019 WIND ROSE FOR SOUTHAMPTON AIRPORT





wsp

wsp.com