SD04b

Air Quality Assessment	
HRA, Winchester	
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1.1. Background

1.1.1 Air Quality Assessments Ltd (AQA) has been commissioned by Winchester City Council to assess the air quality effects of the Winchester Local Plan 2020-2040 (referred to as the "Local Plan" from now on) on the UK National Site Network.

1.1.2 An initial screening using traffic data provided by SYSTRA, using the Solent Transport Sub Regional Transport Model (SRTM) which was used to inform the Strategic Transport Assessment that was prepared to support Winchester City Councils Proposed Submission Local Plan (Regulation 19), has identified roads where the Local Plan, in-combination with other plans and projects, could increase traffic by more than 1,000 annual average daily traffic (AADT). UK National Site Network sites within 200m of these roads may be affected by road traffic emissions, as advised in Natural England's Approach to Advising Competent Authorities on the Assessment of Road Traffic Emissions under the Habitats Regulations (Natural England, 2018). The following UK National Site Network site has been identified:

- River Itchen Special Area of Conservation (SAC).

1.1.3 The increase in emissions due to the additional Local Plan in-combination traffic may have an adverse effect on the sensitive habitats within the River Itchen SAC.

1.1.4 The following roads, where the Local Plan in-combination could increase traffic by more than 1,000 AADT, have been identified within 200m of the River Itchen SAC:

- The Hockley Link (A3090);
- the M3 J11 southbound off slip; and
- the B3335.

1.1.5 Data from documents submitted with the Bushfield Camp outline planning application (Planning Reference: 23/02507/OUT) also show that the Bushfield Camp development could increase traffic on the Hockley Link (A3090) by 1,314 AADT, which could have a significant effect on the River Itchen SAC in its own right. The traffic generated by the Bushfield Camp Local Plan allocation is included in the SRTM scenarios used in this assessment.

1.2. Scope of Assessment

1.2.1 This report describes the existing air quality conditions at the River Itchen SAC and assesses the likely impact that traffic generated by the Local Plan will have on air quality. The main air pollutants of concern related to road traffic emissions are ammonia (NH_3), nitrogen oxides (NOx), nutrient nitrogen deposition and acid nitrogen deposition. The assessment has been undertaken for the 2041 SRTM forecast year.

1.2.2 The assessment has been prepared taking into account all relevant local and national guidance and regulations and informs the Appropriate Assessment undertaken by Land Use Consultants Limited (LUC), completed with regard to Natural England's Guidance on Assessing Road Traffic Emission under the Habitats Regulations (Natural England, 2018).

1.2.3 The assessment has been completed with regard to the consultation response from Natural England on the Proposed Submission Winchester District Local Plan 2020 – 2040 (Regulation 19). Natural England stated the following in their response to the Plan Habitats Regulations Assessment in relation to air quality:

Air Quality – River Itchen SAC - UNSOUND

We understand that the Local Planning Authority (LPA) are currently undertaking further air quality assessment work with the support of Natural England. There remains a possibility that this issue will still be resolved. However at the time of responding, the results of the assessment work were not available. In light of this, we advise that the Local Plan does not currently pass the tests of soundness described in Paragraph 35 of the National Planning Policy Framework (NPPF), for the reasons set out below.

The Plan should address the impacts of air quality on the natural environment. In particular, it should address the traffic impacts associated with new development, particularly where there are impacts on European sites and SSSIs. The environmental assessment of the plan (Sustainability Appraisal (SA) and Habitats Regulations Assessment (HRA)) should also consider any detrimental impacts on the natural environment alone and in-combination, and suggest appropriate avoidance or mitigation measures where applicable.

Natural England has engaged with the LPA regarding potential air quality impacts from the Bushfield Camp allocation (Policy W5), advice was provided in our Regulation 18 response dated 12th December 2022 on the evidence and assessment required for addressing traffic and air quality impacts at the Plan level. The air quality assessment provided does not assess potential impacts to ecological receptors and does not follow the methodology set out in the NE001 Air Quality Assessment guidance published by Natural England.

Therefore, currently we are not able to agree with the conclusion of the HRA (dated July 2024) prepared for the Reg 19 Plan, that there will be no adverse effect on integrity of the River Itchen SAC as a result of air quality (paragraphs 5.31).

Table 4.2 within the HRA sets out that in-combination the Plan has an expected increase of 2459 annual average daily traffic (AADT) within 200m of the River Itchen SAC. In addition, the Council has identified that allocation W5 Bushfield Camp is also likely to have an alone impact on the River Itchen Special Area of Conservation (SAC) from increased traffic.

The HRA is relying on the alone impact from Bushfield Camp to be assessed and mitigated at project level. It is Natural England's advice that this is unlikely to meet the required criteria for mitigation in line with the Conservation of Species and Habitats Regulations 2017 (the Habitats Regulations). Appropriate Assessments cannot have lacunae and must contain complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of the works proposed on the protected site concerned. Natural England advises that more certain mitigation measures need to be provided to support the conclusion of No Adverse Effect on Integrity.

Whilst Natural England welcome the inclusion of Policy W5 Bushfield Camp within the Local Plan, reliance on this policy would not give the certainty required to meet the tests of the Habitats Regulations. Natural England expect the Local Plan to address the impacts of air quality on the natural environment

Paragraph 5.32 also relies on soft measures from other policies such as enabling sustainable transport. These soft measures relying on behavioural change cannot be relied upon with certainty to meet the tests of the Habitats Regulations.

In light of this, we advise that the Local Plan would not pass the tests of soundness described in Paragraph 35 of the NPPF. Namely:

b) Justified: the air quality evidence base currently available as part of the HRA is not current and does not assess alone and in-combination impacts to ecological receptors.

d) National Policy: the NPPF integrates the tests of the Habitats Regulations into national policies and the HRA is inconsistent with the NPPF.

We continue to work with the LPA on addressing this matter and welcome the opportunity to discuss the updated modelling and results when these are available.

A signed interim Statement of Common Ground dated September 2024 is available and sets out our commitment to work through outstanding issues with Winchester City Council.

2 Air Quality Legislation & Planning Policy

2.1. Air Quality Legislation

2.1.1 European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the "Habitats Directive") requires member states to introduce a range of measures for the protection habitats and species. The Conservation of Habitats and Species Regulations 2017 (as amended) transposes the Directive into law in England and Wales (The Stationary Office, 2017).

2.1.2 The United Kingdom left the European Union on 31st January 2020 and amendments to the Habitats Regulations have transferred functions from the European Commission to the appropriate authorities in England and Wales and SACs and Special Protection Areas (SPAs) now form part of the UK National Site Network.

2.1.3 The Habitats Regulations require the competent authority, which in this case is Winchester City Council, to firstly evaluate whether plans are likely to give rise to a significant effect on Habitats Regulations sites. Where this is the case, it has to carry out an 'appropriate assessment' in order to determine whether the plans will adversely affect the integrity of the site.

2.1.4 The Air Quality Standards Regulations 2010 (as amended) set legally binding limit values for concentrations of major air pollutants in outdoor air that impact public health and vegetation, including a critical level for NOx (The Stationary Office, 2010). The critical level for NOx is an annual mean concentration of 30µg/m^3. Achievement of the critical levels is a national obligation rather than a local one. The critical levels only apply at sites more than 20 km from agglomerations, or more than 5 km away from other built up areas, industrial installations or motorways or major roads with traffic counts of more than 50,000 vehicles a day.

2.1.5 Part IV of The Environment Act 1995, as amended by the Environment Act 2021, requires the UK Government to prepare a national Air Quality Strategy. A new Air Quality Strategy for England was published in April 2023 (Defra, 2023). The Air Quality Strategy sets out the actions that Defra expects local authorities to take in support of long-term air quality goals and provides a framework to enable local authorities to make the best use of their powers and make improvements for their communities.

2.1.6 The strategy sets out air quality standards and objectives intended to protect human health and the environment. Standards are the concentrations of pollutants in the atmosphere, below which there is a minimum risk of health effects or ecosystem damage; they are set with regard to scientific and medical evidence. Objectives are the policy targets set by the Government, taking account of economic efficiency, practicability, technical feasibility and timescale, where the standards are expected to be achieved by a certain date. The Government has also published a Clean Air Strategy, which provides an overview of the actions that the government will take to improve air quality (Defra, 2019). The actions in the Clean Air Strategy focus on emissions from transport, the home, farming, and industry.

2.1.7 The national air quality objective for NOx is an annual mean of 30µg/m^3, which is the same as the critical level; however, the compliance date by which the objective must be achieved, and maintained thereafter, is 31st December 2000.

2.1.8 The national objective only strictly applies away from urban areas and heavily trafficked roads; however, Natural England has adopted a precautionary approach and applies the objective across all Habitats Regulations sites.

2.2. National Policies

2.2.1 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these should be applied (Ministry of Housing, Communities & Local Government, 2023). It provides a framework within which locally prepared plans for development can be produced. At Paragraph 8c, the NPPF states that the purpose of the planning system is to contribute to the achievement of sustainable development and includes an overarching environmental objective:

"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."

2.2.2 With regard to environmental impacts from traffic, the NPPF states at Paragraph 108 that:

"Transport issues should be considered from the earliest stages of plan-making and development proposals, so that: …

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; …"

2.2.3 The NPPF states at Paragraph 180 that:

"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; …"

2.2.4 The NPPF goes on to state at Paragraph 191:

"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."

2.2.5 With specific reference to air quality, the NPPF states at Paragraph 192 that:

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

2.2.6 The NPPF also includes the following statement at Paragraph 194:

"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."

2.2.7 The NPPF is supported by air quality national Planning Practice Guidance (nPPG) (Ministry of Housing, Communities & Local Government, 2019). The PPG states that:

"The Department for Environment, Food and Rural Affairs carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with relevant Limit Values. It is important that the potential impact of new development on air quality is taken into account where the national assessment indicates that relevant limits have been exceeded or are near the limit, or where the need for emissions reductions has been identified."

2.2.8 The PPG also states:

"Air quality considerations may also be relevant to obligations and policies relating to the conservation of nationally and internationally important habitats and species."

2.2.9 With regard to development plans, the PPG states that:

"It is important to take into account air quality management areas, Clean Air Zones and other areas including sensitive habitats or designated sites of importance for biodiversity where there could be specific requirements or limitations on new development because of air quality. Air quality is also an important consideration in habitats assessment, strategic environmental assessment and sustainability appraisal which can be used to shape an appropriate strategy, including through establishing the 'baseline', appropriate objectives for the assessment of impacts and proposed monitoring."

2.2.10 The PPG goes on to state that:

"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have

an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity."

2.2.11 The PPG also sets out the information that may be required in an air quality assessment, stating that:

"Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific."

2.2.12 It also provides guidance on options for mitigating air quality impacts, and makes clear that:

"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact."

3 Methodology

3.1. Natural England Guidance

3.1.1 Natural England have published internal guidance to assist their staff when giving advice to competent authorities undertaking assessment of road traffic impacts under the Habitats Regulations (Natural England, 2018). The following methodology ensures that the competent authority is able to reach a conclusion with regards to air quality in the Habitats Regulations Assessment.

3.2. Baseline Conditions

3.2.1 Information on background NOx and NH_3 concentrations and nutrient and acid nitrogen deposition at the River Itchen SAC have been collated from the following sources:

- Background pollutant concentration maps published by Defra (Defra, 2024). These cover the whole country on a 1 x 1 km grid; and
- Background ammonia concentrations and nitrogen deposition fluxes published by the Air Pollution Information System (APIS, 2024).

3.2.2 Background concentrations of NOx are provided by Defra to support local authorities carrying out their duties under Local Air Quality Management (LAQM) and include projections up to 2030 only. Therefore, the 2041 background NOx concentrations required to align with the SRTM modelling scenarios (see **Paragraph 3.3.2**) are assumed to be the same as in 2030.

3.2.3 Background concentrations of NH_3 and nitrogen deposition rates are provided by APIS for an average of 2020-22, with no future projections. Therefore, background NH_3 concentrations and nitrogen deposition rates in 2041 are assumed to be the same as the 2020-22 average.

3.3. Road Traffic Impacts

Sensitive Locations

3.3.1 Concentrations have been modelled at receptors within the River Itchen SAC closest to the roads where the Local Plan in-combination is predicted to increase traffic flows by more than 1,000 AADT. Receptors have been modelled on transects located to the north of the A3090, between the A3090 and the M3, and to the south of the M3 at points spaced 1m apart from the edge of the River Itchen SAC up to 100m from the edge of the road. Full details of the transect receptors are provided in in **Table A1** in **Appendix A1**. The transect locations are shown in **Figure 1**. The initial screening focuses on the transect receptors closest to the roads, where the impacts will be greatest.

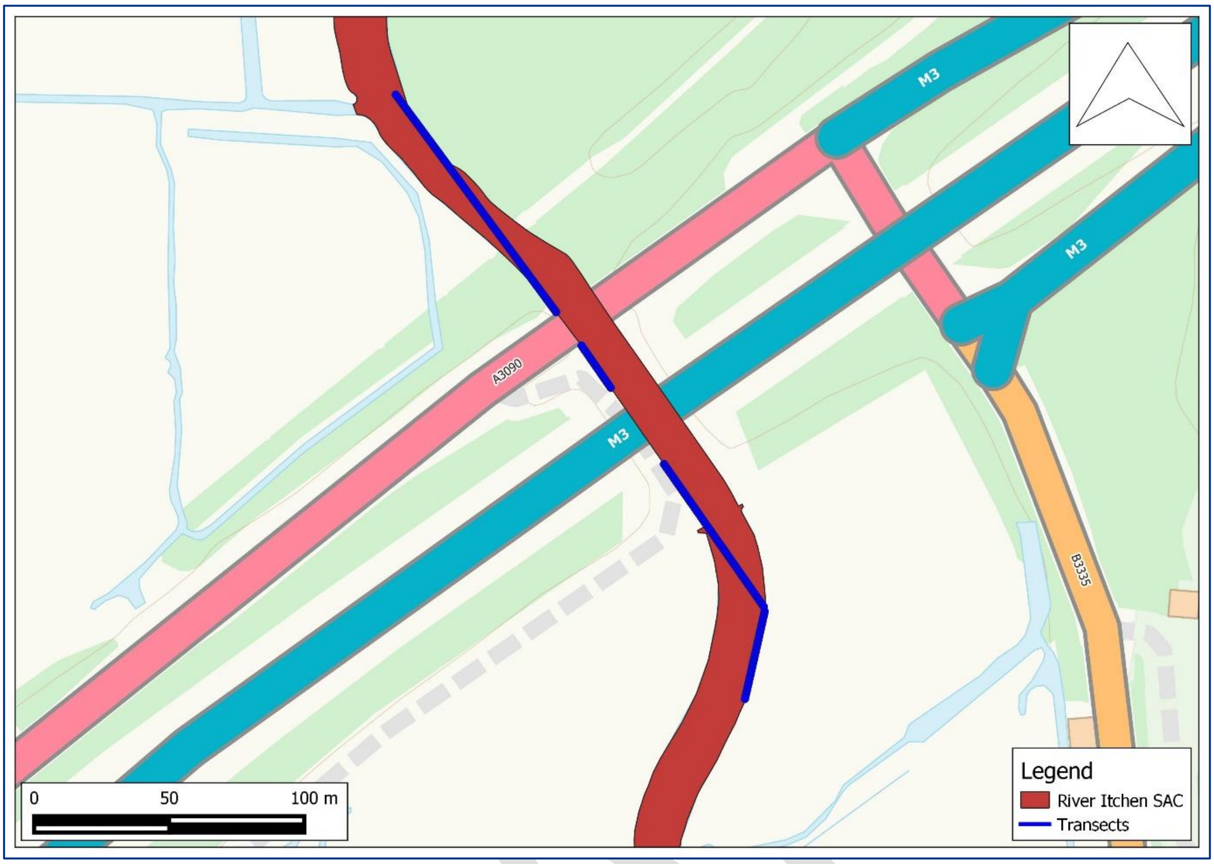

Figure 1: Location of Transects
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Assessment Scenarios

3.3.2 Concentrations of NOx and NH_3 have been predicted for the following scenarios, from the SRTM modelling scenarios for the Local Plan Strategic Transport Assessment (Hampshire Services, 2024):

- 2019, the SRTM base year and air quality model verification year;
- 2041 Baseline (no Winchester Local Plan development except for committed sites); and
- 2041 with the Winchester Local Plan (which is the Do Minimum scenario in the Local Plan Strategic Transport Assessment).

3.3.3 A full description of each SRTM modelling scenario is available in the Local Plan Transport Assessment. The SRTM Do Minimum scenario assumes that, outside of Winchester, development growth is in line with the adopted Local Plans for the respective neighbouring authorities; therefore, a comparison with the Baseline scenario provides an assessment of the Local Plan air quality impact in isolation.

3.3.4 Contributions to future road transport emissions close to the River Itchen SAC will be due to many projects and plans. The SRTM 2041 Baseline scenario includes all committed development and infrastructure within Winchester District through to

2041, as well as growth due to Neighbouring Authorities adopted Local Plans. These in-combination emissions sources would need to be removed from the 2041 baseline in order to determine the in-combination effect of the Local Plan. Therefore, concentrations have been predicted for an additional 2041 baseline scenario that uses the 2019 SRTM base year traffic data with 2041 vehicle emissions and background concentrations. This provides an alternative 2041 no growth baseline against which to compare the 2041 with Local Plan scenario. A comparison of the 2041 with Local Plan scenario with this alternative 2041 no growth future baseline provides an assessment of the Local Plan air quality impact in-combination.

Modelling Methodology

3.3.5 Concentrations have been predicted using the ADMS Roads (v5.0.1.3) dispersion model (CERC, 2024). The model requires the input of a range of data, details of which are provided in **Appendix A1**, along with details of the model verification calculations.

Uncertainty

3.3.6 There are many factors that contribute to uncertainty when predicting pollutant concentrations. The emission factors utilised in the air quality model are dependent on traffic data, which have inherent uncertainties associated with them. There are also uncertainties associated with the model itself, which simplifies real world conditions into a series of algorithms. The model verification process, as described in **Appendix A1**, minimises the uncertainties; however, future year predictions use projected traffic data, emissions data, and background concentrations. The most recent emission factors and background data published by Defra and APIS have been used in this assessment.

3.4. Assessment Criteria and Significance

3.4.1 Critical levels are defined as concentrations of pollutants in the atmosphere above which direct adverse effects on plants or ecosystems may occur according to present knowledge. A critical level is the gaseous concentration of a pollutant in the air. Critical levels are not habitat specific, but have been set to cover broad vegetation types, with an ammonia annual mean critical level of 3µg/m^3 set for higher plants, and 1µg/m^3 set where sensitive lichens and bryophytes are an important part of the ecosystem integrity. The critical level for NOx is the 30µg/m^3 annual mean national air quality objective.

3.4.2 Environment Agency online guidance also sets out a critical level for 24-hour NOx, which is a non-statutory level derived from the World Health Organisation (WHO) Air Quality Guidelines for Europe (WHO, 2000; Defra & EA, 2016). The WHO Guidelines state that:

"A strong case can be made for the provision of critical levels for short-term exposures. There are insufficient data to provide these levels with confidence at present, but current evidence suggests values of about 75 µg/m^3 for NOx … as 24-hour means."

3.4.3 Institute of Air Quality Management (IAQM) guidance on assessing air quality impacts on nature conservation sites states (IAQM, 2020):

"This IAQM guidance, therefore, recommends that only the annual mean NOx concentration is used in assessments unless specifically required by a regulator; for instance, as part of an industrial permit application where high, short term peaks in emissions, and consequent ambient concentrations, may occur."

3.4.4 Given the uncertainty associated with the short-term critical level for NOx and its non-statutory status, greater emphasis should be placed on the achievement of the annual mean NOx objective and an assessment of the impact on 24-hour NOx has not been included in this assessment.

3.4.5 Critical loads are defined as a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur, according to present knowledge. The critical load relates to the quantity of pollutant deposited from air to ground. Critical loads for nitrogen deposition onto sensitive ecosystems have been specified by the United Nations Economic Commission for Europe (UNECE).

3.4.6 It must be emphasised that an exceedance of the critical level/load does not provide a quantitative estimate of damage to an ecosystem, but only the *potential* for damage to occur.

3.4.7 The APIS GIS map tool provides site relevant critical levels and loads for designated conservation sites in the UK and Ireland (APIS, 2024). APIS has provided critical levels and loads for the River Itchen SAC interest features shown in **Table 1**.

3.4.8 The area that is 200m from the River Itchen SAC, and also within 200m of roads that may have an effect on the River Itchen SAC, is shown in **Figure 2**. The area of the River Itchen SAC within 200m of the roads where the Local Plan may have an effect corresponds exactly with the underlying River Itchen SSSI unit 107, which is a rivers and streams habitat. The River Itchen SAC boundary within the area that may be affected by the Local Plan covers the surface of the river only and does not include any adjacent areas of land that may include heath habitat. Therefore, the Northern wet heath habitat and the dwarf shrub heath habitat, the only habitats in the River Itchen SAC with critical loads for nitrogen deposition, will not be present within the affected area.

3.4.9 LUC have confirmed that 'rich fens habitats' is the supporting habitat for southern damselfly (Coenagrion mercurial) on the River Itchen SAC. Therefore, LUC have recommended that an assessment is undertaken for impacts on this habitat using a critical load of 15kgN/ha/yr, also shown in **Table 1**. The 15kgN/ha/yr critical load is the minimum critical load for rich fens established by UNECE, which are used in APIS.

3.4.10 The water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation interest feature of the River Itchen SAC is within 200m of roads that may have an effect on the SAC; however, there are no nitrogen deposition critical loads provided for this interest feature.

3.4.11 Therefore, the assessment of impacts on the River Itchen SAC has been completed for impacts on critical levels for NOx and NH_3 of 30µgNOx/m^3 and 3µgNH_3/m^3 respectively, but also considers the impact on the nitrogen critical load for Rich fens of 15kgN/ha/yr.

Table 1: Ammonia Critical Level and Nitrogen Critical Loads

Designated Conservation Site	Feature Name	N Critical Load Class	Acidity Critical Load Class	Critical Level		Critical Load	
				Annual Mean NOx (µg/m³)	Annual Mean NH_3 (µg/m³)	Nutrient N Deposition (kg/ha/yr)	Acid Deposition (Nmax) (keq/ha/yr)
River Itchen SAC	Coenagrion mercuriale	Northern wet heath: 'L' Erica tetralix dominated wet heath (lowland)	Dwarf shrub heath	No critical level has been assigned for this feature, please seek site specific advice	No critical level has been assigned for this feature, please seek site specific advice	5	0.922
		Rich fens	n/a	30	3	15	n/a
	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	No comparable habitat with established critical load estimate available	Freshwater	30	3	n/a	Not provided in APIS

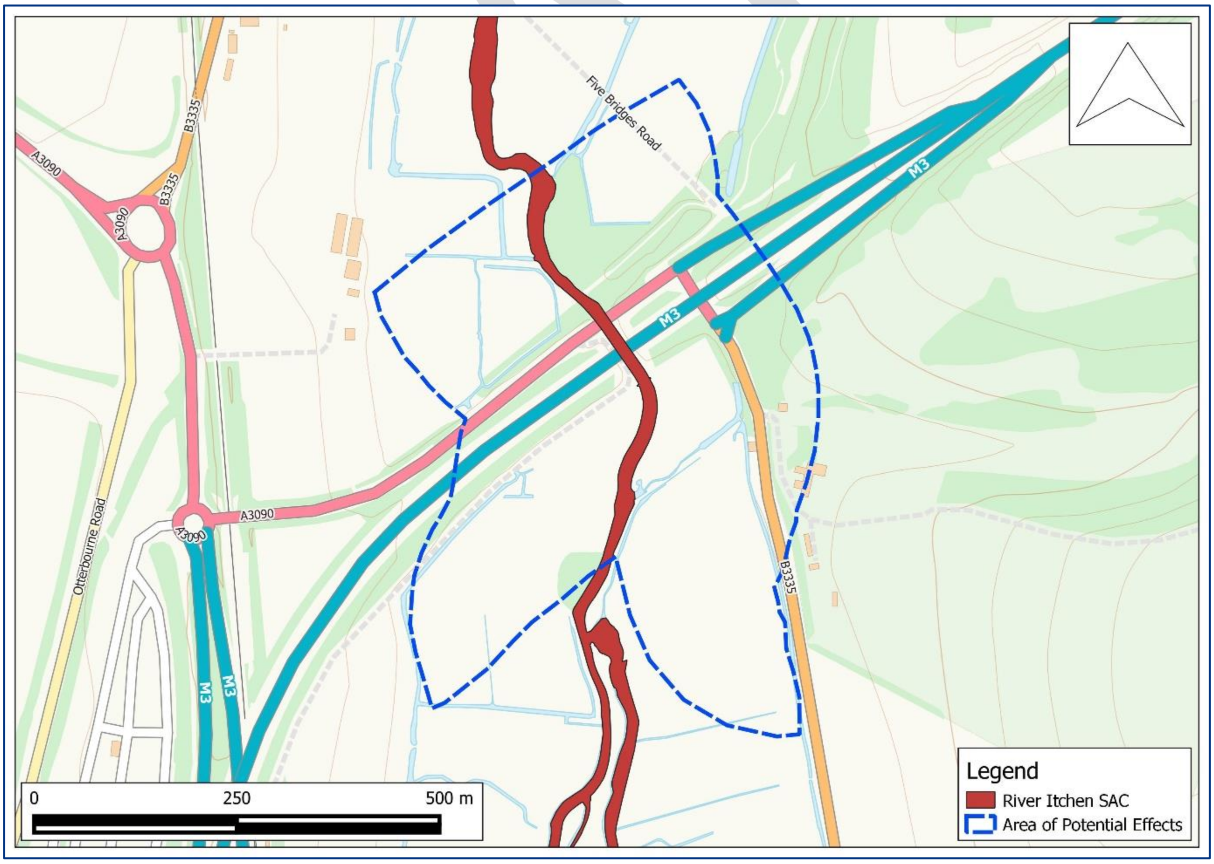

Figure 2: Area within 200m of the River Itchen SAC and within 200m of roads that may have an effect on the River Itchen SAC

3.4.12 The Habitats Regulations require a competent authority to undertake a Habitats Regulations Assessment (HRA) for development schemes that may harm Habitats Regulations sites. The HRA process includes screening and appropriate assessment stages. The screening stage of the HRA identifies whether there is a risk of significant adverse effects on a Habitats Regulations site, which would then require further detailed examination through an appropriate assessment. If risks that might undermine a site's conservation objectives can clearly be ruled out at the screening stage, a development scheme will have no likely significant effect and no appropriate assessment will be needed.

3.4.13 A HRA screening assessment has been undertaken to determine whether the competent authority, in this case Winchester City Council, would need to progress to an appropriate assessment. A pollutant process contribution (PC) due to the Local Plan road traffic emissions alone, or in-combination with other potentially polluting schemes, greater than 1% of the relevant critical level or load would trigger a likely significant effect (LSE), and an appropriate assessment would be required.

3.4.14 For the purposes of deciding whether an appropriate assessment is required, the screening decision should not take into account any mitigation measures, as ruled in the Irish High Court case 'People Over Wind'. Where an LSE is triggered, mitigation can be taken into account at the appropriate assessment stage.

3.4.15 NE guidance on advising competent authorities on the assessment of road traffic Emissions under the Habitats Regulations states that:

"In general terms, it is important for a competent authority to remember that the subject plan or project remains the focus of any in-combination assessment. Therefore, it is Natural England's view that care should be taken to avoid unnecessarily combining the insignificant effects of the subject plan or project with the effects of other plans or projects which can be considered significant in their own right. The latter should always be dealt with by its own individual HRA alone. In other words, it is only the appreciable effects of those other plans and projects that are not themselves significant alone which are added into an in-combination assessment with the subject proposal (i.e., 'don't combine individual biscuits (=insignificant) with full packs (=significant)')."

3.4.16 Where the initial screening cannot rule out a likely significant effect, the predicted environmental concentration (PEC) has been provided. The PEC is the PC plus the concentration/deposition rate of the pollutant already present in the environment (the baseline concentration/deposition rate). The PEC can then be used in the appropriate assessment to determine whether the impact of the Local Plan would have an adverse effect on site integrity at the designated site. The integrity of a designated site is the coherence of its ecological structure and function, across its whole area that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was designated.

3.4.17 In their internal guidance on road traffic impacts under the Habitats Regulations, NE advise that no threshold value is applied at appropriate assessment, with the focus on detailed modelling and case specific professional judgement using a suite of tools and evidence. The competent authority would need to determine whether an adverse effect on site integrity can be ruled out with regard to the following:

- Whether the sensitive qualifying features of the site would be exposed to emissions;
- The Habitats Regulations site's conservation objectives;
- Whether or not there are current exceedances of the critical levels/loads;
- Background pollution and concentrations/deposition trends;
- Appropriate use of the critical levels/loads;
- The designated site in its national context;
- Site survey information;
- The evidence on small incremental impacts from nitrogen deposition;
- The spatial scale and duration of the predicted impact and the ecological functionality of the affected area;
- National, regional and local initiatives or measures which can be relied upon to reduce background levels at the site; and
- Measures to avoid or reduce the harmful effects of the plan or project on site integrity.

3.4.18 The IAQM, the professional body for air quality professionals, has set out the following opinion with regard to the use of the 1% screening threshold (IAQM, 2020):

"In the IAQM's opinion, the 1% and 10% screening criteria should not be used rigidly and, not to a numerical precision greater than the expression of the criteria themselves. Whilst it is straightforward to generate model results for the PC to any level of precision required, the accuracy of the result is much less certain and it is unwise to place too much emphasis on whether the PC is 0.9% or 1.1%, for example. In practice, because the magnitude of impacts attributable to new sources is often around 1% of the criterion, a regulator may require the results to be presented at greater resolution, i.e. having one (or more) decimal places. The distinction here is between the presentation of the model results and the weight given to fine differences around the criterion itself in making a judgement."

3.4.19 An increase above the screening threshold of 0.1-0.4% of the critical load/level, i.e. 1.1% to 1.4%, would round to 1% of the screening threshold. Changes at this level of magnitude would be difficult to distinguish from normal fluctuations, such as those due to weather and emissions variations, and there would be a high level of uncertainty associated with the predicted change. Percentages have been presented to one decimal place and PECs provided at receptors where the process contribution is greater than 1.0% of the screening threshold; however, the competent authority would need to judge whether a process contribution of 1.1-1.4% of the screening threshold should trigger an appropriate assessment.

4 Baseline Conditions

4.1. Background Concentrations

4.1.1 Estimated background concentrations and nitrogen deposition rates for short vegetation within the assessment area are shown in **Table 2**.

4.1.2 The background NOx and NH_3 concentrations are below the critical levels at the River Itchen SAC within the study area. The background nutrient N deposition rate is just below the critical load for Rich fens.

Table 2: Estimated Background Concentrations and Deposition Rates

Receptor	Annual Mean NOx (µg/m³)			Annual Mean NH_3 (µg/m³)		Nutrient N Depostion (kg/ha/yr)		Acid N Deposition (Nmax) (keq/ha/yr)	
	2019	2030	Critical Level	2020-22	Critical Level	2020-22	Critical Load	2020-22	Critical Load
River Itchen SAC	27.5	15.4	30	1.394	3	14.760	15	1.090	n/a [a]

a No relevant critical loads for acid nitrogen deposition within the study area.

4.2. Predicted Baseline Concentrations

4.2.1 Baseline concentrations and nutrient N deposition rates at the transect receptors closest to the road sources are set out in **Table 3**.

4.2.2 Annual mean NOx concentrations are predicted to be above the NOx critical level at receptors closest to the road sources in 2019; however, due to the projected increase in lower emission vehicles in the UK fleet and the associated decrease in background concentrations, by 2041 the critical level is predicted to be achieved by a wide margin.

4.2.3 Annual mean NH_3 concentrations are predicted to be below the NH_3 critical level at receptors closest to the road sources in 2019 and 2041.

4.2.4 Nutrient nitrogen deposition rates are predicted be above the critical load in 2019 and 2041.

Table 3: Predicted Baseline Concentrations and Deposition Fluxes in 2019 and 2041

Receptor	NOx (µg/m³)		NH_3 (µg/m³)		Nutrient N (kg/ha/yr)	
	2019	2041	2019	2041	2019	2041
N0	49.1	18.7	2.150	2.364	20.3	20.0
M0	49.1	18.6	2.151	2.356	20.3	20.0
M20	49.8	18.8	2.177	2.393	20.5	20.2
S0	45.7	18.1	2.022	2.188	19.4	19.1
Critical Level/Load	**30**		**3**		**15**	

5 Screening Assessment

5.1. Local Plan Impact In Isolation

5.1.1 This section considers the impact of the Local Plan in isolation. The maximum predicted PCs to annual mean NOx and NH_3 concentrations and the PCs as a percentage of the critical levels at the River Itchen SAC are shown in **Table 4** and **Table 5** respectively. The maximum predicted PCs to nutrient N deposition are shown in **Table 6**.

5.1.2 The Local Plan in isolation does not lead to any exceedances of the 1% screening threshold for NOx, NH_3 or nutrient N deposition at the receptors closest to the road sources.

5.1.3 The Local Plan in isolation results in lower concentrations/deposition rates when compared with baseline concentrations/deposition rates; therefore, there is a marginal improvement in air quality at the River Itchen SAC due to the Local Plan.

Table 4: NOx PCs and PCs as % of Critical Level – In Isolation

Receptor	Predicted Road Contribution 2041 (μgNOx/m³)			Critical Level (μgNOx/m³)	PC as % of Critical Level	Further Assessment Required
	Baseline	Do Minimum	PC			
N0	3.243	3.172	-0.071	30	-0.2	No
M0	3.194	3.143	-0.051	30	-0.2	No
M20	3.314	3.254	-0.059	30	-0.2	No
S0	2.682	2.650	-0.032	30	-0.1	No

Table 5: NH_3 PCs and PCs as % of Critical Level – In Isolation

Receptor	Predicted Road Contribution 2041 (μgNH₃/m³)			Critical Level (μgNH₃/m³)	PC as % of Critical Level	Further Assessment Required
	Baseline	Do Minimum	PC			
N0	0.970	0.946	-0.023	3	-0.8	No
M0	0.962	0.944	-0.018	3	-0.6	No
M20	0.999	0.979	-0.020	3	-0.7	No
S0	0.794	0.782	-0.012	3	-0.4	No

Table 6: Nutrient N PCs and PCs as % of Critical Load – In Isolation

Receptor	Predicted Road Contribution 2041 (kgN/ha/yr)			Critical Load (kgN/ha/yr)	PC as % of Critical Load	Further Assessment Required
	Baseline	Do Minimum	PC			
N0	5.286	5.161	-0.125	15	-0.8	No
M0	5.244	5.147	-0.097	15	-0.6	No
M20	5.446	5.335	-0.111	15	-0.7	No
S0	4.328	4.264	-0.063	15	-0.4	No

5.2. Local Plan Impact In Combination

5.2.1 This section considers the impact of the Local Plan in-combination with other plans and projects. As explained at **Paragraph 3.3.4**, the Local Plan in isolation PEC (Local Plan PC plus background), minus the 2041 no growth baseline PEC (no growth PC plus background), determines the in-combination pollutant process contribution (PC).

5.2.2 The maximum predicted in-combination PCs to annual mean NOx and NH_3 concentrations and the PCs as a percentage of the critical levels at the River Itchen SAC are shown in **Table 7** and **Table 8** respectively. The maximum predicted in-combination PCs to nutrient N deposition are shown in **Table 9**.

5.2.3 With no growth assumed between the 2019 baseline and the 2041 assessment year, the 2041 baseline concentration/deposition rates are lower; therefore, the in-combination impact is greater than the impact of the Local Plan in isolation. Although the in-combination PCs exceed the 1% screening threshold for NOx, NH_3 and nutrient N deposition, the Local Plan in isolation results in a decrease in predicted concentrations/deposition rates; therefore, the in-combination impacts are all due to other plans and projects. NE guidance is clear that insignificant effects of a plan should not be unnecessarily combined with the effects of other plans or projects that could be considered significant in their own right (see **Paragraph 3.4.15**); therefore, the marginal air quality improvements due to the Local Plan should not require further assessment in-combination with other plans and projects.

5.2.4 The with Local Plan PECs are below the critical levels for NOx and NH_3; however, nutrient N deposition rates remain above the critical load.

Table 7: NOx PECs, PCs and PCs as % of Critical Level – In-combination

Receptor	Predicted PECs and In-combination PCs 2041 (μgNOx/m^3)			Critical Level (μgNOx/m^3)	PC as % of Critical Level	Further Assessment Required
	No Growth Baseline PEC	With Local Plan PEC	PC			
N0	18.090	18.610	0.520	30	1.7	No
M0	18.040	18.582	0.542	30	1.8	No
M20	18.142	18.693	0.551	30	1.8	No
S0	17.613	18.089	0.475	30	1.6	No

Table 8: NH_3 PECs, PCs and PCs as % of Critical Level – In-combination

Receptor	Predicted PECs and In-combination PCs 2041 (μgNH_3/m^3)			Critical Level (μgNH_3/m^3)	PC as % of Critical Level	Further Assessment Required
	No Growth Baseline PEC	With Local Plan PEC	PC			
N0	1.659	2.340	0.682	3	22.7	No
M0	1.656	2.338	0.682	3	22.7	No
M20	1.667	2.373	0.706	3	23.5	No
S0	1.610	2.176	0.566	3	18.9	No

Table 9: Nutrient N PECs, PCs and PCs as % of Critical Load – In-combination

Receptor	Predicted PECs and In-combination PCs 2041 (kgN/ha/yr)			Critical Load (kgN/ha/yr)	PC as % of Critical Load	Further Assessment Required
	No Growth Baseline PEC	With Local Plan PEC	PC			
N0	16.339	19.921	3.582	15	23.9	No
M0	16.322	19.907	3.585	15	23.9	No
M20	16.384	20.095	3.711	15	24.7	No
S0	16.049	19.024	2.975	15	19.8	No

6 Conclusions

6.1.1 The assessment has demonstrated that the Local Plan does not result in any exceedances of the 1% screening threshold for NOx, NH_3 or nutrient N deposition when considered in isolation and results in a marginal improvement in air quality at the River Itchen SAC. The improvement is due to reduced traffic flows due to the Local Plan on the M3 and A3090 where they cross the River Itchen SAC.

6.1.2 The Local Plan in isolation results in a decrease in predicted concentrations/deposition rates at the River Itchen SAC; therefore, the in-combination impact is all due to other plans and projects. NE guidance is clear that insignificant effects of a plan should not be unnecessarily combined with the effects of other plans or projects that could be considered significant in their own right. In-combination exceedances of the 1% screening threshold for NOx, NH_3 and nutrient N deposition are predicted; however, the increases in pollutant concentrations/deposition rates are all due to in-combination sources. As the Local Plan itself results in a marginal improvement in air quality, no further assessment should be required.

6.1.3 As the Local Plan would decrease pollutant concentrations/deposition rates at the River Itchen SAC, the Local Plan would not have an adverse effect on site integrity at the River Itchen SAC. This conclusion would need to be confirmed by an ecologist in the Appropriate Assessment.

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8 Appendices

A1 Modelling Methodology

A1.1. Receptors

A1.1.1 Receptors have been modelled on transects located to the north of the A3090, between the A3090 and the M3, and to the south of the M3 at points spaced 1m apart from the edge of the River Itchen SAC up to 100m from the edge of the road. Full details of each transect point are shown in **Table A1**.

Table A1: Points on the Transects

Point ID	Description	OS Coordinate		
		x	y	z
N0	North of A3090	447772.2	126659.6	0
N1	North of A3090	447771.6	126660.4	0
N2	North of A3090	447771.0	126661.2	0
N3	North of A3090	447770.4	126662.0	0
N4	North of A3090	447769.8	126662.8	0
N5	North of A3090	447769.2	126663.6	0
N6	North of A3090	447768.6	126664.4	0
N7	North of A3090	447768.0	126665.2	0
N8	North of A3090	447767.4	126666.0	0
N9	North of A3090	447766.8	126666.8	0
N10	North of A3090	447766.2	126667.6	0
N11	North of A3090	447765.6	126668.4	0
N12	North of A3090	447765.0	126669.2	0
N13	North of A3090	447764.4	126670.0	0
N14	North of A3090	447763.8	126670.8	0
N15	North of A3090	447763.3	126671.6	0
N16	North of A3090	447762.7	126672.4	0
N17	North of A3090	447762.1	126673.2	0
N18	North of A3090	447761.5	126674.1	0
N19	North of A3090	447760.9	126674.9	0
N20	North of A3090	447760.3	126675.7	0
N21	North of A3090	447759.7	126676.5	0
N22	North of A3090	447759.1	126677.3	0
N23	North of A3090	447758.5	126678.1	0
N24	North of A3090	447757.9	126678.9	0
N25	North of A3090	447757.3	126679.7	0
N26	North of A3090	447756.7	126680.5	0
N27	North of A3090	447756.1	126681.3	0
N28	North of A3090	447755.5	126682.1	0
N29	North of A3090	447754.9	126682.9	0

Point ID	Description	OS Coordinate		
		x	y	z
N30	North of A3090	447754.3	126683.7	0
N31	North of A3090	447753.8	126684.5	0
N32	North of A3090	447753.2	126685.3	0
N33	North of A3090	447752.6	126686.1	0
N34	North of A3090	447752.0	126686.9	0
N35	North of A3090	447751.4	126687.7	0
N36	North of A3090	447750.8	126688.5	0
N37	North of A3090	447750.2	126689.3	0
N38	North of A3090	447749.6	126690.1	0
N39	North of A3090	447749.0	126691.0	0
N40	North of A3090	447748.4	126691.8	0
N41	North of A3090	447747.8	126692.6	0
N42	North of A3090	447747.2	126693.4	0
N43	North of A3090	447746.6	126694.2	0
N44	North of A3090	447746.0	126695.0	0
N45	North of A3090	447745.4	126695.8	0
N46	North of A3090	447744.8	126696.6	0
N47	North of A3090	447744.3	126697.4	0
N48	North of A3090	447743.7	126698.2	0
N49	North of A3090	447743.1	126699.0	0
N50	North of A3090	447742.5	126699.8	0
N51	North of A3090	447741.9	126700.6	0
N52	North of A3090	447741.3	126701.4	0
N53	North of A3090	447740.7	126702.2	0
N54	North of A3090	447740.1	126703.0	0
N55	North of A3090	447739.5	126703.8	0
N56	North of A3090	447738.9	126704.6	0
N57	North of A3090	447738.3	126705.4	0
N58	North of A3090	447737.7	126706.2	0
N59	North of A3090	447737.1	126707.0	0
N60	North of A3090	447736.5	126707.8	0
N61	North of A3090	447735.9	126708.7	0
N62	North of A3090	447735.3	126709.5	0
N63	North of A3090	447734.8	126710.3	0
N64	North of A3090	447734.2	126711.1	0
N65	North of A3090	447733.6	126711.9	0
N66	North of A3090	447733.0	126712.7	0
N67	North of A3090	447732.4	126713.5	0

Point ID	Description	OS Coordinate		
		x	y	z
N68	North of A3090	447731.8	126714.3	0
N69	North of A3090	447731.2	126715.1	0
N70	North of A3090	447730.6	126715.9	0
N71	North of A3090	447730.0	126716.7	0
N72	North of A3090	447729.4	126717.5	0
N73	North of A3090	447728.8	126718.3	0
N74	North of A3090	447728.2	126719.1	0
N75	North of A3090	447727.6	126719.9	0
N76	North of A3090	447727.0	126720.7	0
N77	North of A3090	447726.4	126721.5	0
N78	North of A3090	447725.8	126722.3	0
N79	North of A3090	447725.3	126723.1	0
N80	North of A3090	447724.7	126723.9	0
N81	North of A3090	447724.1	126724.7	0
N82	North of A3090	447723.5	126725.6	0
N83	North of A3090	447722.9	126726.4	0
N84	North of A3090	447722.3	126727.2	0
N85	North of A3090	447721.7	126728.0	0
N86	North of A3090	447721.1	126728.8	0
N87	North of A3090	447720.5	126729.6	0
N88	North of A3090	447719.9	126730.4	0
N89	North of A3090	447719.3	126731.2	0
N90	North of A3090	447718.7	126732.0	0
N91	North of A3090	447718.1	126732.8	0
N92	North of A3090	447717.5	126733.6	0
N93	North of A3090	447716.9	126734.4	0
N94	North of A3090	447716.3	126735.2	0
N95	North of A3090	447715.8	126736.0	0
N96	North of A3090	447715.2	126736.8	0
N97	North of A3090	447714.6	126737.6	0
N98	North of A3090	447714.0	126738.4	0
N99	North of A3090	447713.4	126739.2	0
N100	North of A3090	447712.8	126740.0	0
M0	Between A3090 and M3	447792.3	126631.6	0
M1	Between A3090 and M3	447791.8	126632.3	0
M2	Between A3090 and M3	447791.3	126633.1	0
M3	Between A3090 and M3	447790.7	126633.9	0
M4	Between A3090 and M3	447790.2	126634.7	0

Point ID	Description	OS Coordinate		
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M6	Between A3090 and M3	447789.1	126636.2	0
M7	Between A3090 and M3	447788.6	126637.0	0
M8	Between A3090 and M3	447788.0	126637.8	0
M9	Between A3090 and M3	447787.5	126638.6	0
M10	Between A3090 and M3	447787.0	126639.3	0
M11	Between A3090 and M3	447786.4	126640.1	0
M12	Between A3090 and M3	447785.9	126640.9	0
M13	Between A3090 and M3	447785.3	126641.7	0
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M15	Between A3090 and M3	447784.3	126643.2	0
M16	Between A3090 and M3	447783.7	126644.0	0
M17	Between A3090 and M3	447783.2	126644.8	0
M18	Between A3090 and M3	447782.7	126645.6	0
M19	Between A3090 and M3	447782.1	126646.3	0
M20	Between A3090 and M3	447781.6	126647.1	0
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S2	South of M3	447813.2	126601.6	0
S3	South of M3	447813.8	126600.8	0
S4	South of M3	447814.3	126600.0	0
S5	South of M3	447814.9	126599.2	0
S6	South of M3	447815.5	126598.4	0
S7	South of M3	447816.1	126597.6	0
S8	South of M3	447816.6	126596.8	0
S9	South of M3	447817.2	126595.9	0
S10	South of M3	447817.8	126595.1	0
S11	South of M3	447818.3	126594.3	0
S12	South of M3	447818.9	126593.5	0
S13	South of M3	447819.5	126592.7	0
S14	South of M3	447820.0	126591.9	0
S15	South of M3	447820.6	126591.1	0
S16	South of M3	447821.2	126590.3	0
S17	South of M3	447821.7	126589.5	0
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S21	South of M3	447824.0	126586.2	0

Point ID	Description	OS Coordinate		
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S23	South of M3	447825.1	126584.6	0
S24	South of M3	447825.7	126583.8	0
S25	South of M3	447826.3	126583.0	0
S26	South of M3	447826.8	126582.1	0
S27	South of M3	447827.4	126581.3	0
S28	South of M3	447828.0	126580.5	0
S29	South of M3	447828.5	126579.7	0
S30	South of M3	447829.1	126578.9	0
S31	South of M3	447829.7	126578.1	0
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S38	South of M3	447833.7	126572.4	0
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S40	South of M3	447834.8	126570.8	0
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S42	South of M3	447835.9	126569.1	0
S43	South of M3	447836.5	126568.3	0
S44	South of M3	447837.1	126567.5	0
S45	South of M3	447837.6	126566.7	0
S46	South of M3	447838.2	126565.9	0
S47	South of M3	447838.8	126565.1	0
S48	South of M3	447839.3	126564.3	0
S49	South of M3	447839.9	126563.5	0
S50	South of M3	447840.5	126562.6	0
S51	South of M3	447841.0	126561.8	0
S52	South of M3	447841.6	126561.0	0
S53	South of M3	447842.2	126560.2	0
S54	South of M3	447842.8	126559.4	0
S55	South of M3	447843.3	126558.6	0
S56	South of M3	447843.9	126557.8	0
S57	South of M3	447844.4	126557.0	0
S58	South of M3	447845.0	126556.2	0
S59	South of M3	447845.6	126555.3	0

Point ID	Description	OS Coordinate		
		x	y	z
S60	South of M3	447846.2	126554.5	0
S61	South of M3	447846.7	126553.7	0
S62	South of M3	447847.3	126552.9	0
S63	South of M3	447847.8	126552.1	0
S64	South of M3	447848.4	126551.3	0
S65	South of M3	447849.0	126550.5	0
S66	South of M3	447849.3	126548.7	0
S67	South of M3	447849.1	126547.8	0
S68	South of M3	447848.9	126546.8	0
S69	South of M3	447848.7	126545.8	0
S70	South of M3	447848.5	126544.9	0
S71	South of M3	447848.3	126543.9	0
S72	South of M3	447848.1	126543.0	0
S73	South of M3	447847.8	126542.0	0
S74	South of M3	447847.6	126541.1	0
S75	South of M3	447847.4	126540.1	0
S76	South of M3	447847.2	126539.2	0
S77	South of M3	447847.0	126538.2	0
S78	South of M3	447846.8	126537.3	0
S79	South of M3	447846.5	126536.3	0
S80	South of M3	447846.3	126535.4	0
S81	South of M3	447846.1	126534.4	0
S82	South of M3	447845.9	126533.5	0
S83	South of M3	447845.7	126532.5	0
S84	South of M3	447845.5	126531.6	0
S85	South of M3	447845.3	126530.6	0
S86	South of M3	447845.0	126529.7	0
S87	South of M3	447844.8	126528.7	0
S88	South of M3	447844.6	126527.8	0
S89	South of M3	447844.4	126526.8	0
S90	South of M3	447844.2	126525.9	0
S91	South of M3	447844.0	126524.9	0
S92	South of M3	447843.8	126524.0	0
S93	South of M3	447843.5	126523.0	0
S94	South of M3	447843.3	126522.1	0
S95	South of M3	447843.1	126521.1	0
S96	South of M3	447842.9	126520.2	0
S97	South of M3	447842.7	126519.2	0

Point ID	Description	OS Coordinate		
		x	y	z
S98	South of M3	447842.5	126518.2	0
S99	South of M3	447842.3	126517.3	0
S100	South of M3	447842.0	126516.3	0

A1.2. Model Inputs

Traffic Data

A1.2.1 The AADT flows and vehicle fleet composition data have been provided by SYSTRA and come from the SRTM. The traffic data are shown in **Table A2** and the modelled road network used for the assessment is shown in **Figure 3**. Diurnal flow profiles for the traffic have been derived from the national diurnal profiles published by the DfT (DfT, 2024a). Vehicle speeds have been estimated based on the speed limit for the road, reduced to 20km/h within 25m of a junction stop line. Some roads used for model verification, located within Winchester, have been modelled as street canyons using the advanced street canyon module in ADMS Roads and are shown in **Figure 5**.

A1.2.2 The River Itchen SAC lies below the A3090 and M3 and LIDAR data published by the Environment Agency has been used to estimate the height of the roads above the SAC (Environment Agency, 2024). The A3090 has been modelled at a height of 3.5m above the SAC and the M3 at a height of 7.5m above the SAC.

Table A2: Summary of Traffic Data used in the Assessment

Label on Figure	Road Description	AADT			% HDV		
		2019	2041		2019	2041	
			Baseline	With Local Plan		Baseline	With Local Plan
1	B3330 (Chesil St)	11,217	12,488	12,263	3.0	7.1	6.1
2	B3404 (Alresford Rd)	6,435	8,737	9,188	3.7	3.9	3.9
3	B3335 (St Cross Rd)	10,149	14,198	14,078	10.2	8.8	9.1
4	M3 between J10 and J11	125,654	153,408	152,694	11.6	11.0	10.8
5	M3 J11 nb onslip	9,339	11,630	10,820	5.4	7.8	8.0
6	M3 J11 sb offslip	9,738	10,682	10,333	6.7	9.7	10.5
7	M3 between J11 on/offslips	105,617	130,272	130,483	12.7	11.4	11.1
8	A3090 (Hockley Link to M3 nb onslip)	12,603	14,643	12,691	3.3	4.4	5.8

Label on Figure	Road Description	AADT			% HDV		
		2019	2041		2019	2041	
			Baseline	With Local Plan		Baseline	With Local Plan
9	B3335 between M3 J11 on/off slips	14,204	17,374	16,685	4.8	7.5	8.1
10	B3335 south of M3 J11	16,348	19,079	18,986	6.9	11.0	11.6

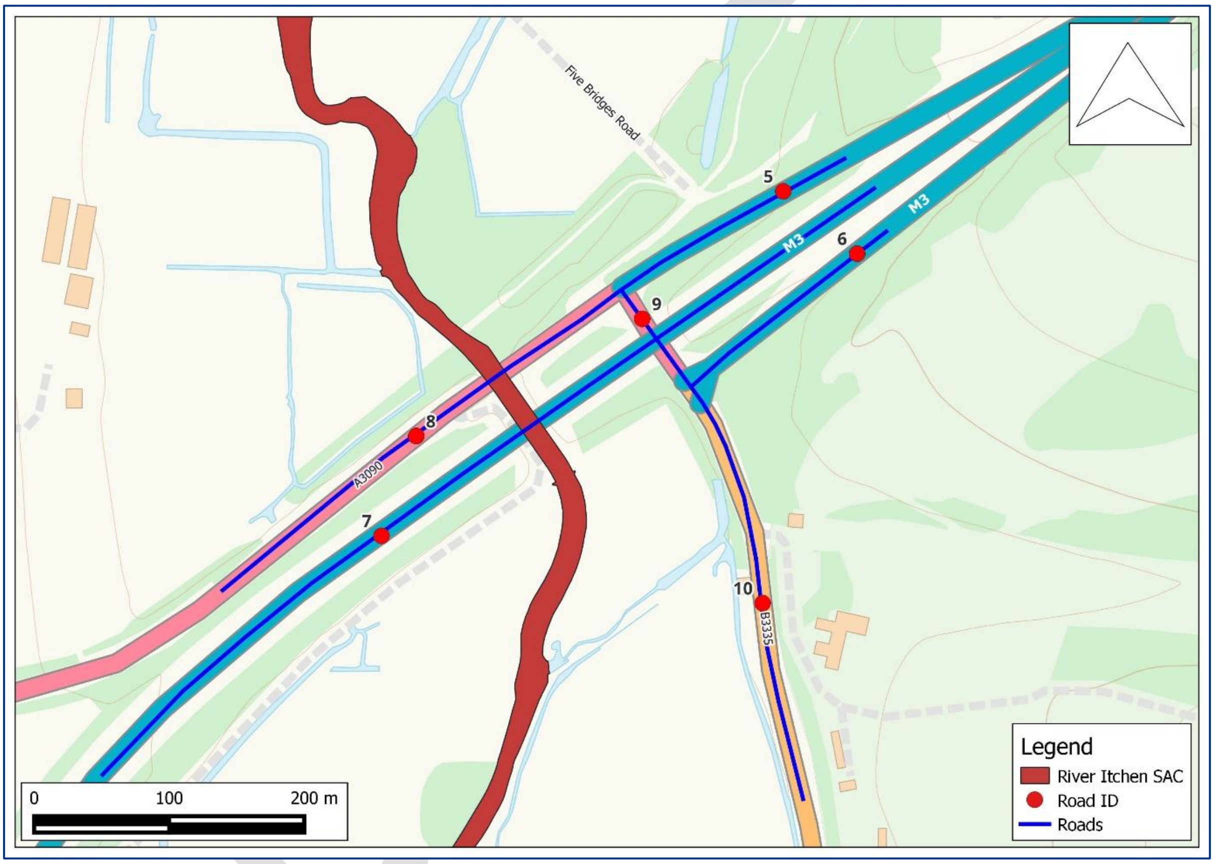

Figure 3: Modelled Roads
Contains Ordnance Survey data © Crown copyright and database right, OS Licence Number: OS AC 000809217 (2024)

Emissions

A1.2.3 NOx emissions have been calculated using the most recent version of the Emissions Factor Toolkit (EFT) v12.1, which provides fleet projections and emission rates through to 2050 (Defra, 2024). The traffic data have been entered into the EFT in order to calculate a combined emission rate for each of the road links in the modelled network. Supporting LAQM tools published by Defra, i.e., the background mapping data and NOx to NO_2 Calculator, only support assessment years up to 2030;

therefore, 2041 emissions data from the EFT have been used, along with 2030 data from the LAQM tools.

A1.2.4 There is evidence that excluding NH_3 from road traffic emissions assessments may underestimate impacts on sensitive habitats (Air Quality Consultants Ltd, 2020). Emissions of NH_3 from individual vehicle types are highly uncertain as they are not regulated, which would also mean that the level of nitrogen deposition derived from the ambient NH_3 concentrations would be highly uncertain. There is currently no tool publicly available for the assessment of road traffic emissions of NH_3 from National Highways, Defra, Natural England, or other nature conservation bodies; therefore, NH_3 emissions have been calculated using the Calculator for Road Emissions of Ammonia (CREAM) tool (V1A) published by Air Quality Consultants Ltd (Air Quality Consultants Ltd, 2020). The NH_3 emissions in the tool have been derived from the results of remote sensing, real-world fuel consumption data, and ambient ammonia measurements recorded in Ashdown Forest (2014-2016). There are no results from direct testing of ammonia emissions from vehicles made over representative drive cycles which are considered suitable to generate robust, fleet-wide emissions factors for use in the UK. There is a high level of uncertainty associated with the CREAM NH_3 emissions data; however, Air Quality Consultants Ltd consider that using the emissions factors to make future-year predictions will be an improvement on any assessment that omits ammonia and that the emissions can be considered to provide the most robust estimate of traffic-related ammonia possible at the present time.

A1.2.5 The CREAM tool currently uses vehicle fleet information from Defra's EFT v9 which has now been superseded by EFT v12.1. EFT v9 used base 2018 fleet composition data that assumes that there are no electric vehicles in rural areas in England in 2035, the latest year that CREAM emissions data are available. EFT v12.1 uses base 2022 fleet composition data that assumes that 25% of the vehicle fleet in rural areas and on motorways will be electric in 2041. Air Quality Consultants Ltd is currently working on an update to the CREAM tool that will use the DfT's Transport Analysis Guidance (TAG) to estimate the proportion of electric vehicles on the road in future years (Air Qualtiy Consultants Ltd, 2023). The UK government has announced a ban on new diesel and petrol cars from 2035, with a requirement that 80% of new cars and 70% of new vans be zero emission by 2030, and the TAG assumes that 63% of cars and 31% of LGVs will be electric in 2036 (DfT, 2024b). Therefore, as electric vehicles do not have any on road emissions, the current CREAM tool significantly underestimates the number of electric vehicles on the road in future years and is likely to overestimate ammonia emissions.

A1.2.6 In order to account for the expected fleet composition of electric vehicles in 2041, 25% of the light vehicle flows have been removed from the annual average daily traffic flows input to the CREAM tool. This results in estimated ammonia emissions in 2041 that use CREAM 2035 emissions data and the 2041 EFT v12.1 fleet composition data.

Meteorological Data

A1.2.7 The model has been run using the full year of 2019 meteorological data taken from the monitoring station located at Southampton Airport, approximately 9km to the south of the study area. A wind rose of the data is shown in **Figure 4**.

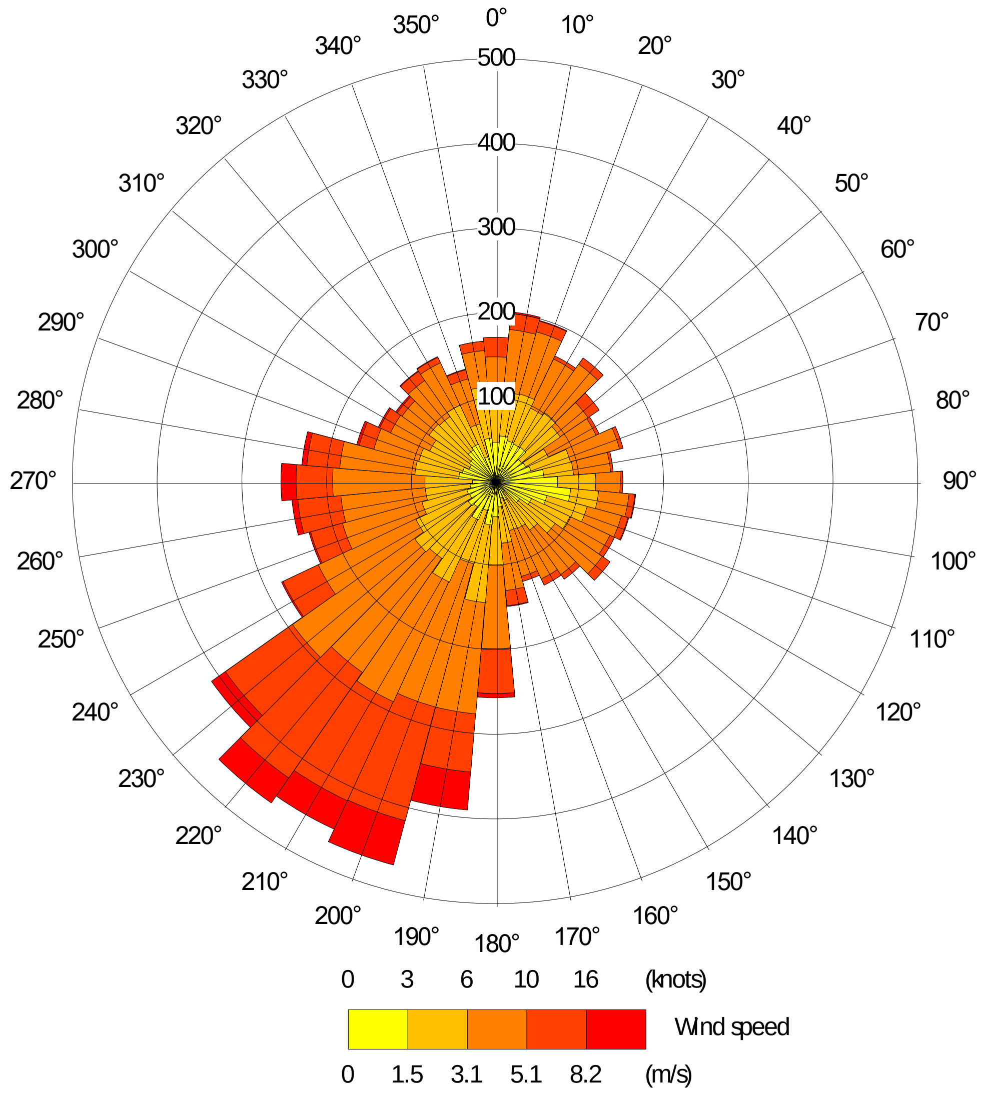

Figure 4: Wind Rose Southampton Airport 2019

A1.3. Background Concentrations

A3.1.1 Background NOx and NO_2 concentrations have been derived from those published by Defra (Defra, 2024). These cover the whole country on a 1 km by 1 km grid and are published for each year from 2018 to 2030. The current maps have been verified against measurements undertaken during 2018. As the background maps are only available up to 2030, it has been assumed that background concentrations in 2041 will be the same as those in in the Defra 2030 map.

A3.1.2 Background NH_3 and nitrogen and acid deposition data have been taken from the APIS database (APIS, 2024). Future year background concentrations and deposition fluxes have been assumed to be the same as the 2020-2022 average provided by APIS.

A3.1.3 Future estimates of atmospheric ammonia concentrations and nitrogen deposition rates are not provided by APIS and the assessment assumes there will be no reduction in background ammonia concentrations and nitrogen deposition rates. This is a conservative assumption as, under the National Emissions Ceilings Regulations (NECR), the UK must meet legally binding ammonia emissions reductions of 16% compared with the relevant 2005 baseline emission levels by 2030, and this should result in a reduction in background concentrations and deposition rates. A National Air Pollution Control Programme (NAPCP) sets out how the UK can meet the legally binding 2030 emission reduction commitments (ERCs). The Nitrogen Futures project has developed a quantitative spatial dataset of 2030 ammonia emissions based on future projections of source activities for NAPCP scenarios (JNCC, 2024). The results from the Nitrogen Futures 2030 NAPCP+DA (NECR NOx) baseline scenario provide the most likely future baseline for ammonia concentrations and nutrient nitrogen deposition (JNCC, 2020). DA refers to modifications due to input from the Devolved Administrations and NECR NOx refers to NOx emissions meeting the 2030 NECR targets. The Nitrogen Futures project compared a current baseline (2017) with 2030 baseline scenario NAPCP+DA (NECR NOx) to evaluate the likely effects of NECR related polices on atmospheric ammonia and nutrient nitrogen deposition.

A3.1.4 The Nitrogen Futures project estimates that implementation of the NAPCP would result in a 12% reduction in UK ammonia emissions when compared to the 2017 baseline, with a corresponding decrease in atmospheric ammonia concentrations of between 0.05-0.25µg/m^3 in the study area. Nutrient nitrogen deposition to low growing semi-natural vegetation features is predicted to decrease by 1-2.5kgN/ha/yr in the study area.

A1.4. Verification

A1.4.1 The verification process seeks to minimise uncertainties associated with the air quality model by comparing the model output with locally measured concentrations. The model has been verified against 2019 data from four nitrogen dioxide (NO_2) diffusion tube monitoring sites located in Winchester. The monitoring sites are shown in **Figure 5**. The data used for model verification is provided in **Table A3**. The verification methodology is described below.

Table A3: Data Used for Model Verification

Monitoring Site ID	Monitoring Site Location	Measured Annual Mean NO_2 Concentration 2019 (µg/m³)	Annual Mean Background NO_2 Concentration 2019 (µg/m³)
Site 11	Southgate St	28.3	14.1
Site 16	Alresford Rd (M3)	30.0	17.8
Site 17	Chesil St	35.3	14.6
Site 22	St Cross Rd	20.2	14.1

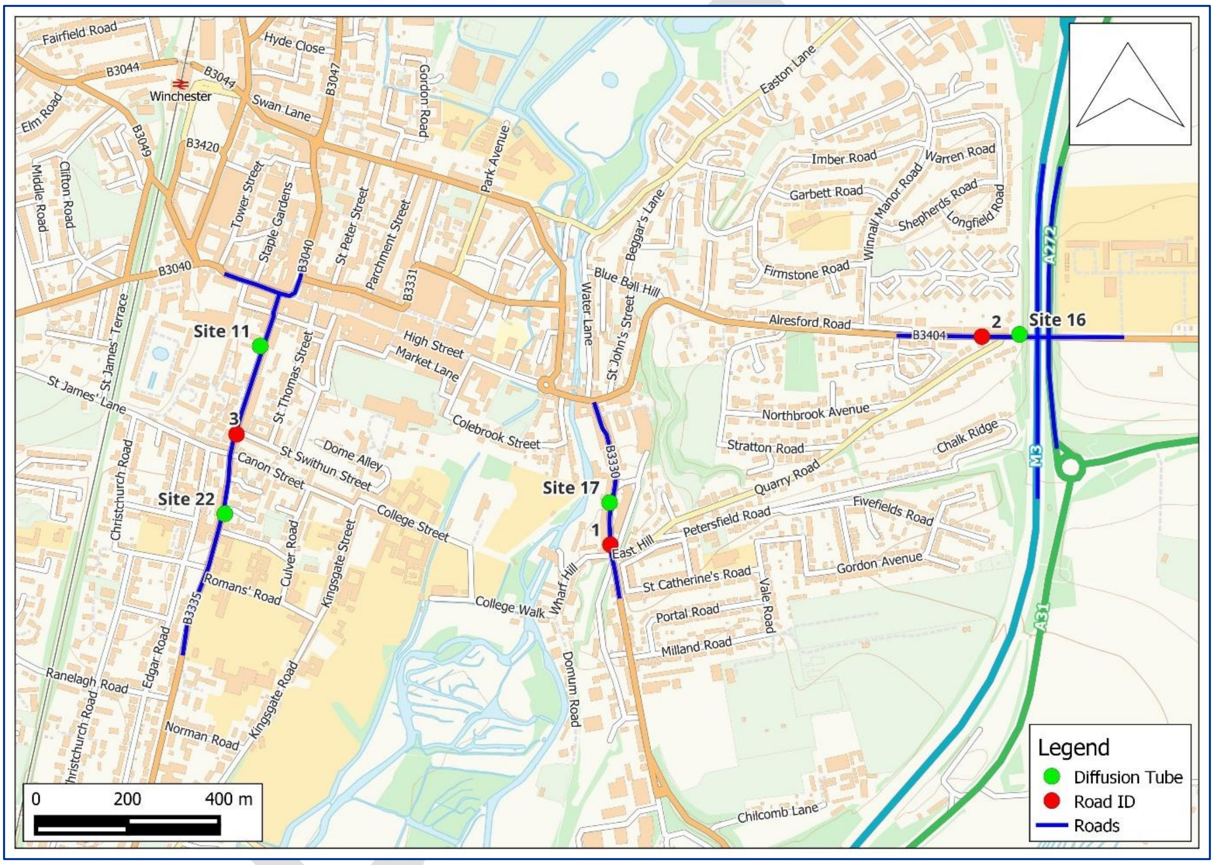

Figure 5: Diffusion Tube Monitoring Sites and Roads Used for Model Verification

NO_2

A1.4.2 Most NO_2 is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides ($NOx = NO + NO_2$). The model has been run to predict the 2019 annual mean NOx concentrations at the monitoring sites.

A1.4.3 The model output of road-NOx has been compared with the 'measured' road-NOx, calculated from the measured annual mean NO_2 concentrations and the background concentrations using the NOx from NO_2 calculator v8.1 published by Defra (Defra, 2024).

A1.4.4 The slope of the best-fit line between the 'measured' road-NOx contribution and the model derived road-NOx contribution, forced through zero, has been used to determine the adjustment factor (**Figure 6**). The adjustment factor of 1.22 has been applied to the modelled road-NOx concentration for each receptor to provide adjusted modelled road-NOx concentrations. The NOx to NO_2 calculator has then been used to determine total NO_2 concentrations from the adjusted modelled road-NOx concentrations and the background NO_2 concentrations.

A1.4.5 A comparison of the final adjusted modelled total NO_2 at each monitoring site to the measured total NO_2 shows close agreement (**Figure 7**). The results imply that the model has over-predicted the road-NOx contribution. An evaluation of the model performance using statistical methods is shown in **Table A4**.

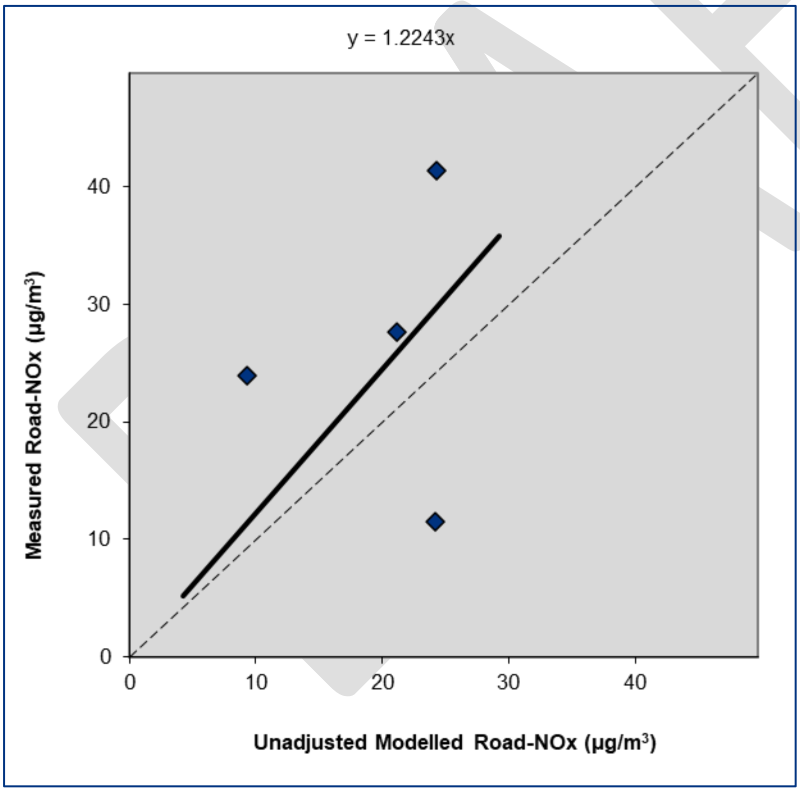

Figure 6: Comparison of Measured Road NOx to Unadjusted Modelled Road NOx Concentrations.

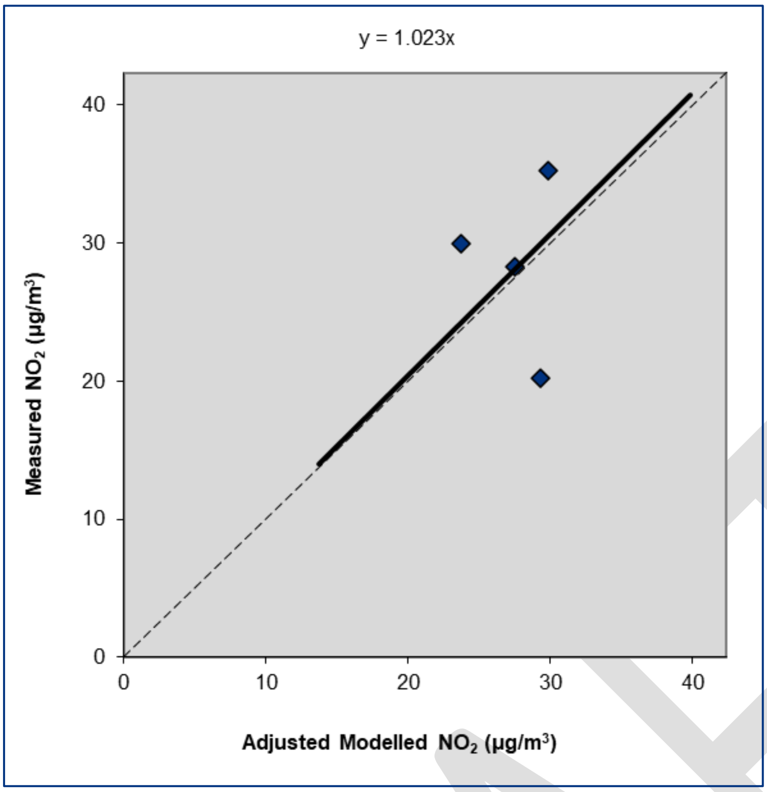

Figure 7: Comparison of Measured Total NO_2 to Primary Adjusted Modelled Total NO_2 Concentrations.

Table A4: Evaluation of Model Performance

Statistical Parameter	Description	Values		
		Before verification (Figure 6)	After verification (Figure 7)	Ideal
Correlation coefficient	Linear relationship between predicted and observed data. Less useful for small datasets as single high/low values can have a large effect.	0.12	-0.08	1
Fractional bias	Identifies systematic tendency to over/under predict (negative = over-predict, positive = under-predict).	0.28	0.03	0.0
Root mean square error (RMSE)	Average error of the model (µg/m^3). Ideally within 10% of the annual mean NO_2 objective, i.e., 4 µg/m^3; however, within 25% acceptable, i.e., 10 µg/m^3.	13.32	6.16	0.0

A2 Professional Experience

Bob Thomas, BSc (Hons) PgDip MSc MIEnvSc MIAQM CSci

Bob Thomas is a Director at AQA, with over 21 years working in the sciences and 17 years' experience in the field of air quality management and assessment. He has carried out air quality assessments for a wide range of developments, including residential, commercial, industrial, minerals and waste developments. He has been responsible for air quality projects that include ambient air quality monitoring of nitrogen dioxide, dust and PM_{10}, the assessment of nuisance odours and dust, and the preparation of Review and Assessment reports for local authorities. He has extensive dispersion modelling experience for road traffic, energy centre and industrial sources, and has completed many stand-alone reports and chapters for inclusion within an Environmental Statement. Bob has worked with a variety of clients to provide expert air quality services and advice, including local authorities, planners, developers, architects and process operators, and has provided expert witness services at public inquiry. He is a Chartered Scientist, a Member of the Institute of Air Quality Management and a Member of the Institution of Environmental Sciences.

A full CV for Bob Thomas is available at http://aqassessments.co.uk/about