A46 Coventry Junctions (Walsgrave)
Scheme Number: TR010066

6.1 Environmental Statement
Chapter 5 – Air Quality

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A46 Coventry Junctions (Walsgrave)
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ENVIRONMENTAL STATEMENT
Chapter 5 - Air Quality

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Table of contents

5. Air quality

5.1. Introduction

5.1.1. This chapter presents information required by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) to be provided in the Environmental Statement (ES) to enable the identification and assessment of likely significant effects on air quality.

5.1.2. Air quality is a consideration when the introduction of a Scheme results in a change of emissions to the air. Air quality is assessed by measuring concentrations of select pollutants in the air and the impact these pollutants have on sensitive receptor locations at relevant human and ecological exposure. The key pollutants of concern in relation to vehicle emissions include nitrogen oxides (NO_x), nitrogen dioxide (NO_2), ammonia (NH_3) and particulate matter (PM_{10} and $PM_{2.5}$).

5.1.3. This air quality assessment has been carried out in accordance with the following:

- Design Manual for Roads and Bridges (DMRB) LA 105 Air quality (National Highways, 2024) (DMRB LA 105).
- The Department for Environment, Food and Rural Affairs' (Defra) Local Air Quality Management (LAQM) technical guidance (hereafter referred to as LAQM.TG (2022)).
- ES Chapter 6 (Air Quality) of Coventry Junction (Walsgrave) Environmental Scoping Report (**TR010066/APP/6.8**), National Highways, 2023.
- Planning Inspectorate's Scoping Opinion (**TR010066/APP/6.9**) on behalf of the Secretary of State for this Scheme. Responses to the Scoping Opinion (**TR010066/APP/6.9**) are contained in the Scoping Opinion Response, ES Appendix 4.1 (Scoping Opinion Response) (**TR010066/APP/6.3**).

5.1.4. This ES chapter reports the likely significant effects for air quality as a result of the Scheme, with the following being scoped in:

- A review of existing baseline air quality conditions within the study area.
- Assessment of potential risk of construction dust impacts with recommended mitigation measures.
- Detailed assessment of potential local air quality impacts of the operation of the Scheme on air quality at representative sensitive human health receptors and ecological habitats. The impact at ecological habitats includes the potential impacts of NH_3 and its contribution to nutrient nitrogen deposition.

Assessment of the potential risk of the Scheme affecting compliance with relevant statutory air quality limit values.

5.1.5. In line with the Environmental Scoping Report (**TR010066/APP/6.8**) and Planning Inspector's Scoping Opinion (**TR010066/APP/6.9**) on behalf of the Secretary of State the impact of construction traffic emissions on local air quality was originally scoped out of this assessment (ID 3.1.1 in ES Appendix 4.1 (Scoping Opinion Response) (**TR010066/APP/6.3**)). However, as there is potential for the construction phase to last longer than two years, a screening assessment has been undertaken. This has considered the potential requirement for a detailed assessment should the number of HDV AADT be greater than 200 HDV AADT for a period greater than two years as per DMRB LA 105. This is discussed further in section 5.5.

5.1.6. Additionally, no further assessment of the impact of construction plant (Non-Road Mobile Machinery (NRMM)) emissions on local air quality has been considered.

5.1.7. ES Chapter 2 (The Scheme) (**TR010066/APP/6.1**) contains a detailed description of the Scheme. The drawings referenced in this Chapter can be found in the ES Figures (**TR010066/APP/6.2**), and the technical appendices referred to in this chapter are presented in the ES Appendices (**TR010066/APP/6.3**):

- ES Figure 5.1: Wind rose based on hourly data obtained from Church Lawford monitoring station (2018)
- ES Figure 5.2: Sensitive receptors within a distance of construction activities
- ES Figure 5.3: Affected Road Network (ARN) including roads where DMRB LA 105 screening criteria is exceeded
- ES Figure 5.4: Human health receptor locations
- ES Figure 5.5a: Ecological transect receptor locations for designated sites included in operational phase air quality assessment
- ES Figure 5.5b: Ecological transect receptor locations for designated sites included in operational phase air quality assessment
- ES Figure 5.6: Local authority monitoring locations
- ES Figure 5.7: Pollutant climate mapping receptors
- ES Figure 5.8: Operational phase annual mean NO_2 concentration impacts at human health receptors
- ES Figure 5.9a: Operational phase annual mean NOx concentration impacts at ecological transects

- ES Figure 5.9b: Operational phase annual mean NOx concentration impacts at ecological transects
- ES Figure 5.9c: Operational phase annual mean NOx concentration impacts at ecological transects
- ES Figure 5.10a: Operational phase annual mean NH_3 concentration impacts at ecological transects
- ES Figure 5.10b: Operational phase annual mean NH_3 concentration impacts at ecological transects
- ES Figure 5.10c: Operational phase annual mean NH_3 concentration impacts at ecological transects
- ES Figure 5.11a: Operational phase annual mean N-deposition impacts at ecological transects
- ES Figure 5.11b: Operational phase annual mean N-deposition impacts at ecological transects
- ES Figure 5.11c: Operational phase annual mean N-deposition impacts at ecological transects
- ES Appendix 5.1: Air Quality Modelling Process
- ES Appendix 5.2: Air Quality Verification and Model Adjustment
- ES Appendix 5.3: Air Quality Receptor Results

5.1.8. Air quality impacts associated with ecological features are presented in ES Chapter 8 (Biodiversity) (**TR010066/APP/6.1**) and ES Appendix 8.15 (Assessment of Air Quality Impacts on Ecological Features) (**TR010066/APP/6.3**). Information related to traffic data is presented in the Transport Assessment (**TR010066/APP/7.3**).

5.2. Competent expert evidence

5.2.1. The competent expert for this chapter and all supporting appendices is an air quality specialist (BSc, Full Member of the Institute of Air Quality Management (MIAQM) and a Full Member of the Institution of Environmental Sciences (MIEnvSc)) with 30 years' experience in the air quality field. They have prepared multiple road traffic assessments following best practice for EIA over the length of their career and have used their EIA knowledge and professional judgement in identifying the likely significant impacts associated with the Scheme and providing technical guidance through the assessment process.

5.3. Legislative and policy framework

National legislation

5.3.1. The national legislation and regulatory framework applicable in this assessment for air quality are summarised in Table 5-1.

Table 5-1 : Summary of legislation and regulatory framework applicable to the air quality assessment

Legislation	Summary	How this legislation is addressed in the assessment
The Air Quality Standards Regulations 2010 As amended by: Air Quality Standards (amendment) Regulations 2016 Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020	These standards implement Directive 2008/50/EC on ambient air quality (European Union, 2008). These regulations define air pollutant limit values and dates by which they are to be achieved for the purpose of protecting human health and the environment. Limit values are legally binding parameters that must not be exceeded. They are set for individual pollutants and are made up of a concentration value, an averaging time over which it is to be measured, the number of exceedances allowed per year, if any and a date by which it must be achieved.	The potential for exceedance of the relevant limit values has been considered as part of the compliance risk assessment (Section 5.9 presents the results of compliance risk assessment).
Part IV of the Environment Act 1995 (Defra,2003), as amended in Schedule 11 of the Environment Act 2021	Sets guidelines for managing and protecting air quality within the UK and for local air quality management. It requires local authorities to regularly review and assess their local air quality and identify any exceedances of the national Air Quality Objectives (AQOs). Where AQOs are exceeded, the local authority is required to declare an Air Quality Management Area (AQMA). The AQOs only apply to locations where members of the public may be regularly exposed. Where an AQMA has been declared, it requires local authorities to prepare an air quality action plan (AQAP) describing the pollutant reducing measures which have been put in place.	The potential for exceedances of relevant AQOs as a result of the Scheme operation has been assessed at relevant sensitive human and ecological receptors and is presented in section 5.9.
The Air Quality Strategy (AQS) for England 2023 (replaces 2007 AQS (Defra, 2007)) Based on: Air Quality (England) Regulations 2000 Air Quality (England) Amendment Regulations 2002	The 2023 AQS reinforces the AQOs and limit values in addition to including new $PM_{2.5}$ targets. The new $PM_{2.5}$ targets include a long-term annual mean concentration target and an average population exposure reduction target, both to be achieved by 2040. The relevant AQOs, limit values, and targets considered in this assessment are presented in Table 5-4. The AQS states that whilst the new $PM_{2.5}$ targets have been set, the Department for Levelling Up, Housing and Communities is	

Legislation	Summary	How this legislation is addressed in the assessment
The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023.	leading wider planning reforms that will detail how other statutory bodies should implement these targets with respect to decision-making. At the time of writing, these reforms are yet to be published.	
Section 79(1)(d) of the Environmental Protection Act 1990	This defines one type of 'statutory nuisance' as "*any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance*". Where a local authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. Failure to comply with an abatement notice is an offence. Best practicable means is a widely used defence by operators, if employed to prevent or to counteract the effects of the nuisance.	The potential for dust nuisance effects have been identified as part of the construction dust assessment and are presented in section 5.9.

National policy

National Networks National Policy Statement 2024

5.3.2. The National Networks National Policy Statement (NPS NN) sets out the policy which the Scheme should comply with. It is also the basis for informing a judgement on the impacts of a Scheme, for example whether the Scheme is consistent with the requirements of the NPS NN. Compliance of the Scheme with the NPS NN is detailed within the NPS NN Accordance Tables (**TR010066/APP/7.2**).

5.3.3. The requirements of the NPS NN in relation to assessing and mitigating the impacts of the Scheme on air quality and how they have been addressed in the assessment are summarised in Table 5-2.

Table 5-2 : Summary of NPS NN planning policy relevant to the air quality assessment

NPS NN 2024 Paragraph number	Summary	How this policy is addressed in the assessment
5.12	*The applicant should undertake an assessment as part of their Development Consent Order application where the impacts of the project (both on and off-scheme) are likely to have significant air quality effects in relation to meeting environmental assessment requirements or affect the UK's ability to comply with the Air Quality Standards Regulations 2010, or impact the relevant local authority's ability to comply with The Air Quality (England) Regulations 2000. Applicants should also refer to the*	This assessment has reviewed the potential impacts of the Scheme on local air quality with reference throughout to the AQOs defined by the relevant national legislation, including the Air Quality Standards Regulations 2010 and the Air Quality (England) Regulations 2000. This is presented in section 5.9.

NPS NN 2024 Paragraph number	Summary	How this policy is addressed in the assessment
	Environmental Assessment section in chapter 4 and paragraph 5.4.	
5.13	*The assessment should describe:* • *existing air quality emissions and concentrations* • *forecasts of emissions and concentrations at the time of opening, assuming that the scheme is not built (the future baseline) and taking account the impact of the scheme* • *any significant air quality effects, their mitigation and any residual effects distinguishing between the construction and operation stages and taking account of the impact of any road traffic generated by the project* • *the predicted emissions, concentration change and absolute concentrations of the proposed project after mitigation methods have been applied* • *any potential impacts on nearby designated habitats from air pollutants* • *the proximity and nature of nearby receptors which could be impacted, including those more sensitive to poor air quality.*	This assessment has reviewed existing and future baseline air quality within the defined study area and has considered air quality impacts associated with both the construction and operation phases of the Scheme. Where appropriate, mitigation is detailed and the residual effects stated. The assessment has addressed impacts at local sensitive receptors (including nearby habitats), within the context of relevant AQOs and limit values. This is presented in sections 5.8, 5.9 and 5.10.
5.14	*In addition, applicants should consider The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 by following available Defra guidance, including interim guidance.*	This assessment has reviewed the potential impacts of the Scheme on local air quality with reference throughout to the AQOs defined by the relevant national legislation, including The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023. This is presented in section 5.9.
5.15	*Defra publishes future projections of UK air pollutant emissions based on evidence of future emissions, traffic and vehicle fleet. Projections are updated as the evidence base changes. The applicant's assessment should be consistent with this approach but may include more detailed modelling to demonstrate local impacts. If an applicant believes they have robust additional*	The methodology for the assessment has not deviated from the standard tools as recommended by Defra as presented in Section 5.5

NPS NN 2024 Paragraph number	Summary	How this policy is addressed in the assessment
	supporting evidence, such as updated vehicle fleet data, that has not been incorporated into the Emissions Factor Toolkit and is likely to change the projected emissions, to the extent they could affect the conclusions of the assessment, they should include this in the representations to the Examining Authority along with the source of evidence.	
5.17	*"Mitigation measures may affect the project design, layout, construction, operation and/or may consist of measures to improve air quality beyond the immediate locality of the scheme. Measures could include, but are not limited to, changes to the route or design of the new scheme, changes to the proximity of vehicles to local receptors in the existing route, physical means including barriers to better disperse emissions, and/or speed control."*	
5.18	*Where a project is likely to lead to a breach of any relevant statutory air quality objectives or targets, the applicant should work with the relevant authorities to secure appropriate mitigation measures. Where a project is located within, or in close proximity to, an Air Quality Management Area or Clean Air Zone, applicants should engage with the relevant local authority to ensure the project is compatible with the Local Air Quality Action Plan.*	Section 5.4 presents the consultation undertaken. This assessment has reviewed the potential impacts of the Scheme on local air quality with reference throughout to the AQOs defined by the relevant national legislation, including the Air Quality Standards Regulations 2010 and the Air Quality (England) Regulations 2000. This is presented in section 5.9.
5.19	*With respect to all relevant statutory air quality limits, objectives and targets other than those set out under The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023, all reasonable mitigation action should be taken. At a minimum, all proposed mitigation measures should ensure that the net impact of a project does not delay compliance with those objectives.*	This assessment has reviewed the potential impacts of the Scheme on local air quality with reference throughout to the AQOs defined by the relevant national legislation, including the Air Quality Standards Regulations 2010 and the Air Quality (England) Regulations 2000. This is presented in section 5.9.
5.20	*With respect to The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023, the applicant should take all reasonable steps to reduce the emissions of $PM_{2.5}$, and its precursor pollutants in the construction and operational stages of the*	This assessment has reviewed the potential impacts of the Scheme on local air quality with reference throughout to the AQOs defined by the relevant national legislation, including the Air Quality Standards Regulations 2010

NPS NN 2024 Paragraph number	Summary	How this policy is addressed in the assessment
	development by following available Defra guidance	and the Air Quality (England) Regulations 2000. This is presented in section 5.9.
5.21	*Where a scheme is expected to lead to a deterioration of air quality the applicant should justify why the level of mitigation proposed is deemed to be reasonable.*	This assessment has reviewed the potential impacts of the Scheme on local air quality. This is presented in section 5.9.
5.22	*In all cases, the Secretary of State must take account of any relevant statutory air quality limits, objectives and targets. The Secretary of State should consider the mitigation measures put forward by the applicant are acceptable. In doing so, the Secretary of State should have regard to relevant guidance including the Air Quality Strategy or any successor to it, Local Air Quality Management guidance and any relevant $PM_{2.5}$ target guidance.*	This assessment has reviewed the potential impacts of the Scheme on local air quality with reference throughout to the AQOs defined by the relevant national legislation. This is presented in section 5.9. Mitigation measures are presented in section 5.10.
5.23	*Air quality considerations are likely to be particularly relevant where schemes are proposed:* • *within or adjacent to Air Quality Management Areas; roads identified as being above Limit Values; and* • *where changes are sufficient to bring about the need for a new Air Quality Management Area or change the size of an existing Air Quality Management Area; or bring about changes to the exceedances of the Limit Values*	This assessment has reviewed the potential impacts of the Scheme on local air quality with reference throughout to the AQOs defined by the relevant national legislation. This is presented in section 5.9.
5.24	*The Secretary of State should give air quality considerations substantial weight where, after taking into account mitigation, a project would lead to a significant air quality impact in relation to meeting environmental assessment requirements and/or where they lead to a deterioration in air quality in a zone/agglomeration.*	The outcome of the assessment has shown there to be no likely significant air quality effect.
5.25	*The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impact of the scheme will:* • *Result in a zone/agglomeration which is currently reported as being compliant with the Air Quality Standards Regulations becoming non-compliant.* • *Affect the ability of a non-compliant area to achieve compliance within*	The assessment of likely significant air quality effect is presented in section 5.11.

NPS NN 2024 Paragraph number	Summary	How this policy is addressed in the assessment
	the most recent timescales reported to the examining authority at the time of the examination.	

National Planning Policy Framework 2023

5.3.4. The National Planning Policy Framework (NPPF) 2023 sets out the Government's planning policy framework for the whole of England, including the Government's expectation for content and quality of planning applications and local plan policy. The overall strategic aims of the NPS NN and NPPF are consistent. The NPPF may be an important and relevant matter but does not form the basis for a decision on an NSIP.

5.3.5. With regard to air quality, in Paragraph 180 it states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: …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 quality…"

5.3.6. Paragraph 192 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."

5.3.7. To comply with these requirements, this Chapter identifies all air quality receptors within the study area (Section 5.8) and presents assessments of likely significant effects in Section 5.11.

National Planning Practice Guidance 2019

5.3.8. National Planning Practice Guidance 2019 is a web-based resource, which includes a dedicated section on air quality *(National Planning Practise Guidance, 2019)*. It notes that, for new planning applications, the local planning authority may require information on:

- *"the 'baseline' local air quality', including what would happen to air quality in the absence of the development;*
- *whether the scheme could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity); and*
- *whether occupiers or users of the development could experience poor living conditions or health due to poor air quality."*

5.3.9. It also states the following in relation to determining whether air quality is relevant to a planning decision:

"*Whether air quality is relevant to a planning decision will depend on the scheme 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 scheme would be particularly sensitive to poor air quality in its vicinity" (National Planning Practise Guidance, 2019)*."

Other relevant national policy

25 Year Environment Plan 2023

5.3.10. The 25 Year Environment Plan sets out aims to achieve clean air by:

- "*Meeting legally binding targets to reduce emissions of five damaging air pollutants; this should halve the effects of air pollution on health by 2030*".
- "*Ending the sale of new conventional petrol and diesel cars and vans by [2035]*" (The original deadline of 2040 has been brought forward)."
- "*Maintaining the continuous improvement in industrial emissions by building on existing good practice and the successful regulatory framework*".

5.3.11. The assessment has considered the targets set out for $PM_{2.5}$ within the assessment as set out in section 5.5 of this Chapter.

Local policy

Coventry local policy

5.3.12. The Coventry City Council Local plan (2011-2031), 2017 and Coventry City Council Air Quality Supplementary Planning Document, 2019 contain policies relevant to air quality. These polices are included within Table 5-3.

Table 5-3 : Summary of relevant policies within Coventry City Council Local plan (2011-2031), 2017 and Coventry City Council Air Quality Supplementary Planning Document, 2019

Policy number / Section	Summary	How this policy is addressed in the assessment
Impact of growth on local network: AC2	The Coventry Local Plan highlights the council's partnership with the Low Emissions Towns and Cities programme (LETCP) and sets out their aims with regards to air quality. Policies relevant to air quality within the Local Plan include Policy AC2, which states that development proposals which are likely to impact the capacity of a road network should mitigate traffic growth to ensure the development does not cause an unacceptable decline in air quality. Policy AC2 also states that mitigation measures should firstly promote sustainable modes of transport and secondly deliver highway capacity interventions.	This assessment has been completed with reference to DMRB LA105. By association, it aligns with these policies by assessing the potential for significant effects on air quality (i.e. potential for decline in air quality) during both the construction and operation phases. Where appropriate, mitigation measures are detailed. (These are presented in sections 5.5, 5.9 and 5.10 of this Chapter). NRMM emission standard controls have been included within the EMP for the construction phase.
Air Quality: EM7	Policy EM7 includes information relating to air quality impacts from major developments and includes a that 'a supplementary planning document will be developed to support this Policy' in the form of the Coventry City Council Air Quality Supplementary Planning Document, 2019. This supplementary guidance provides information on mitigation measures include which are relevant to non-road mobile machinery (NRMM) to meet minimum emission standards in Table 6. These are the same as the standards presented in the Rugby Borough Council Air Quality Supplementary Planning Document, 2021.	

Rugby local policy

5.3.13. The Rugby Borough Council Local Plan (2011-2031), 2019 is supported by the Rugby Borough Council Air Quality Supplementary Planning Document (SPD), 2021. These documents contain policies relevant to air quality and these are included within Table 5-4.

Table 5-4 : Summary of relevant policies within Rugby Borough Council Local Plan (2011-2031), 2019 is supported by the Rugby Borough Council Air Quality Supplementary Planning Document (SPD), 2021

Policy number/section	Summary	How this policy is addressed in the assessment
Healthy, safe and inclusive communities: HS5	The Rugby Local Plan sets out Policy HS5 relating to Traffic Generation and Air Quality, Noise and Vibration with respect to development that would generate new floor space. Whilst Policy HS5 is not directly relevant to the Scheme, the Policy is supported by Rugby Council's Air Quality SPD, which includes mitigation methods for developments that have the potential to impact air quality. Of relevance to the Scheme and specifically the construction phase, the SPD states that NRMM should meet minimum emissions standards. Table 4 of the SPD states: *"NRMM of net power between 37kW and 560kW will be required to meet the standards based upon the engine emissions standards in EU Directive 97/68/EC and its subsequent amendments…"*	This assessment has been completed with reference to DMRB LA105. By association, it aligns with these policies by assessing the potential for significant effects on air quality (i.e. potential for decline in air quality) during both the construction and operation phases. Where appropriate, mitigation measures are detailed. (These are presented in sections 5.5, 5.9 and 5.10 of this Chapter). NRMM emission standard controls have been included within the EMP for the construction phase.

West Midlands Combined Authority Air Quality Framework, (2024 -2026), 2023

5.3.14. West Midlands Combined Authority Air Quality Framework, (2024-2026) was developed to provide a summary of West Midlands Combined Authorities (WMCA's) air quality framework priority measures that will be progressed/delivered between 2024 and 2026. Relevant sections are presented in Table 5-5.

Table 5-5 : Summary of West Midlands Combined Authority Air Quality Framework, (2024-2026), 2023

Sections	Summary	How this policy is addressed in the assessment
Introduction	The framework includes a list of priority measures which have been narrowed down from a list of 145 potential 'options' that could be enacted to address poor air quality and inequality of exposure. These options focus on measures that can be implemented at a regional level and vary in terms of timescale for implementation, cost and their likely impact. The options for the framework include: • Monitoring and digital engagement • Air quality communications	This chapter includes an air quality assessment which assesses the impact of the Scheme on air quality.

Sections	Summary	How this policy is addressed in the assessment
	• School engagement • General air quality engagement and behaviour change • Dedicated engagement and behaviour change package for domestic combustion • Net zero and retrofitting • Planning and air quality assessment • Natural environment • Research	
Appendix D – Option appraisal	Some of the framework options that are relevant to the Scheme include: • *TRN15: "Speed limit reduction (or dynamic speed limits) on high-speed roads"* • *NBE2: "Promote transport schemes and road alternations that include effective green infrastructure to reduce exposure to poor air quality".*	The Scheme includes a reduced speed limit for the majority of the A46.

Relevant air quality objectives, limit and target values

5.3.15. The air quality objectives, limit and target values relevant to the Scheme are summarised in Table 5-6 which are based upon the national legislation and policies outlined above and including the legislation within Table 5-1.

Table 5-6 : Relevant air quality objectives, limit and target values for human health and ecological sensitive receptors in this assessment

Pollutant	Averaging period	Concentration (µg/m^3)	Allowed number of exceedances	For protection of:
Nitrogen dioxide (NO_2)	Annual	40	-	Human health
	1-hour	200	18 per calendar year	
Particulates (PM_{10})	Annual	40	-	Human health
	24-hour	50	35 per calendar year	
Fine particulates ($PM_{2.5}$)	Annual	20	-	Human health
		10[(a)]	-	
Oxides of nitrogen (NO_x)[(b)]	Annual	30	-	Vegetation and ecosystems

(a) As per the *Environmental Targets (Fine Particulate Matter) (England) Regulations 2023*. $PM_{2.5}$ annual mean target concentration to be attained by 2040.

(b) Designated for the protection of vegetation and ecosystems and also referred to as the 'critical level' for NO_x. The policy of the UK statutory nature conservation agencies is to apply the annual mean NOx

Pollutant	Averaging period	Concentration (µg/m^3)	Allowed number of exceedances	For protection of:
criterion in internationally designated conservation sites and Site of Special Scientific Interest (SSSI) on a precautionary basis, as the limit value applies only to locations more than 20km from towns with more than 250,000 inhabitants or more than 5km from other built-up areas, industrial installations or motorways.				

5.4. Consultation

5.4.1. An Environmental Scoping Report (**TR010066/APP/6.8**) was submitted to the Planning Inspectorate in 2023. A Scoping Opinion (**TR010066/APP/6.9**) was received in response to the Environmental Scoping Report (2023). The Applicant's responses to the Scoping Opinion are contained in the Scoping Opinion Response, ES Appendix 4.1 (Scoping Opinion Response) (**TR010066/APP/6.3**).

5.4.2. Responses in relation to the statutory consultation undertaken are presented in the Consultation Report (**TR010066/APP/5.1**). Details of how the Applicant has undertaken further engagement with statutory consultees is set out in the Consultation Report Annexes (**TR010066/APP/5.2**).

5.4.3. Both Coventry City Council and Rugby Borough Council were contacted in March 2024 to obtain the most recent local authority air quality monitoring data for 2023.

5.4.4. No further consultation was deemed to be required with regard to the air quality assessment.

5.5. Assessment methodology

5.5.1. The assessment methodology detailed herein has aligned with that outlined in Chapter 6 (Air Quality) of the Environmental Scoping Report (**TR010066/APP/6.8**).

5.5.2. The level of assessment required was identified using the *"flow chart for the determination of simple or detailed assessment"* given in DMRB LA 105 (Figure 2.10) which is based on the project's risk potential and the sensitivity of the receiving environment.

5.5.3. The project's risk potential was classified as 'high' due to the scale and nature of the Scheme, which comprises a large junction upgrade on the A46 strategic road link. The receiving environment sensitivity was classified as 'high' due to the number of potentially sensitive human and ecological receptors which have been identified within 50m of roads included in the study area (the study area is further described in section 5.7, paragraph 5.7.3).

5.5.4. Therefore, it was determined that a *detailed assessment* was required.

5.5.5. The air quality assessment, following the relevant guidance, includes:

- A review of existing baseline conditions.
- Identification of an appropriate study area for both the construction and operation phases.
- The identification of sensitive human and ecological receptors within the respective study areas.
- A qualitative assessment of the effect on air quality during the construction phase.
- A detailed assessment of the changes in air pollutant concentrations on local air quality, including nutrient nitrogen (N) deposition rates, during the operational phase at the identified sensitive receptors.
- The determination of significant air quality effects, including a compliance assessment with the Air Quality Standards Regulations 2010.
- The identification of mitigation measures, where appropriate.

Construction phase

Construction dust

5.5.6. Potential construction dust effects have been assessed in accordance with section 2.56 to 2.59 of DMRB LA 105, through determination of the sensitivity of the receiving environment and by identifying the construction dust risk potential of the Scheme based on the scale of the project, as per Table 5-7.

5.5.7. The sensitivity of the receiving environment is defined based on the matrix presented in Table 5-8, whereby sensitive receptors are identified within discrete distance buffers (50m, 100m, 200m) based on the location of the Scheme construction activities. For the purposes of this assessment, each distance buffer was taken from the Order Limits, thereby conservatively assuming that construction activities could occur anywhere within the Order Limits.

Table 5-7 : Construction dust risk potential

Risk	Scale of project
Large	Large smart motorway projects, bypass and major motorway junction improvements.
Small	Junction congestion relief project i.e. small junction improvements, signalling changes, short smart motorway projects.

Table 5-8 : Receiving environment sensitivity to construction dust

Construction dust risk potential	Distance from construction activities		
	0-50m	50-100m	100-200m
Large	High	High	Low
Small	High	Low	Low

5.5.8. The outcome of the construction dust assessment is used to inform the appropriate level of best practice dust mitigation for the construction phase, which is contained within the First Iteration Environmental Management Plan (EMP) (**TR010066/APP/6.5**) for the Scheme. Furthermore, the construction dust risk potential is used to determine the supporting activities that should be followed to monitor the effectiveness of EMP dust mitigation measures.

Construction traffic

5.5.9. Section 2.60 of DMRB LA 105 advises that, where construction activities are programmed for a total duration of less than two years, there is unlikely to be a significant effect on air quality.

5.5.10. The Scheme's construction activities are programmed for a total period of 23 months (October 2026 to June 2028), which is less than two years. However, there is a risk that the construction phase could be extended such that the two-year screening criterion is exceeded. Therefore, in order to de-risk the Scheme, the associated traffic movements have been assessed against the DMRB LA 105 traffic scoping criteria, as per paragraph 5.7.3.

5.5.11. The appointed Principal Contractor for the Scheme provided a breakdown of all traffic movements associated with each activity for the duration of the construction phase. These data were collated to provide an Annual Average Daily Traffic (AADT) flow of heavy-duty vehicles (HDVs) and light-duty vehicles (LDVs) (including cars) for each calendar year, as summarised in Table 5-9.

Table 5-9: Annual Average Daily Traffic (AADT) Flow for each calendar year

Parameter	Construction Phase: year		
	2026	2027	2028
Total AADT (LDV + HDV)	30	114	33
HDV AADT only	10	36	5

5.5.12. Based on a review of the above data, the DMRB LA 105 traffic scoping criterion for total AADT (a change of 1,000 AADT) will not be triggered in any construction

year. The annual average number of off-site HDV movements is similarly shown to be well below the respective criterion (a change of 200 HDV AADT).

5.5.13. As such, should the construction programme extend beyond two years there is no requirement to progress the assessment of construction traffic emissions further, in accordance with DMRB LA 105.

Non road mobile machinery emissions.

5.5.14. Rugby Borough Council's consultation response to the PEIR (see Consultation Report (**TR010066/APP/5.1**)) references Rugby's Air Quality SPD (Rugby Borough Council, 2021) associated with Policy HS5 of the Rugby Local Plan. Whilst this policy is not directly relevant to the Scheme, the SPD does reference the need for NRMM to meet specified emissions standards at all construction sites within the borough.

5.5.15. Although DMRB LA 105 does not provide guidance on assessing emissions from NRMM, the Institute of Air Quality Management (IAQM) provides guidance (IAQM, 2024) states in section 4.3 that:

"…Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality and in the vast majority of cases they will not need to be quantitatively assessed".

5.5.16. With reference to Table 4 of the Air Quality SPD (Rugby Borough Council, 2021), the relevant NRMM emissions standards will be adhered to via the Scheme's First Iteration EMP (**TR010066/APP/6.5**) discussed further in Section 5.9. As such, emissions from NRMM will not have a likely significant effect on air quality and no further assessment has been carried out.

Operational phase

5.5.17. The operational phase air quality assessment has been completed with reference to DMRB LA 105 and LAQM.TG22. The key pollutants of concern within this assessment for human health and ecological sensitive receptors are presented in Table 5-10.

Table 5-10 : Key pollutants of concern for sensitive receptor types within operational phase assessment

Human health receptors	Ecological sensitive receptors	Compliance risk assessment
NO_2	NO_x	NO_2
PM_{10}	Ammonia (NH_3)	-

Human health receptors	Ecological sensitive receptors	Compliance risk assessment
$PM_{2.5}$	Nutrient nitrogen (N) Deposition	-

Assessment scenarios

5.5.18. The air quality assessment was undertaken using the Atmospheric Dispersion Modelling System for Roads (ADMS-Roads) software (version 5.0.0.1) and the relevant Defra and National Highway's tools, as outlined herein. Further information describing the modelling parameters used are presented in ES Appendix 5.1 (Air Quality Modelling Process) (**TR010066/APP/6.3**).

5.5.19. The assessment focuses on concentrations of air pollutants which can have an impact at local level. The assessment considered emissions of NO_x, NO_2, NH_3, and PM_{10}. The scenarios included in the assessment are:

- **Base year 2018** – used for model verification against relevant local authority air quality monitoring (see Section 5.7).
- **Projected base year 2028** – for assessment of long term trends in NO_2 concentrations (see Section 5.5.37).
- **Do-Minimum (DM) 2028** – Opening year without the Scheme.
- **Do-Something (DS) 2028** – Opening year with the Scheme.

5.5.20. As per DMRB LA 105 guidance, where the model results of the base year scenario indicate that there are no exceedances of the PM_{10} annual mean objective, then no further assessment of PM_{10} in the Do-Minimum and Do-Something scenarios will be undertaken.

5.5.21. Furthermore, DMRB LA 105 states that there is no need to model $PM_{2.5}$ as the UK currently meets its legal requirements for the achievement of the $PM_{2.5}$ air quality annual mean limit value (20 µg/m^3). Whilst the government has set two new legally binding targets to reduce concentrations of $PM_{2.5}$, the planning reforms required to facilitate the implementation of the new targets into decision-making have not been published at the time of undertaking the assessment.

5.5.22. The closest Defra's Automatic Urban and Rural Network (AURN) monitoring sites to the Scheme already meet the 2040 $PM_{2.5}$ annual mean concentration target (Defra, 2024). The nearest AURN site that exceeds the target (10 µg/m^3) in 2022 is Northampton Spring Park. However, this site is located approximately 40 km from the Scheme and therefore not representative of local conditions due to this distance.

5.5.23. Therefore, the air quality assessment has adhered to DMRB LA 105 and $PM_{2.5}$ has not been assessed further.

Traffic data

5.5.24. Outputs from a strategic transport model developed for the Scheme have been used for this assessment. Full details of the transport model are reported in the Transport Assessment in (**TR010066/APP/7.3**). Data on vehicle flows, speed bands and percentage of heavy duty vehicles (HDV) were provided for the following periods in each of the assessed air quality model scenarios (Base 2018, DM 2028 and DS 2028):

- AM peak period
- Inter-peak period
- PM peak period
- Off-peak period

5.5.25. The time period traffic flows with their associated time periods were inputted to the National Highways *IAN 185-13 Speed Band Emissions Factors* tool (*v4.3*)[1]. This was used to develop a vehicle emissions inventory for NO_x and PM_{10} across the study area in each scenario. The vehicle emission rates for each pollutant were derived on a link-by-link basis, such that they could be input directly to the air quality model along with the road geometry (i.e. road alignments and road widths) for the modelled network.

Meteorological data

5.5.26. Representative hourly sequential meteorological data were sourced from the Church Lawford meteorological monitoring station for the base year of 2018 and used in the air quality modelling assessment. This monitoring station is located approximately 7km to the south-west of the Scheme Order Limits.

5.5.27. There are two other meteorological stations within 7km of the study area, however the latest available data for Coventry Airport is 2016 and Coventry monitoring station is an urban site and not representative of the full study area (mixed suburban and semi-rural).

[1] At the time of commencing the emissions calculations and dispersion modelling (Dec 2023), this was the latest available emissions factors tool. National Highways published an updated Speed Band Emission Factors tool (v5.1) in January 2024. For assurance, a comparison of the road-NO_x emissions outputs from both versions of the tool was undertaken in June 2024 using traffic data associated with the Do Something 2028 scenario. This demonstrated that, on average, the link-by-link vehicle NO_x emission rates (g/km/s) increased by less than 0.5% when using v5.1 of the tool. This level of change would have no material impact on the assessment results reported herein.

5.5.28. The Church Lawford wind rose for 2018 is presented in ES Figure 5.1 (Wind rose based on hourly data obtained from Church Lawford monitoring station (2018)) (**TR010066/APP/6.2**). This wind rose depicts that the majority of winds occur from the south-west direction.

NO_x to NO_2 conversion

5.5.29. Emission rates used within dispersion modelling are based on NOx to represent all nitrogen-oxygen species emitted in exhaust gases. The proportion of NO_2 is needed for comparison with the air quality objectives presented in Table 5-3. The predicted modelled road-NOx concentrations for each modelled receptor were converted to annual mean NO_2 concentrations using, the most recent version at the time of the assessment, Defra's NOx to NO_2 calculator (version 8.1) (Defra, 2020). Input parameters in the NOx to NO_2 calculator were set for the modelled year and each modelled receptor grouped by their respective local authority location (Coventry City Council/Rugby Borough Council etc.). The traffic mix has been set as 'All other urban UK traffic'.

Background pollutant concentrations

5.5.30. The air quality model predicts the pollutant contribution from road traffic emissions to the annual mean concentrations of NO_x and PM_{10} at the identified modelled sensitive receptors. These contributions are referred to as modelled road-NO_x and road-PM_{10}, respectively and are combined with the relevant 1km x 1km gridded background concentrations to derive total annual mean concentrations for each pollutant. This enables a comparison with the relevant annual mean air quality objectives.

5.5.31. Background pollutant concentrations for the relevant grid squares and assessment years (2018 and 2028) were obtained from Defra's background maps (see paragraph 5.8.4).

5.5.32. Further information regarding background concentration within the study area (including sector removal) is discussed within ES Appendix 5.1 (Air Quality Modelling Process) (**TR010066/APP/6.3**).

Air quality model verification

5.5.33. The model verification process has been conducted in accordance with the guidance outlined in LAQM.TG (22). Modelled annual mean NO_2 concentrations for the base year (2018) scenario were compared to the equivalent monitored 2018 local authority data at appropriate air quality monitoring locations within the study area. This enabled the derivation of appropriate model adjustment factors,

specific to modelled road-NO_x, to ensure the performance of the dispersion model was acceptable.

5.5.34. It should be noted that study area was extended slightly to include further 2018 monitoring locations. This ensured that there was a good coverage across the study area, an adequate amount of monitoring locations for enough verification points (8) and monitoring at all road types had been included.

5.5.35. In line with LAQM.TG (22), in the absence of any PM_{10} monitoring sites within the study area, the adjustment factors derived in relation to road-NO_x concentrations were applied to the modelled road-PM_{10} concentrations.

5.5.36. Full details on the air quality model verification process are provided in ES Appendix 5.2 (Air Quality Verification and Model Adjustment) (**TR010066/APP/6.3**).

Addressing long-term trends in roadside NO_2 concentrations

5.5.37. To account for uncertainties in predicted future roadside NO_2 concentrations, DMRB LA 105 guidance requires that a 'gap analysis' be completed. The 'gap analysis' aims to address the difference between the assumed rates of reduction in roadside NO_x and NO_2 levels (as per Defra air quality modelling tools) when compared to real-world observed roadside monitoring trends. This is so that future annual mean NO_2 roadside predictions are not overly optimistic.

5.5.38. To do this, an additional model scenario within the air quality assessment is required, referred to as 'the projected base year'. This scenario uses the base year (2018) traffic data with the opening year (2028) vehicle emission factors and background concentrations. Both the 'base year (2018)' and 'projected base year' results feed into the *National Highways Long Term Gap Analysis Calculator v1.1* to derive appropriate 'gap factors' that can be applied to the DM and DS opening year scenario results for NO_2.

5.5.39. Further details on the approach to addressing long-term trends in NO_2 concentrations and derivation of the adjustment factors are provided in ES Appendix 5.1 (Air Quality Modelling Process) (**TR010066/APP/6.3**).

Ammonia (NH_3) and nutrient nitrogen deposition

5.5.40. To facilitate the assessment of air quality impacts on sensitive ecological receptors, it was necessary to assess the contribution of NO_x and NH_3 emissions from road traffic to ambient concentrations, in addition to the associated contribution to N deposition rates.

5.5.41. National Highways provide a calculator tool (*DRAFT – Highways England Ammonia N Deposition Tool_v4*, (National Highways, 2024)) that applies a NO_x to NH_3 ratio to the modelled road-NO_x concentrations from both light duty and HDV. The ratio applied is dependent of the assessment year, vehicle type (light or heavy) and the road type (i.e. motorway, urban, rural). The resulting road-NH_3 concentrations from light and heavy vehicles were summed and added to the corresponding background values to derive total concentrations at each receptor.

5.5.42. The modelled NH_3 concentrations were used to quantify the impact of the Scheme on the identified sensitive ecological receptors within the context of the relevant non-statutory critical levels (see paragraph 5.8.19).

5.5.43. Given that ambient NH_3 also contributes to N deposition, the calculator tool provides a conversion for road-NH_3 concentrations ($\mu g/m^3$) to N deposition rates (kgN/ha/yr) based on the habitat type applicable to the ecological receptor (i.e. short or long vegetation). The following conversions are applied by the calculator and are based on Environment Agency guidance (Air Quality Technical Advisory Group AQTAG, 2014):

- Grassland and similar habitats; 1$\mu g/m^3$ of NH_3 = 5.19kgN/ha/yr
- Forests and similar habitats; 1$\mu g/m^3$ of NH_3 = 7.79kgN/ha/yr

5.5.44. In a similar manner to NH_3, it was necessary to assess the contribution to N deposition from road-NO_2 concentrations. Initially, the modelled road-NO_x concentration at each ecological receptor was converted to road-NO_2 using the Defra NO_x-NO_2 calculator. The associated N deposition rate from the road-NO_2 concentration was derived by applying the following conversions based on habitat type, as per DMRB LA 105 and Environment Agency guidance (AQTAG, 2014):

- Grassland and similar habitats; 1$\mu g/m^3$ of NO_2 = 0.14kgN/ha/yr
- Forests and similar habitats; 1$\mu g/m^3$ of NO_2 = 0.29kgN/ha/yr

5.5.45. The modelled N deposition rates associated with both road-NH_3 and road-NO_2 were summed and added to the relevant background N deposition rate to derive a total deposition rate at each receptor. The results of the modelling were used to quantify the impact of the Scheme on the identified sensitive ecological receptors within the context of the relevant non-statutory critical loads for N deposition (see paragraph 5.8.20).

Compliance with limit value on ambient air quality

5.5.46. The Pollution Climate Mapping (PCM) model is used by Defra to establish compliance across the UK with the respective legal limit values for NO_2, PM_{10} and $PM_{2.5}$, covering all years from 2018 to 2030 from a reference base year of 2018. The most recent PCM model data at the time of undertaking the assessment were published in 2020. The focus of the DMRB LA 105 compliance risk assessment is on annual mean NO_2 roadside concentrations and the respective limit value (40µg/m^3).

5.5.47. The PCM model output is comprised of road links which exceed the limit value of 40µg/m^3 for NO_2 in the PCM's base model year (2018).

5.5.48. Compliance with the NO_2 annual mean limit value has been assessed in accordance with guidance outlined in DMRB LA 105 and is based on identifying 'qualifying features'. These include public access and sensitive receptors (residential properties, schools and hospitals) that reside within 15m of a relevant PCM road link, but not within 25m of a junction as defined using professional judgement.

5.5.49. Where qualifying features are identified along a PCM link that intersects with a triggered link (any road which meets the traffic screening criteria as outlined in Section 5.7), annual mean NO_2 concentrations have been modelled for:

- The nearest qualifying feature along the PCM link where the concentrations are highest.
- A 4m point from the PCM link's edge of the carriageway in the same location as the qualifying feature to be compared against the national PCM modelled point.

Assessment significant criteria

Human health

5.5.50. The evaluation of potential significant air quality effects for the Scheme at sensitive human receptors has been completed based on the DMRB LA 105 assessment criteria.

5.5.51. Only those sensitive receptors that are predicted to exceed an air quality threshold in the DM 2028 or the DS 2028 scenario are assessed for significance. The differenced in concentrations between the DM and DS scenarios, along with the numbers of receptors, are used to determine the level of significance as outlined in Table 5-11.

Table 5-11 : Information required for judgement of significant air quality effects – example table

Magnitude of change in concentration	Value of change in annual average NO_2 and PM_{10} ($\mu g/m^3$)	Total number of receptors with:	
		Worsening of an air quality at sensitive receptor above the air quality threshold or the creation of a new exceedance	Improvement of an air quality at sensitive receptor above the air quality threshold or the removal of an existing exceedance
Large	Greater than $4\mu g/m^3$		
Medium	Greater than $2\mu g/m^3$		
Small	Greater than $0.4\mu g/m^3$		
Total change		Sum of above	Sum of above

5.5.52. A conclusion of no likely significant effects for human health receptors can be determined if:

- Modelled concentrations for human health are less than the air quality thresholds in the DM and DS scenarios.
- The difference in the concentrations between the DM and DS scenarios are imperceptible i.e. less than 1% of the air quality threshold (or $0.4\mu g/m^3$).

5.5.53. DMRB LA 105 outlines a framework of guideline bands based on the number of receptors that fall within each of the magnitude of change criteria. Should the change in concentrations be greater than 1% of the air quality threshold then sensitive receptors will be assigned to the select criteria, as provided in Table 5-12. This will then be used to inform a judgement on whether the Scheme triggers a significant air quality effect.

Table 5-12 : Guidance to the number of properties informing a judgment of significant air quality effects.

Magnitude of change in annual mean NO_2 or PM_{10} ($\mu g/m^3$)	Guideline bands for number of receptors with:	
	Worsening of an air quality objective already above the objective or the creation of a new exceedance	Improvement of an air quality at sensitive receptor above the air quality threshold or the removal of an existing exceedance
Large (>4)	1 to 10	1 to 10
Medium (>2)	10 to 30	10 to 30
Small (>0.4)	30 to 60	30 to 60

5.5.54. Where the number of receptors fall between the lower and upper guideline bands for any magnitude of change bands, DMRB LA 105 directs the application of professional judgement using the following criteria to inform whether a significant effect is triggered:

- The absolute concentration at each receptor (i.e. is the modelled concentration over 40µg/m^3 (annual mean objective) or over 60µg/m^3)[2];
- How many receptors are there in each of the magnitude of change criteria (i.e. does the project create more worsening than improvements); and
- The magnitude of change in concentration at each receptor (e.g. 0.6µg/m^3 or 1.8µg/m^3).

5.5.55. Where the total number of receptors is greater than the upper guideline band in any of the magnitude categories, the project is likely to trigger a significant air quality effect.

5.5.56. Where the numbers of receptors are less than the guideline band for each magnitude of change, then the project is unlikely to trigger a significant air quality effect for human health.

5.5.57. The significance of the effect is presented in Section 5.11.

Compliance risk assessment

5.5.58. If the following criteria are met, then the assessment can conclude that there is no risk to the UK's ability to comply with the *Air Quality Standards Regulations 2010*:

- There are no modelled exceedances of the air quality limit values for any PCM link; or
- There are modelled exceedances of the air quality limit value for any PCM link, but the change in annual mean NO_2 concentrations between the DM and DS is less than or equal to +/- 0.4µg/m^3; and
- The Scheme does not materially impact on measures within local air quality or national plans for the achievement of compliance.

5.5.59. The significance of the effect is presented in Section 5.11.

Ecological

5.5.60. In terms of N deposition, an assessment of significant effects will be required if the N deposition rate in the DS 2028 scenario exceeds the assigned lower

[2] If annual average concentrations are predicted to be less than 60µg/m^3, the hourly average NO_2 objective is unlikely to be exceeded (LAQM TG(22)).

critical load[3] (see Table 5-15) and the change in N deposition rate between DM and DS is greater than 1% of the lower critical load, as per Figure 2.98 of DMRB LA 105. At this point, the competent biodiversity expert will assess the air quality attribute of the designated site to confirm whether it should be restored or maintained. This is in line with DMRB LA 105.

5.5.61. Similarly, for annual mean NO_x and NH_3 concentrations, the magnitude of change between DM and DS at each modelled transect receptor has been assessed in the context of the statutory NO_x critical level (30µg/m^3) and the non-statutory NH_3 critical level (1 or 3µg/m^3 depending on ecological designation; see Table 5-14)[4]. Where either critical level is predicted to be exceeded in the DS 2028 scenario and the magnitude of change exceeds 1% of the critical level, the competent biodiversity expert will assess the potential for a likely significant effect at the respective designated site.

5.5.62. The likely significance of the effect is discussed within Section 5.9. Where applicable, the determination of a likely significant effect will be concluded by the biodiversity expert and reported in ES Chapter 8 Biodiversity with further detail provided in ES Appendix 8.15 (Assessment of Air Quality Impacts on Ecological Features) (**TR010066/APP/6.3**).

5.6. Assessment assumption and limitations

5.6.1. The construction phase and operational phase assessments have been based on the Scheme description presented in ES Chapter 2 (The Scheme) (**TR010066/APP/6.1**) and the design presented on the Works Plans (**TR010066/APP/2.3**).

5.6.2. Both Coventry City Council and Rugby Borough Council were contacted in March 2024 to obtain the most recent local authority air quality monitoring data for 2023. Unfortunately, results for 2023 were not made available at the time of writing (March 2024) by either council.

[3] Critical loads define the rates of nitrogen (N) deposition (e.g. in kiloequivalents per hectare per year, keq/ha/yr) below which significant harmful effects are not expected to occur in sensitive habitats. Critical loads for N deposition are set under the Convention on Long Range Transboundary Air Pollution (APIS, 2024).

[4] The project's competent biodiversity expert was consulted and was confirmed that there are lichens and bryophytes (in the form of mosses) present at one designation only (Willenhall Wood LNR - inc. Ancient Woodland) within the study area. Therefore, the appropriate non-statutory NH_3 annual mean critical level is 1µg/m^3 within this designation only and 3µg/m^3 within the rest of the study area, with reference to the Working Group on Effects of the UNECE Convention on Long Range Transboundary Air Pollution (APIS, 2024).

Construction phase

5.6.3. To provide a conservative assessment of potential dust risk, distance bands (20m, 50m, 100m, 200m) have been used (in line with DMRB LA105) to determine the sensitivity of the receiving environment were based on the Scheme Order Limits.

5.6.4. It is assumed that in the instance of any changes to the design within the vertical and horizontal limits of deviation, mitigation measures would still be provided and would function as described in this Chapter and as such there would be no change to the assessment of significant effects.

Operational phase

5.6.5. There are inherent uncertainties associated with both measured and predicted concentrations of airborne pollutants. The model (ADMS-Roads) used in this assessment relies on input data (including predicted traffic flows), which are subject to uncertainty. 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.

5.6.6. Vehicle emissions inventories for NO_x and PM_{10} were developed using the National Highways *IAN185-13 Speed Band Emission Factors v4.3*. There are inherent uncertainties associated with forecasting the national vehicle fleet composition and engine emissions into future years, particularly with respect to road-NO_x emissions and associated roadside NO_2 concentrations. To provide a conservative assessment of future NO_2 concentrations, a 'gap analysis' was undertaken to address long-term trends in roadside NO_2 concentrations, as per DMRB LA 105 (see paragraph 5.5.37).

5.6.7. Background concentrations for NO_2, NO_x and PM_{10} were sourced from Defra's background maps. To provide representative background concentrations specific to the study area, appropriate 'sector removal' of pollutant contributions was carried out. This removed the potential for 'double counting' of vehicle emissions contributions from the existing road network included in the air quality model. For more information see ES Appendix 5.1 (Air Quality Modelling Process) (**TR010066/APP/6.3**).

5.6.8. Background NH_3 concentrations and N-deposition rates were obtained from the Air Pollution Information System (APIS, 2025) Site Relevant Critical Loads and Source Attribution map tool. The backgrounds are given as a three-year average (2017-2019) (chosen to represent the assessment's baseline year of 2018) for each 1x1km grid square. The road contribution components of the background

values were not removed and the same background values were used in the future year (2028) assessment, as per DMRB LA 105 guidance. Therefore, for the roads included within the air quality model (DM and DS), emission contributions to NH_3 concentrations and N-deposition rates are essentially 'double counted', providing a conservative assessment in this regard.

5.6.9. Within each grid square, a different background N-deposition rate is provided for areas of 'Forest' and areas of 'Grassland (short vegetation)'. The competent biodiversity expert provided direction on the most appropriate classification of each designated site (i.e. 'Forest' or 'Grassland)'.

5.6.10. The identification of sensitive receptors was based on the latest available OS Address Base Plus data at the time of assessment (December 2023). There is the possibility that these data do not contain properties which have been recently built and therefore may not have been considered within the air quality assessment.

5.6.11. To reduce the uncertainty associated with any modelling limitations, air quality model verification was carried out with reference to guidance set out in LAQM TG (22). As the predicted concentrations from the model were verified against local authority monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations. The verification adjustment factor was applied to the baseline, Do-Minimum and Do-Something scenarios. The statistical analysis of adjusted model results has demonstrated that the model performed within the ideal ranges given in relation to the root mean square error (i.e. average model error), correlation coefficient (i.e. strength of relationship between monitored and modelled values) and fractional bias (i.e. tendency for model to under- or over- predict). See ES Appendix 5.2 (Air Quality Verification and Model Adjustment) (**TR010066/APP/6.3**).

5.7. Study area

5.7.1. The location of the Scheme and key environmental constraints can be found in ES Figure 2.3 (Environmental Constraints) (**TR010066/APP/6.2**).

Construction phase

Construction dust

5.7.2. The construction phase study area, relating to dust risk potential, comprises an area up to 200m from the Scheme construction activities, as per Table 5-8. For the purposes of proving a conservative assessment, the 200m was taken to be from the Order Limits of the Scheme. This was agreed within the Scoping Opinion (**TR010066/APP/6.9**)).

Operational phase

5.7.3. To determine the study area for the air quality assessment, the following traffic scoping criteria, outlined in DMRB LA 105, were used to identify roads which are likely to be impacted by the Scheme. Roads which triggered the below scoping criteria, based on comparing the DM and DS 2028 scenarios' traffic data, were considered within the air quality assessment:

- An annual average daily traffic (AADT) flow change of 1,000 or more
- An AADT heavy-duty vehicle (HDV) flow change of 200 or more
- A change in speed band
- A change in carriageway alignment by greater than 5m.

5.7.4. Once the road links triggering the traffic scoping criteria were identified, all adjoining roads within 200m of a triggered link were included in the assessment, where modelled traffic data were available within the Scheme's transport model. This formed the air quality affected road network (ARN).

5.7.5. To facilitate air quality model verification, the Baseline (2018) model network also included road links adjacent to relevant Coventry City Council and Rugby Borough Council air quality monitoring locations, which were used in the verification process; see ES Appendix 5.2 (Air Quality Verification and Model Adjustment) (**TR010066/APP/6.3**).

5.7.6. Potentially sensitive receptors (human and ecological) within 200m of the triggered road links were identified, as detailed in Section 5.8 and included in the operational phase assessment.

5.7.7. The air quality ARN and associated identified sensitive receptors formed the study area for the operation phase assessment, as depicted on the following ES Figures (**TR010066/APP/6.2**):

- ES Figure 5.3 Affected Road Network (ARN) including roads where LA 105DMRB LA 105 screening criteria is exceeded
- ES Figure 5.4 Human health receptor locations
- ES Figure 5.5a (Ecological transects) and ES Figure 5.5b (Ecological transects)

5.8. Baseline conditions

5.8.1. The Scheme is located within the administrative boundaries of Rugby Borough Council and Coventry City Council.

5.8.2. Coventry City Council currently has a citywide AQMA, declared due to exceedances of the annual mean NO_2 objective[3], the boundary of which is immediately adjacent to the Scheme Order Limits. As such, a number of road links within the study area are located within the AQMA.

5.8.3. Rugby Borough Council currently has one AQMA declared, which covers the urban area of Rugby, approximately 8km to the east of the Scheme and outside of the study area.

Baseline data collation

5.8.4. Baseline air quality conditions within the identified study area were defined based on a review of information and data collated from the following sources:

- Coventry City Council air quality Annual Status Report (ASR) for 2022 and 2023 including associated non-automatic air quality monitoring data for the years 2017-2022.
- Defra's UK AIR Data Archive for 2018-2023 automatic monitoring data for Coventry Binley Road Monitoring Site.
- Rugby Borough Council air quality ASRs for 2023 and 2022 including associated air quality monitoring data for the years 2018-2022.
- National Highways Scheme specific 2016 Passive Diffusion Tube (PDT) monitoring
- Defra 1km x 1km grid background pollutant maps for NO_x, NO_2 and PM_{10} for the grid squares encompassing the operational phase study area.

5.8.5. There is good spatial coverage of local authority PDT monitoring undertaken for the model base year (2018) and the most recent year (2022). The monitoring data provides both a representative air quality baseline of the study area. The 2018 monitoring data has been used for the verification of the 2018 base air quality model. Further details of model performance can be found in section 5.5 and ES Appendix 5.2 (Air Quality Verification and Model Adjustment) (**TR010066/APP/6.3**).

5.8.6. Therefore, due to the coverage and quality of the 2018 base year local authority data for verification and 2022 local authority data for current baseline conditions, no Scheme-specific air quality monitoring has been undertaken.

Local authority air quality monitoring

Non-automatic monitoring

5.8.7. A review of both Coventry City Council's and Rugby Borough Council's passive diffusion tube monitoring networks for NO_2 identified that there are 14 monitoring

sites within the study area. Details of the monitoring locations and annual mean NO_2 concentrations as reported for the period 2017-2022, where available, are presented in Table 5-13 and Table 5-14. The geographic locations are depicted in Figure 5.6 (Local authority monitoring locations) (TR010066/APP/6.2).

Table 5-13: Annual mean NO_2 concentrations recorded at relevant diffusion tube sites within Coventry City Council (2017-2022)

Site ID	Site name	Site classification	National grid reference		Annual mean NO_2 concentration ($\mu g/m^3$)[1]					
			X	Y	2017	2018	2019	2020[2]	2021[2]	2022
GL1	Green Lane - Outside Primary School	Roadside	432818	275321	n/a	n/a	n/a	n/a	12.0	11.3
LON8	On no. 703 London Road	Façade	436551	275703	30.0	25.3	25.3	18.0	19.6	18.8
SHP1	257 Sir Henry Parks Road	Roadside	430447	277080	N/A	28.0	27.5	17.1	21.1	20.4
SHP2	262 Sir Henry Parks Road	Roadside	430364	277059	28.6	29.5	27.8	17.5	21.2	20.5
SHP3	Outside 190 Sir Henry Parks Road	Roadside	430566	277231	34.0	33.5	31.3	19.3	23.2	21.9
STL1	End of Stonehouse Lane	Roadside	436203	275841	35.2	31.3	33.6	21.7	23.5	22.4
STM1	Outside No. 2 Moseley Avenue	Roadside	433019	275729	n/a	n/a	n/a	n/a	17.0	16.3
STM2	Corner Green Lane & St Martins Lane	Roadside	433158	274766	n/a	n/a	n/a	n/a	15.8	17.4

n/a denotes not applicable as monitoring was not undertaken in that year.

[1] Data for 2023 was requested from Coventry City Council but Coventry City Council were unable to provide this at the time of writing.

[2] Concentrations monitored in 2020 and 2021 were notably lower than previous years due to travel restrictions associated with the COVID-19 pandemic. Data for 2022 is similarly low, suggesting traffic flows / transport behaviours had not returned to pre-pandemic levels.

Table 5-14 : Annual mean NO_2 concentrations recorded at relevant diffusion tube sites within Rugby Borough Council (2017-2022)

Site ID	Site name	Site classification	National grid Reference		Annual mean NO_2 concentration ($\mu g/m^3$)[1]					
			X	Y	2017	2018	2019	2020[2]	2021[2]	2022
S4	St Margaret's School, Wolston	Urban Background	441131	275648	12.3	12.1	10.4	8.2	8.9	8.3
S5	High St Ryton A45 by Subway	Kerbside	441131	275648	12.3	24.0	23.5	16.4	17.1	17.6
S14	Binley Woods Village Hall	Urban Background	439450	277523	14.7	15.1	16.8	10.9	10.7	11.1
S16	A45 Citrus Hotel	Roadside	436867	275275	18.2	19.6	18.8	13.5	14.6	14.1

[1] Data for 2023 were requested from Rugby Borough Council but Rugby Borough Council were unable to provide these.

[2] Concentrations monitored in 2020 and 2021 were notably lower than previous years due to travel restrictions associated with the COVID-19 pandemic. Data for 2022 is similarly low, suggesting traffic flows / transport behaviours had not returned to pre-pandemic levels.

5.8.8. The results presented in Table 5-13 and Table 5-14 demonstrate that NO_2 concentrations have remained consistently below the annual mean objective ($40\mu g/m^3$) over the period 2017 – 2022. Monitoring sites STL1 and LON8 are both located in proximity to the A46 Tollbar End junction, concentrations from which are likely to be representative of conditions near to the existing A46 Walsgrave junction.

5.8.9. Monitoring site STL1 recorded a concentration of $33.6\mu g/m^3$ in 2019, prior to the Covid-19 pandemic, which is below the annual mean objective. The most recent published concentration at STL1 was $22.4\mu g/m^3$ in 2022. It is evident that concentrations at all monitoring sites have experienced a notable reduction over the period 2020-2022 inclusive, principally attributed to the travel restrictions imposed during the pandemic (2020 and 2021) and associated changes to transport behaviours.

Automatic monitoring

5.8.10. There is an automatic monitoring site within Coventry City Council, which forms part of Defra's AURN, located east of Coventry urban centre on Binley Road (Site ID: COBR). The site is located approximately 3.5km to the west of the

Scheme's Order Limits (ES Figure 5.6 (Local authority monitoring locations) (**TR010066/APP/6.2**)) and continuously monitors both NO_2 and PM_{10}. The monitored annual mean concentrations for both pollutants are presented in Table 5-15 for the period 2018-2023 inclusive.

Table 5-15 :Annual mean NO_2 and PM_{10} concentrations from Coventry City Council automatic monitoring site

Site ID	Site name	Site type	X	Y	Distance to Scheme (km)	Pollutant	Annual mean concentration (µg/m^3)					
							2018	2019	2020[1]	2021[1]	2022	2023
COBR	Coventry Binley Road	Urban Traffic	434785	278978	3.5	NO_2	29.4	30.9	23.0	24.3	23.5	22.2
						PM_{10}	19.4	19.5	16.7	16.5	16.7	15.4
[1] Annual concentrations affected by COVID-19 pandemic travel restrictions												

5.8.11. The data from the AURN monitoring site demonstrates that NO_2 and PM_{10} annual mean concentrations have remained well below the respective air quality objectives (40µg/m^3) over the period reviewed.

Previous Highways England baseline Scheme specific monitoring – 2016 Annual Mean NO_2 Monitoring

5.8.12. An air quality baseline monitoring survey was undertaken by Highways England in 2016 in relation to the Scheme, prior to the options selection stage assessment. The monitored annualised mean NO2 concentrations are presented in Table 5-16.

Table 5-16 : Highways England 2016 Scheme-specific air quality monitoring data for NO_2 (diffusion tubes)

Site ID	Road name	Site type	Distance to Scheme (km)	Annual mean concentration (µg/m^3)
A46Cov_003	Faber Road	Roadside	1.5	22.0
A46Cov_004	Abbotsbury Close	Roadside	0.6	19.0
A46Cov_005	Valencia Road	Roadside	0.3	25.0
A46Cov_006	The Stoop	Roadside	1.2	23.0
A46Cov_009	Rugby Road	Roadside	1.6	30.0
A46Cov_0010	Grange Avenue	Roadside	2.1	17.0
A46Cov_0018	Bracadale Close	Roadside	0.3	23.0

	Annual mean objective	**40**

5.8.13. No exceedances of the NO_2 annual mean objective were recorded at any of the reported diffusion tube locations in 2016. The highest annualised mean concentration, measured at A46Cov_009 was 30µg/m^3 at approximately 1.6km to the south-east from the Scheme, was well below the objective of 40µg/m^3.

5.8.14. Given the overall decline in annual mean NO_2 concentrations in the study area over the period 2018 – 2022, as reported in Table 5-13 and Table 5-14, it is reasonable to assume that baseline levels at the 2016 monitoring locations will have experienced a similar trend over the same period.

Defra background air pollutant mapping

5.8.15. Defra provides mapped future year projections of background pollution concentrations for NO_x, NO_2 and PM_{10} for each 1km x 1km grid square across the UK for all years between 2018 and 2030[7]. The maps include a breakdown of background concentrations by emission source, including road and industrial sources, which have been calibrated against UK monitoring data from 2018.

5.8.16. The range in background concentrations reported for the grid squares encompassing the study area for the base year (2018), current year (2024) and future opening year (2028) are summarised in Table 5-17.

Table 5-17 : Range in background annual mean NO_x, NO_2 and PM_{10} concentrations for baseline (2018), current (2024) and opening (2028) years applicable to the assessed study area

Year	**Source**	**Annual mean concentration (µg/m^3)**		
		NO_x	**NO_2**	**PM_{10}**
2018	Defra background maps (2018-base); adjusted to remove relevant road source sectors*	17.6 – 23.1	12.9 – 16.4	13.9 – 15.0
2024		13.8 – 18.6	10.4 – 13.6	12.7 – 13.6
2028		13.0 – 17.3	9.8 – 12.7	12.5 – 13.4
* Concentrations contributions from motorway and Trunk A-road emission sources removed from background concentration using Defra's NO_2 Adjustment for NO_x Sector Removal Tool. This was completed to avoid double counting of vehicles emissions within the air quality modelling assessment.				

5.8.17. The reported background annual mean concentrations are within the relevant objectives for NO_2 and PM_{10}. Similarly, the current and future background NO_x concentration (23.1-17.3µg/m^3) is well within the statutory critical level for ecological sites (30µg/m^3). Background concentrations are predicted to decline annually based on the available Defra mapped data.

Background ammonia concentrations and critical levels

5.8.18. Background ammonia levels were sourced from the APIS website (APIS, 2024) and are based on the three-year average (2017-2019) ammonia concentration for the relevant grid squares encompassing each designated site within the study area. This three year average was utilised given that the middle year (2018) is equivalent to the assessment base year scenario.

5.8.19. The relevant critical levels were determined through consultation with the Scheme's competent biodiversity expert for the designated sites included in the study area (see 5.8.31). Both the critical level and background concentration data are presented in Table 5-18, demonstrating that the critical level (1µg/m^3) is exceeded at Willenhall Wood Local Nature Reserve (LNR) - including Ancient Woodland.

Table 5-18 : Annual mean background NH_3 concentrations and critical level values

Designated site	Background NH_3 concentration (2017-2019) (µg/m^3)	Critical level (µg/m^3)
Baginton Fields LWS	1.9	3.0
Binley Common Farm Woods Ancient Woodland	2.1	
Coombe Pool SSSI	2.2	
Gainford Rise LWS	2.2	
Herald Way Marsh SSSI	2.0	
Lower Sowe Meadows LWS	1.9	
Piles Coppice LWS inc. Ancient Woodland	2.1	
Sowe Valley: Dorchester Way LWS	2.2	
Sowe Valley: Wyken Croft to Antsy Road LWS	2.2	
Stonebridge Meadows LNR / LWS	1.9	
Stretton Croft LWS	2.2	
Willenhall Wood LNR - inc. Ancient Woodland	2.0	1.0

Background nitrogen deposition rates and critical loads

5.8.20. The equivalent background N deposition rates and associated critical load ranges for the designated ecological sites included within the study area were sourced from the APIS website (APIS, 2025). The background N-deposition rates are provided as a three-year average (2017-2019) for each 1x1km grid square. Within each square, a different rate is given for areas of 'Forest' and areas of 'Grassland (short vegetation)'.

5.8.21. The relevant N deposition background information and critical load ranges are presented in Table 5-19. At all respective designated sites, the background average N deposition rate exceeds the lower critical load (kgN/ha/yr).

Table 5-19 : Background nitrogen deposition rates and critical load values

Designated site	Nitrogen critical load class	Critical load range (kg N/ha/yr)*	Habitat Classification+	Average background N deposition rate per grid sqaure (2017-2019) (kg N/ha/yr)	Species sensitive to N deposition?
Baginton Fields LWS	Semi-improved grassland	10-15	Forest	32.3	Yes
Binley Common Farm Woods Ancient Woodland	Ancient Woodland	10	Forest	32.7	Yes
Coombe Pool SSSI	Shoveler – non-breeding, Grey heron – breeding, lowland open waters	10	Forest	33.6	Yes
Gainford Rise LWS	Rank, damp grassland	10-15	Forest	33.6	Yes
Herald Way Marsh SSSI	Invertebrate assemblage	10	Grassland (short vegetation)	18.6, 18.7, 18.8**	Yes
Lower Sowe Meadows LWS	Riverside woodland, marshy grassland, swamp, semi-improved grassland	10-15	Forest	32.3, 32.4**	Yes
Piles Coppice LWS inc. Ancient Woodland	Ancient Woodland	10	Forest	32.7	Yes
Sowe Valley: Dorchester Way LWS	Neutral grassland	20-30	Grassland (short vegetation)	19.4, 19.5, 19.8**	Yes
Sowe Valley: Wyken Croft to Antsy Road LWS	Grassland, swamp, woodland, fen, scrub, mire	10-15	Forest	34.0	Yes
Stonebridge Meadows LNR / LWS	Unimproved meadow, semi-improved grassland, marsh, notable plant species, birds, invertebrates	10-15	Forest	32.3	Yes
Stretton Croft LWS	Woodland, grassland, shrub,	10-15	Forest	34.8, 35.0	Yes

Designated site	Nitrogen critical load class	Critical load range (kg N/ha/yr)*	Habitat Classification+	Average background N deposition rate per grid sqaure (2017-2019) (kg N/ha/yr)	Species sensitive to N deposition?
	swamp, boundary hedges				
Willenhall Wood LNR - inc. Ancient Woodland	Woodland, semi-improved grassland.	10	Forest	32.4	Yes

* Lower critical load has been used in assessment

** The receptor transect applied in the assessment spans more than one grid square, resulting in varying background N-deposition rates.

+ For those ecological features which have a mix of both woodland and short vegetation types as qualifying interests, woodland has been used to provide a relative worst-case representation of background rates. Woodland habitats have a higher deposition velocity for nitrogen compared to short vegetation habitats, which results in an elevated deposition flux (i.e. higher deposition rate) for nutrient nitrogen.

Pollutant climate mapping model

5.8.22. There are six PCM road links which overlap the triggered links included within the study area. The maximum predicted annual mean NO_2 concentrations for these PCM links are presented in Table 5-20 for the baseline (2018), current (2024) and future Scheme opening (2028) years.

5.8.23. The PCM links included in the compliance assessment are depicted in ES Figure 5.7 (Pollutant climate mapping receptors) (**TR010066/APP/6.2**).

Table 5-20 : Defra PCM modelled annual mean NO_2 roadside concentrations for PCM links included in study area

PCM census ID	2018 NO_2 concentration ($\mu g/m^3$)	2024 NO_2 concentration ($\mu g/m^3$)	2028 NO_2 concentration ($\mu g/m^3$)
802073314	34.0	23.6	19.1
802007118	30.5	22.2	18.2
802077296	27.6	20.4	16.7
802016467	28.6	21.0	17.1
802036504	33.1	24.4	19.8
802006490	27.6	20.3	16.6

5.8.24. All Defra modelled NO_2 concentrations for each relevant PCM link are below the annual mean limit value ($40\mu g/m^3$) in each assessment year. This demonstrates that the Scheme would not affect the UK's reported ability to comply with the Air Quality Directive in the shortest timescale possible.

Selected sensitive receptors

5.8.25. Sensitive receptors have been chosen following the guidance outlined in DMRB LA 105.

Construction phase

5.8.26. The sensitivity of the receiving environment was determined using the criteria outlined in Table 5-8.

5.8.27. The number of sensitive receptors identified within each distance band, comprising residential properties, schools, medical health facilities (human) and ecological designated areas, are summarised in Table 5-21 and depicted in ES Figure 5.2 (Sensitive receptors within a distance of construction activities) (**TR010066/APP/6.2**).

Table 5-21 : Number of sensitive receptors within 200m of the Scheme Order Limits

Distance from Scheme Order Limits			
Within Order Limits	**0-50m**	**50-100m**	**100-200m**
2*	23	105	315
Notes: * Order limits overlap Coombe Pool SSSI and Gainford Rise LWS designated boundaries			

5.8.28. Based on the above, the receiving environment sensitivity for the construction phase of the Scheme was classified as ‘high’ due to the presence of receptors within 50m from the Scheme’s Order Limits.

Operational phase (human receptors)

5.8.29. The human receptors identified in closest proximity to roads that triggered the screening criteria were considered the most sensitive to changes in vehicle emissions. These were typically within 20 m of the triggered road links and consisted of residential, healthcare, and school properties.

5.8.30. A summary of the number and type of human health receptors included in the air quality modelling is provided in Table 5-22 and their locations depicted on ES Figure 5.4 (Human health receptor locations) (**TR010066/APP/6.2**). Full details of the modelled receptor locations are provided in ES Appendix 5.3 (Air Quality Receptor Results) (**TR010066/APP/6.3**).

Table 5-22 : Sensitive human discrete receptors included in operational phase air quality modelling

Receptor type	Count	Total
Residential	80	94
Healthcare	7	
School	7	

Operational phase (ecological receptors)

5.8.31. All ecologically designated sites within 200m of the triggered links were identified, comprising Sites of Special Scientific Interest (SSSI), Local Nature Reserves (LNR), Local Wildlife Sites (LWS) and Ancient Woodlands. The designated sites identified for this assessment are shown in ES Figure 5.5a (Ecological transects) and ES Figure 5.5b (Ecological transects) (**TR010066/APP/6.2**) and include:

- Binley Common Farm Wood Ancient Woodland
- Coombe Pool SSSI
- Gainford Rise LWS
- Herald Way Marsh SSSI & LNR
- Piles Coppice Ancient Woodland
- Sowe Valley: Dorchester Way LWS
- Sowe Valley: Wyken Croft to Ansty Road LWS
- Stonebridge Meadows LNR
- Stretton Croft LWS
- Willenhall Wood LNR inc. Ancient Woodland

5.8.32. Each of the above designated sites contain features/habitats that are potentially sensitive to changes in NO_x and NH_3 concentrations and N deposition rates, as detailed in section 5.8 Baseline conditions and informed by the professional judgment of the competent biodiversity expert. In line with paragraph 2.26.1 of DMRB LA 105, N deposition to watercourses does not require assessment.

5.8.33. With reference to DMRB LA 105 guidance, the above receptors were represented in the air quality model as a series of transects. Transect points were modelled at 10m increments, extending to 200m perpendicular to the relevant triggered link. These transects represented locations that are most sensitive to changes in vehicle emissions and thus changes in pollutant concentrations.

5.8.34. The locations of the modelled receptor transects are depicted in ES Figure 5.5a (Ecological transects) and ES Figure 5.5b (Ecological transects) (**TR010066/APP/6.2**).

Future baseline

5.8.35. Notwithstanding the impact of the Covid-19 pandemic, the existing air quality baseline review (as seen in Table 5-13 to Table 5-15) has demonstrated that roadside and urban levels of NO_2 and PM_{10} have generally been declining over recent years. Similarly, the Defra roadside NO_2 projections for the PCM links included within the study area (Table 5-17) indicate that annual mean concentrations will continue to reduce year-on-year up to 2030. This is expected to continue beyond 2030, principally due to the increased proportion of zero exhaust emission vehicles in the national fleet and the introduction of more stringent vehicle emissions standards that apply to NOx and particulates. Therefore, future roadside annual mean NO_2 concentrations are anticipated to experience a continued decline, such that they will remain below the respective objective.

5.8.36. Furthermore, the review of current and future background levels of NO_2, PM_{10}, and $PM_{2.5}$ projected by Defra confirmed that levels of each pollutant are expected to remain below the relevant objectives up to 2028 (as shown in ES Appendix 5.1 (Air Quality Modelling Process) (**TR010066/APP/6.3**), taking into account contributions from various emissions source sectors including roads, industry, and agriculture. The background maps predict an incremental improvement (reduction) in each of these pollutants in the coming years, which is anticipated to continue beyond 2028.

5.9. Potential impacts

5.9.1. This section presents the findings of the assessment of potential impacts of the Scheme on air quality.

Construction phase

5.9.2. The dust risk potential for the project was classified as ‘large’ as the Scheme principally relates to a bypass or major junction improvement project, as per Table 5-7. Due to this and the presence of receptors within 100m of the Scheme Order Limits (see Table 5-21), the receiving environment sensitivity is classified as ‘high’, as per the classification matrix in Table 5-8.

5.9.3. Therefore, as stated in DMRB LA 105, with the application of best practice construction mitigation measures commensurate to the level of dust risk level (as presented in the First Iteration EMP) and receptor sensitivity, the impact of

construction dust is unlikely to trigger a significant air quality effect (see Section 5.10).

Operation phase

Air quality impacts: human health

5.9.4. This section presents the results of the air quality modelling assessment relating to the operation of the Scheme and specifically the predicted air quality impacts at identified human receptors.

5.9.5. The results and analysis are presented for annual mean concentrations of both NO_2 and PM_{10}, respectively, focussed on the results modelled for the DM and DS 2028 scenarios relating to the Scheme opening year.

Nitrogen dioxide, NO_2

5.9.6. The annual mean NO_2 concentrations were adjusted in line with the outcomes of the verification exercise, as detailed in ES Appendix 5.2 (Air Quality Verification and Model Adjustment) (**TR010066/APP/6.3**). The full set of annual mean concentration results and associated concentration impacts (DM versus DS) are presented in ES Appendix 5.3 (Air Quality Receptor Results) (**TR010066/APP/6.3**). All receptors that are predicted to experience a change greater than 1% of the annual mean objective are presented in Table 5-23. The modelled sensitive receptors and equivalent magnitude of impact are depicted in ES Figure 5.8 (Operational phase annual mean NO_2 concentration impacts at human health receptors) (**TR010066/APP/6.2**).

Table 5-23: Human health receptor results greater than 1% (+/-0.4µg/m^3) of the annual mean objective (40µg/m^3)

Receptor	Annual mean NO_2 (µg/m^3)		
	DM 2028*	DS 2028*	DS - DM
R8	18.3	17.6	-0.7
R9	21.1	20.2	-0.9
R11	17.9	17.3	-0.7
R12	18.5	18.1	-0.4
R15	19.0	18.2	-0.8
R16	15.8	15.2	-0.6
R18	18.4	18.8	+0.4
R22	20.5	21.0	+0.5
R25	19.0	20.1	+1.1
R26	19.2	20.2	+1.0
R31	22.9	22.4	-0.4

Receptor	Annual mean NO_2 ($\mu g/m^3$)		
	DM 2028*	DS 2028*	DS - DM
R32	24.4	24.0	-0.4
R33	26.7	26.1	-0.6
R34	22.1	21.7	-0.4
R35	21.3	20.9	-0.4
R36	23.5	23.1	-0.4
R37	24.3	23.9	-0.4
R38	24.7	24.2	-0.5
R41	19.2	18.4	-0.8
R42	18.1	17.6	-0.4
R43	18.0	17.5	-0.5
R44	16.6	16.0	-0.6
R46	21.7	22.1	+0.4
R52	18.5	18.1	-0.4
R53	15.9	16.5	+0.6
R54	18.4	18.0	-0.4
R56	25.4	24.6	-0.8
R57	17.6	17.0	-0.7
S1	15.6	15.2	-0.4
Annual mean objective ($\mu g/m^3$)	**40**		
* Results have been subject to NO_2 long term trend 'gap analysis' (see paragraph 5.5.37)			

5.9.7. The results demonstrate that there are no modelled exceedances of the annual mean objective at any of the receptor locations in either the DM or DS 2028 scenarios. The maximum modelled annual mean NO_2 concentrations in the DM ($33.2\mu g/m^3$) and DS ($33.5\mu g/m^3$) scenarios were reported at the same residential receptor (R60) adjacent to the M69 and Wood Lane, equating to approximately 85% of the objective.

5.9.8. The maximum modelled increase (worsening) in annual mean NO_2 concentrations between the DM and DS scenarios is at receptor R25, which represents Hungerly Hall Farm's east outbuilding, located adjacent to the northwest of the Scheme. The increase between the DM ($19.0\mu g/m^3$) and DS ($20.1\mu g/m^3$) scenarios at R25 is $+1.1\mu g/m^3$. This increase is attributed to the change in alignment of the A46 and the B4082, with both moving closer to this property by approximately 5m and 30m (in comparison to the DM A46 alignment), respectively.

5.9.9. The maximum modelled decrease (improvement) in annual mean NO_2 concentrations between the DM and DS scenarios is at receptor R9 (-0.9µg/m^3), located along Clifford Bridge Road, near to the junction with the B4082. This improvement is attributed to an expected reduction in vehicle flows (>6,000 AADT) on the nearby B4082 resulting from the operation of the Scheme.

5.9.10. Overall, six of the 94 receptors (R18, R22, R25, R26, R46 and R53) are predicted to experience a worsening in annual mean NO_2 concentrations and are predominantly located in proximity to the A46 and M69 throughout the study area. A total of 23 receptors are predicted to experience a decrease (improvement) in concentrations with the Scheme in place, with the remaining 65 receptors predicted to experience an imperceptible change in concentrations.

5.9.11. The majority of receptors within the Coventry AQMA experience either an improvement or an imperceptible change in concentrations. Five of the six receptors predicted to experience a worsening in annual mean NO_2 concentrations are located within the AQMA.

5.9.12. As confirmed in Table 5-24, there are no receptors that exceed the annual mean objective. Therefore, with reference to DMRB LA 105, there will be no likely significant air quality effect for human health with respect to NO_2.

Table 5-24 : Predicted annual mean NO_2 impact information to determine potential for likely significant air quality effects

Magnitude of change in concentration (µg/m^3 *)	Value of change in annual average NO_2 and PM_{10}	Total number of receptors with:	
		Worsening of an air quality at sensitive receptor above the air quality threshold or the creation of a new exceedance	Improvement of an air quality at sensitive receptor above the air quality threshold or the removal of an existing exceedance
Large	Greater than 4µg/m^3	0	0
Medium	Greater than 2µg/m^3	0	0
Small	Greater than 0.4µg/m^3	0	0
Total change		0	0

5.9.13. The modelled annual mean NO_2 concentrations at all receptor locations are demonstrably below 60µg/m^3. As such, with reference LAQM.TG22 and the relationship between the annual mean and 1-hour mean NO_2 objectives, there are no predicted exceedances of the 1-hour mean air quality objective with or without the Scheme in place.

Particulate matter, PM_{10}

5.9.14. The baseline annual mean PM_{10} concentrations were adjusted in line with the outcomes of the verification exercise, as detailed in ES Appendix 5.2 (Air Quality Verification and Model Adjustment) (**TR010066/APP/6.3**). The results of the base year (2018) modelling demonstrate that there are no predicted exceedances of the PM_{10} annual mean air quality objective at any modelled receptor. The maximum concentration was 19.2µg/m^3 at R69, R70 and R72.

5.9.15. In line with DMRB LA 105, as there are no exceedances of the PM_{10} annual mean objective in the base year, there is no requirement to model PM_{10} concentrations in the DM and DS 2028 scenarios. Therefore, PM_{10} was scoped out of further assessment, with no likely significance effect for human health.

Ecological receptors

5.9.16. This section presents the results of the air quality modelling assessment relating to the operation of the Scheme and specifically the predicted air quality impacts at the identified ecological receptors. A series of transect receptors were modelled at the relevant designated sites (see paragraph 5.8.31) to assess the impact of changes in roadside vehicle emissions associated with the Scheme.

5.9.17. The results and analysis are presented for annual mean concentrations of NO_x and NH_3, and the contribution from these to N deposition rates.

Oxides of nitrogen, NO_x

5.9.18. The annual mean NO_x results at each transect receptor have been compared to the critical level (30 µg/m^3), focussed on the DM and DS 2028 scenarios. The full set of annual mean concentration results and associated concentration impacts (DM versus DS) for the modelled transects are presented in ES Appendix 5.3 (Air Quality Receptor Results) (**TR010066/APP/6.3**) and depicted on ES Figures 9a, 9b and 9c (Operational phase annual mean NOx concentration impacts) (**TR010066/APP/6.2**). All locations predicted to be above the critical level of 30µg/m^3 are presented in Table 5-25.

Table 5-25 : Modelled exceedances of the NO_x critical level (30µg/m^3)

ID	Designated habitat	Distance from road (m)	Annual mean NO_x (µg/m^3)		
			DM 2028	DS 2028	DS-DM
E4a_1	Baginton Fields LWS	10	31.4	31.6	+0.2
E18_1	Willenhall Wood LWS/LNR	10	31.9	32.2	+0.3

ID	Designated habitat	Distance from road (m)	Annual mean NO_x ($\mu g/m^3$)		
			DM 2028	DS 2028	DS-DM
Annual mean critical level ($\mu g/m^3$)			30		

5.9.19. There are no new exceedances of the critical level (30µg/m^3) caused by the Scheme as all exceedances in the DS are also occurring in the DM. There are two exceedances of the critical level (30µg/m^3) in both the DM and DS 2028 scenarios, within Baginton Fields LWS (E4a_1) and Willenhall Wood LWS/LNR (E18_1), respectively. Exceedances at each receptor transect are predicted to occur at 10m from the carriageway.

5.9.20. Whilst the exceedance of the critical level within the Baginton Fields LWS occurs in both the DM and DS 2028 scenarios, the increase in concentration at this receptor (+0.2µg/m^3) caused by the Scheme is below 1% of the critical level. As such, this represents a negligible impact.

5.9.21. The exceedance at Willenhall Wood LWS/LNR represents the maximum modelled annual mean concentration in the DS scenario (32.2µg/m^3), with the transect receptor (E18_1) being located adjacent to the north of the A46, south of Middle Ride. The increase caused by the Scheme (0.3µg/m^3) at this receptor equates to 1% of the critical level.

5.9.22. The competent biodiversity expert for this project has confirmed that sensitive protected species and habitats are unlikely to be present at and within 10m of the existing carriageway. As such, the impact at Willenhall Wood LWS/LNR (E18_1) would not represent a worsening at this distance, thereby equating to a slight adverse (not significant) impact.

5.9.23. Overall, there will be no likely significant effect for designated ecological receptors with respect to annual mean NO_x concentrations.

Ammonia, NH_3

5.9.24. The annual mean NH_3 results at each transect receptor have been compared to the relevant critical level, focussed on the DM and DS 2028 scenarios. The full set of annual mean concentration results and associated concentration impacts (DM versus DS) for the modelled transects are presented in ES Appendix 5.3 (Air Quality Receptor Results) (**TR010066/APP/6.3**).

5.9.25. There are exceedances of the critical level (1 or 3µg/m^3 depending on designation as per Table 5-18) in both the DM and DS 2028 scenarios. However, there are no new exceedances caused by the Scheme.

5.9.26. The maximum modelled NH_3 annual mean concentration (3.5µg/m^3) in the DS scenario is within the Stretton Croft LWS at transect reference E20_3, located 30m away from the M69 J1 slip road carriageway. Although this exceeds the critical level of 3µg/m^3, the impact (+0.02µg/m^3) equates to less than 1% of the critical level, representing a negligible impact.

5.9.27. The maximum modelled increase in concentrations caused by the Scheme (+0.06µg/m^3) occurs at Coombe Pool SSSI at transect reference E21_3, located 30m back from the A46 main carriageway. Although this impact equates to over 1% of the critical level, the total annual mean concentration in the DS scenario (2.7µg/m^3) remains below the critical level (3µg/m^3) at this location.

5.9.28. At Willenhall Wood LWS/LNR, which includes an area of ancient woodland, there are exceedances of the critical level (1µg/m3) in both scenarios, given that the background annual mean NH3 concentration for this designation is 2µg/m3. There are also impacts greater than 1% of the critical level attributed to the Scheme along a number of the modelled receptor transect points, as detailed within Table 5-26 and depicted on ES Figures 10a, 10b and 10c (Operational phase annual mean NH_3 concentration impacts) (**TR010066/APP/6.2**).

Table 5-26 : Modelled impacts exceeding 1% of the NH_3 critical level

ID	Designated habitat	Distance from road (m)	NH_3 critical level (µg/m³)	Annual mean NH_3 (µg/m³)			DS-DM as % of lower critical level
				DM 2028	DS 2028	DS-DM	
E5_2	Willenhall Wood LWS/LNR	20	1.0	2.72	2.74	+0.02	2.3%
E5_3	Willenhall Wood LWS/LNR	30	1.0	2.58	2.60	+0.02	1.7%
E5_4	Willenhall Wood LWS/LNR	40	1.0	2.48	2.49	+0.01	1.3%
E18_1	Willenhall Wood LWS/LNR	10	1.0	3.04	3.07	+0.03	2.5%
E18_2	Willenhall Wood LWS/LNR	20	1.0	2.73	2.75	+0.02	1.6%
E18_3	Willenhall Wood LWS/LNR	30	1.0	2.59	2.60	+0.01	1.1%

5.9.29. There are predicted exceedances of the 1% criterion at a total of six transect receptors, ranging from 10m to 40m from the carriageway. The maximum modelled impact occurs at transect E18_1, 10m from the carriageway, equating to 2.5% of the critical level.

5.9.30. The competent biodiversity expert for this project has confirmed that, the impact as a result of the Scheme have been assessed as slight adverse (not significant) in accordance with DMRB LA 108. The assessment undertaken by the competent biodiversity expert is based upon analysis of information including background NH_3 levels, areas of the LNR/LWS impacted by the increase and likely habitats within these areas based upon aerial imagery and mapping of the LWS provided by Warwickshire Biological Records Centre (WBRC). Therefore, based on the assessment by the competent biodiversity expert, the effect of the Scheme on NH_3 levels has been concluded to be not significant. See ES Chapter 8 (Biodiversity) (**TR010066/APP/6.1**) and ES Appendix 8.15 (Assessment of Air Quality Impacts on Ecological Features) (**TR010066/APP/6.3**).

Nitrogen deposition

5.9.31. The annual N deposition rates results at each relevant transect receptor have been compared to the lower critical load for the respective sensitive habitats within the designated site, focussed on the DM and DS 2028 scenarios.

5.9.32. The maximum modelled N deposition rates and impacts are presented in Table 5-27 for the relevant receptor transects. The full set of N deposition results and associated impacts (DM versus DS) for the modelled transects are presented in ES Appendix 5.3 (Air Quality Receptor Results) (**TR010066/APP/6.3**) and depicted on ES Figures 11a, 11b and 11c (Operational phase annual mean N-deposition impacts) (**TR010066/APP/6.2**).

Table 5-27 : Maximum modelled N deposition rates in DM and DS 2028 scenarios for comparison with relevant critical loads

Receptor ID[1]	Designated habitat	Distance from road (m)	Total nitrogen deposition rate (kgN/ha/yr)			DS-DM as % of lower critical load[2]
			DM 2028	DS 2028	DS-DM	
E1_1	Lower Sowe Meadows LWS	10	39.9	40.0	0.1	+0.8%
E2_1	Stonebridge Meadows LNR	10	46.1	46.2	0.1	+0.8%
E3_1	Lower Sowe Meadows LWS	10	40.9	40.9	0.0	+0.3%
E4a_1	Baginton Fields LWS	10	42.7	42.8	0.1	**+1.1**%
E4b_2	Stonebridge Meadows LNR	20	40.5	40.5	0.0	-0.1%
E5_1	Willenhall Wood LNR - inc. ancient woodland	10	43.1	43.4	0.3	**+3.1**%
E6_1	Sowe Valley Dorchester Way LWS	10	22.6	22.3	-0.3	**-1.4**%
E7_1	Herald Way Marsh SSSI	10	24.6	24.7	0.1	**+1.2**%
E9_2	Piles Coppice LWS inc., ancient woodland	20	38.2	38.4	0.2	**+1.5**%
E10_8	Binley Common Farm Wood potential LWS inc. ancient woodland	80	35.2	35.3	0.1	**+1.4**%
E11_3	Gainford Rise LWS	30	37.2	37.4	0.3	**+2.7**%
E12_1	Sowe Valley Dorchester Way LWS	10	23.1	22.5	-0.6	**-3.0**%
E13_1	Sowe Valley Dorchester Way LWS	10	22.4	22.1	-0.3	**-1.5**%
E14_1	Sowe Valley: Wyken Croft to Antsy Road LWS	10	40.9	40.4	-0.4	**-4.4**%
E15_13	Gainford Rise LWS	130	34.9	34.7	-0.2	**-1.7**%

Receptor ID[1]	Designated habitat	Distance from road (m)	Total nitrogen deposition rate (kgN/ha/yr)			DS-DM as % of lower critical load[2]
			DM 2028	DS 2028	DS-DM	
E16_4	Gainford Rise LWS	10	37.6	36.6	-0.9	**-9.1**%
E17_12	Gainford Rise LWS	120	35.8	35.4	-0.4	**-3.9**%
E18_1	Willenhall Wood LNR - inc. ancient woodland	10	43.5	43.8	0.2	**+2.4**%
E19_3	Coombe Pool SSSI	30	39.3	39.8	0.5	**+4.6**%
E20_2	Stretton Croft LWS	20	49.8	50	0.2	**+2.3**%
E21_3	Coombe Pool SSSI	30	38.7	39.2	0.6	**+6.0**%
E22_2	Coombe Pool SSSI	20	40.5	40.2	-0.3	**-3.2**%
E23_5	Coombe Pool SSSI	50	37.6	37.2	-0.4	**-3.8**%
SP3790979680	Veteran Tree	12	38.8	38	-0.8	**-8.3**%
SP3847279609	Veteran Tree	71	35.8	36.1	0.3	**+3.0**%
SP3833576796	Veteran Tree	184	33.6	33.6	0.0	<+0.1%
SP3868977180	Veteran Tree	186	33.8	33.8	0.0	-0.1%

Bold indicates exceedance of the +/-1% significance screening criterion. Increases in concentrations show a worsening in concentration with decreases in concentration equating to an improvement.

[1] Receptor ID nomenclature: 'E*n*' referenced the ecological transect specific to a designated site; "*_n*" provides indicator of specific transect receptor distance from nearest road (e.g. 'E2_1' represents ecological transect number two (Stonebridge Meadows LNR) and the specific receptor on that transect at 10m from the nearest road.

[2]Lower critical load for all sites is 10 kg N/ha/yr as per Table 5-19

5.9.33. The results demonstrate that the applicable lower critical load (10 kg N/ha/yr) for each designated site is exceeded in both the DM and DS 2028 scenarios, which is primarily due to the existing background deposition rates (see Table 5-19).

5.9.34. The modelled change in N deposition is less than 1% of the lower critical load at Lower Sowe Meadows LWS and Stonebridge Meadows LNR, as well as veteran trees SP3833576796 and SP3868977180. As such, the modelled impact of the Scheme at these receptors is negligible.

5.9.35. However, the 1% significance screening criterion is exceeded at a number of transect receptor points (21 in total) for the other designated sites/veteran trees included in the modelling assessment. Of these, 10 transect receptors are predicted to experience a decrease (improvement) in N deposition rates above the 1% significance screening criterion, with the Scheme in operation. The remaining 11 transect receptor points are predicted to experience an increase (worsening) in N deposition above the 1% criterion.

5.9.36. As evident in Table 5-27, the maximum modelled decrease in annual N deposition (-0.9kgN/ha/yr) occurs at receptor E16_4 (Gainford Rise LWS), equating to 9.1% of the lower critical load. This receptor is located 10m from the carriageway and the improvement is caused by the proposed changes in alignment of the A46 as part of the Scheme, which will move the road approximately 6m further away from the designation.

5.9.37. Improvements in N deposition rates with the Scheme in place are also predicted at Sowe Valley: Wyken Croft to Antsy Road LWS (E14), Sowe Valley Dorchester Way LWS (E6, E12 & E13), Gainford Rise LWS (E15 & E17) and veteran tree SP3790979680. These improvements are attributed to the expected reduction in traffic caused by the Scheme (approximately 6,000 AADT) along the B4082.

5.9.38. The remaining improvements above the 1% criterion are predicted to occur at Coombe Pool SSSI along transects E22 and E23, due to the realignment of the A46 and the B4082, which will move traffic further away from the designation (E23), in addition to increasing average speeds on the adjacent road relative to the DM scenario (E22). This will be caused by the removal of the existing roundabout as part of the Scheme, as viewed in ES Figure 5.11a (Operational phase annual mean N-deposition impacts) (**TR010066/APP/6.2**).

5.9.39. Conversely, receptor transects E21 and E19 located within the Coombe Pool SSSI designation, located further to the south relative to E22 and E23, are predicted to experience an increase in N deposition. These increases are attributed to the corresponding increase in traffic flows on the adjacent section of the A46 (approximately 3,000 AADT and 350 HDVs), as well as the realignment of the road bringing the A46 closer to the SSSI at this part of the Scheme (see ES Figure 5.11a (Operational phase annual mean N-deposition impacts) (**TR010066/APP.6.2**). The modelled impact at transect receptor E21_3 (+0.6kgN/ha/yr) equates to 6.0% of the lower critical load, with the increase at E19_3 (+0.5kgN/ha/yr) equating to 4.6%.

5.9.40. Similarly, Gainford Rise LWS is predicted to experience a worsening in N deposition at one transect (E11), despite other transects experiencing an improvement. The increase at E11_3 is driven by the expected increase in traffic flows on the A46 attributed to the Scheme.

5.9.41. All other transects and veteran tree SP3847279609 that are predicted to experience a worsening in N deposition above the 1% criterion are predominantly located adjacent to the A46 or the M69; there is also expected to be an increase in traffic flows attributed to the Scheme.

5.9.42. Despite the above mentioned transects exceeding 1% of the lower critical load (1% of 10k N/ha/yr = 0.1kgN/ha/yr), the competent biodiversity expert for the project has confirmed that, in accordance with the assessment as set out in DMRB *LA 108 Biodiversity* and in Chapter 8 (Biodiversity), there would be no significant impacts from the Scheme resulting from increase in N deposition. This is due to the following reasons which are detailed in relation to assessed relevant ecology receptors in ES Appendix 8.15 (Assessment of Air Quality Impacts on Ecological Features) (**TR010066/APP/6.3**):

- Impacted locations are primarily roadside, often in highway boundary woodland, where qualifying habitats for designation are not present.
- The impacted areas of features are often small in footprint relative to the size of the feature as a whole and impacted areas do not impact the integrity of non-impacted areas.
- High N-deposition background rates across the study area mean that ecological designations are already being impacted. The impacts are marginal when considering the change from DM to DS.

5.9.43. Further discussion and analysis have been conducted by the competent biodiversity expert for the project in ES Appendix 8.15 (Assessment of Air Quality Impacts on Ecological Features) (**TR010066/APP/6.3**). Within this discussion, the competent biodiversity expert concluded that there are no significant effects with respect to N-deposition on any ecologically designated sites.

Compliance risk assessment

5.9.44. The compliance risk assessment was undertaken with respect to the four Defra PCM model links (Census IDs 802036504, 802007118, 802073314 and 802006490) identified within the study area. Relevant qualifying features and 4m validation points were modelled adjacent to these links. The full set of qualifying and associated impacts are presented ES Appendix 5.3 (Air Quality Receptor Results) (**TR010066/APP/6.3**).

5.9.45. The results of the modelling in the DM and DS 2028 demonstrate that there are no exceedances of the annual mean NO_2 air quality limit value at any PCM validation point or relevant qualifying feature.

5.9.46. Therefore, with reference to DMRB LA 105, there is no risk to the reported date of compliance and no need for further assessment.

Assessment of significant effects

Construction

5.9.47. As the construction traffic is predicted to be well below the DMRB LA 105 screening criteria (paragraphs 5.5.9 to 5.5.13), there will be **no likely significant effect** on air quality from construction traffic emissions and the Scheme's construction will not affect the UK's ability to comply with the Air Quality Standards (Amendment) Regulations 2016.

5.9.48. With the application of best practice construction mitigation measures, as defined in the First Iteration EMP (**TR010066/APP/6.5**), there will be **no likely significant air quality effect** on local air quality associated with construction dust.

Operation

5.9.49. The operation of the Scheme will have **no significant air quality effect**. This statement is based on the following:

- The human health results analysis has demonstrated that there are no modelled exceedances of the annual mean NO_2 and PM_{10} air quality objectives with the Scheme in operation.
- Based on consultation with the competent biodiversity expert for the Scheme, the results analysis relating to ecological receptors has demonstrated that:
  - There are modelled exceedances of the relevant annual mean NO_x and NH_3 critical levels in in both the DM and DS 2028 scenarios, with some transect receptors experiencing an impact above 1% of the critical level. These occur within 40m of the nearest carriageway. However, there are no new exceedances of the relevant critical levels introduced by the Scheme.
  - Similarly, N deposition rates are assessed to exceed the lower critical load at each designated site in both the DM and DS 2028 scenarios, owing to an existing high background deposition rate. No new exceedances of the relevant lower critical loads are introduced by the Scheme.
  - The Scheme is predicted to have beneficial and adverse impacts on N deposition above 1% of the significance screening criterion.
  - However, the transect receptors exceeding the criterion represent, at worst, minor adverse impacts attributed to the Scheme. This is principally based on the existing high background levels, the size of the impacted area within the designated site, and presence of qualifying features within the impacted area.
  - Within the further discussion, ES Appendix 8.15 (Assessment of Air Quality Impacts on Ecological Features) (**TR010066/APP/6.3**), the

competent biodiversity expert concludes that there are no likely significant air quality effects on the assessed designated sites.

- The outcomes of the compliance risk assessment have demonstrated that there is no risk to the UK's ability to comply with the relevant air quality limit values.

5.10. Design, mitigation and enhancement measures

Design

5.10.1. The development of the Scheme design has been an iterative process. The environment team has worked in close collaboration with the infrastructure design team to avoid or reduce environmental impacts through the Scheme design. This is referred to as embedded (or design) mitigation. The principles of the design and mitigation hierarchy outlined in DMRB LA 104 Environmental Assessment and Monitoring have been followed. The first principle being to avoid potential adverse effects, if at all feasible, before seeking to minimise or mitigate for any unavoidable impacts. Embedded mitigation for the Scheme are reported in ES Chapter 2 (The Scheme).

5.10.2. Scheme design principles adopted to avoid or prevent adverse environmental effects are set out within the Scheme Design Report (**TR010066/APP/7.4**). This includes general principles and specific commitments that will inform the detailed design of the scheme. ES Chapter 3 (Assessment of Alternatives) (**TR010066/APP/6.1**) details the design alternatives that have been considered, including the environmental factors which have influenced the decision-making.

Mitigation

5.10.3. Mitigation is included in the Register of Environmental Actions and Commitments (REAC) contained within Appendix A of the First Iteration EMP (**TR010066/APP/6.5**). The First Iteration EMP will be developed into the Second Iteration EMP for implementation during construction and is secured by Requirement 4 of the draft DCO (**TR010066/APP/3.1**). Further information on the First Iteration EMP is provided within Section 4.8 of ES Chapter 4 (Environmental Assessment Methodology) (**TR010066/APP/6.1**).

Construction phase

5.10.4. This section summarises the mitigation required during the construction of the Scheme. Unless stated all mitigation is considered to be embedded as it follows best practice measures and/or is required to achieve compliance with legislation.

5.10.5. The construction dust assessment has concluded there will be no likely significant air quality effects associated with the Scheme, provided that

appropriate best practice mitigation measures are employed. The mitigation measures commensurate to the construction dust risk potential and environment sensitivity are included in the Scheme's First Iteration EMP (**TR010066/APP/6.5**). (Commitment AQ1 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

5.10.6. Based on a construction dust risk potential of large for the project with high environment sensitivity, the following activities will be required to monitor the effectiveness of the mitigation measures and be included in the First Iteration EMP (**TR010066/APP/6.5**) (Commitment AQ1 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)):

- Development of dust management plan with measures to monitor effectiveness of mitigation
- Daily on site and off site inspections
- Record of complaints/exceptional dust events

5.10.7. In addition, in line with the Coventry City Council and Rugby Borough Council Local Plans, the NRMM limits should be included within the First Iteration EMP (**TR010066/APP/6.5**) (Commitment AQ2 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)).

5.10.8. An Outline Air and Dust Management Plan has been produced and forms Appendix B.1 of the First Iteration EMP (**TR010066/APP/6.5**). This will be developed into an Air and Dust Management Plan during detailed design and form part of the Second Iteration EMP (Commitment AQ1 of the REAC, Appendix A of the First Iteration EMP (**TR010066/APP/6.5**)). The Second Iteration EMP will be secured in the DCO through Requirement 4.

Operation phase

5.10.9. The air quality assessment has concluded there are no significant air quality effects. As such, no mitigation measures have been proposed.

Enhancements

5.10.10. No enhancement measures have been identified for air quality.

5.11. Assessment of likely significant effects

5.11.1. The findings of this air quality assessment are consistent with the requirements set out in sections 5.12 and 5.13 of the NPS NN 2024 and the relevant Council's local plans. This section reports residual effects after mitigation has been considered.

5.11.2. With the implementation of the EMP dust mitigation measures, there would be **no significant effects** to air quality during the construction phase of the Scheme.

5.11.3. No mitigation specific to air quality is required for the operation phase and, as such, there will be **no significant effects** to air quality associated with the Scheme.

5.12. Monitoring

5.12.1. As no significant air quality effects have been identified associated with the Scheme construction and operation, additional air quality monitoring (other than mentioned within the EMP) is not required.

5.12.2. With reference to the consultation response from UKHSA (ES Appendix 4.1 Scoping Opinion Response (**TR010066/APP/6.3**)), the model outputs of the operational phase air quality base (2018) scenario were verified using local authority air quality monitoring data, as detailed in ES Appendix 5.2 (Air Quality Verification and Model Adjustment (**TR010066/APP/6.3**). The model adjustment derived through the verification process was applied to each Scheme opening year scenario (DM and DS 2028), as per Defra guidance LAQM.TG22. Given that the verified results of the modelling assessment have demonstrated that there are no likely significant effects on air quality due to the introduction of the Scheme, post-completion monitoring is not necessary.

5.13. Conclusions

5.13.1. This chapter reports a detailed account of the air quality impact assessment associated with the Scheme construction and operation phases, inclusive of an air quality baseline review. The outcomes of the assessment have been used to conclude on likely significant environmental effects.

5.13.2. The construction phase of the Scheme is identified as having a ‘large’ dust risk potential, with the receiving environment sensitivity being ‘high’. With the application of best practice construction mitigation measures, as included in the Scheme’s Fi4st Iteration EMP (**TR010066/APP/6.5**), the impact of construction dust is unlikely to trigger a significant air quality effect.

5.13.3. Given the intermittent use of NRMM and the transient nature of construction works, emissions from such plant will not have a material impact on air quality. Therefore, no further assessment has been undertaken. Similarly, the need for further assessment of construction vehicle emissions was scoped out (see the Scoping Opinion (**TR010066/APP/6.9**)) due to the proposed construction traffic being below the DMRB LA 105 screening criteria. As such, their impact of

emissions from construction vehicle emissions will have no significant effect on local air quality and will not affect the UK's ability to comply with *Air Quality Standards Amendment Regulations 2016*.

5.13.4. A detailed and verified air quality modelling exercise was completed with respect to assessing operational phase air quality impacts at both human and ecological receptors. With respect to human health, a total of 94 discrete sensitive receptors were included in the assessment. The modelling has demonstrated that the air quality objectives for NO_2 and PM_{10} are not predicted to be exceeded both without and with the Scheme in the opening year (2028). As such, there will be no likely significant air quality effect for human health.

5.13.5. The operational phase study area captured sensitive features and habitats within multiple ecological designations which were assessed with regards to NO_x, NH_3 and N-deposition. Where exceedances of the relevant critical levels and critical loads were modelled, they occurred in both the DM and DS 2028 scenarios, such that the Scheme is not predicted to introduce any new exceedances. However, a number of the modelled receptor transects were predicted to exceed the respective 1% significance screening criteria within some of the modelled designated sites, including but not limited to Coombe Pool SSSI (N deposition), Herald Way Marsh SSSI (N deposition) and Willenhall Wood LWS/LNR (NO_x, NH_3 and N deposition).

5.13.6. Following review of the ecological receptor results by the competent biodiversity expert for the project, it was confirmed that the transect receptors exceeding the 1% criterion represent, at worst, minor adverse impacts attributed to the Scheme. On this basis, and within the further discussion, (ES Appendix 8.15 (Assessment of Air Quality Impacts on Ecological Features) (**TR010066/APP/6.3**)), the competent biodiversity expert concluded that there are no likely significant air quality effects on the assessed designated sites.

5.13.7. A compliance risk assessment was undertaken to assess the potential for the Scheme to affect the UK's compliance with respective legal air quality limit values, specifically with respect to NO_2. The outcomes of the assessment demonstrate that there is no risk of the operational Scheme affecting national compliance.

5.13.8. The air quality assessment has adhered to the requirements set out in sections 5.12 and 5.13 of the NPS NN and has concluded there will be no significant effects in terms of air quality on human and ecological receptors as a result of the Scheme.

Acronyms

Acronym	Meaning
AADT	Annual average daily traffic
ADMS	Atmospheric Dispersion Modelling System
APIS	Air Pollution Information System
AQAP	Air quality action plan
AQMA	Air quality management area
AQO	Air quality objectives
AQS	Air quality strategy
ARN	Affected Road Network
ASR	Annual status Report
AURN	Automatic Urban and Rural Network
CERC	Cambridge Environmental Research Consultants
DMRB	Design Manual for Roads and Bridges
Defra	Department for Environment, Food and Rural Affairs
DM	Do-Minimum
DS	Do-Something
EMP	Environmental Management Plan
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LNR	Local Nature Reserve
LWS	Local Wildlife Site
N-deposition	Nutrient nitrogen deposition
NH_3	Ammonia
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NRMM	Non-Road Mobile Machinery
NSP NN	National Policy Statement for National Networks
NSIP	Nationally significant infrastructure projects
OS	Ordinance Survey
PCM	Pollution Climate Mapping
PEIR	Preliminary Environmental Information Report
$PM_{2.5}$	Particulate matter with a mean aerodynamic diameter of 2.5 micrometres or less
PM_{10}	Particulate matter with a mean aerodynamic diameter of 10 micrometres or less
SPD	Supplementary Planning Document
SSSI	Site of Special Scientific Interest
TfWM	Transport for West Midlands
TRA	Traffic Reliability Area
UKHSA	UK Health Security Agency
UNECE	United Nations Economic Commission for Europe
WMCA's	West Midlands Combined Authorities

Glossary

Glossary term	Definition
Air Quality Standards	Concentrations recorded over a given time period which are considered to be acceptable.
Affected road network	All roads which trigger the traffic screening criteria and adjoining roads within 200m
Average Annual Daily Traffic	The number of vehicles that travel past the location on an average day of the year.
Critical Level	The concentration of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge.
Critical Load	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.
Exceedance	A period of time (defined for each standard) where the concentration is higher than set out in the Standard.
Limit Values	Legally binding parameters which must not be exceeded.
Objectives	The target date on which exceedance of a Standard must not exceed a specified number.
Non Road-Mobile Machinery	Mobile machines and transportable industrial equipment or vehicles fitted with internal combustion engines but not made to transport good or passengers on the roads.
Speed Band	A range of categories for which outputs from the traffic model are grouped into to describe their emissions.
Target Values	Parameters which are to be attained where possible by taking all necessary measure not entailing disproportionate costs.
Triggered Link Network	All roads which trigger the traffic screening criteria.
Traffic Reliability Area	The area covered by the traffic model which the competent expert for traffic has identified as reliable for inclusion in an environmental assessment.
Vehicle Flow	Total AADT (including HDVs) in a specified direction.

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