

A1 in Northumberland: Morpeth to Ellingham

Scheme Number: TR010041

6.3 Environmental Statement – Chapter 5 Air Quality

Part B

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed
Forms and Procedure) Regulations 2009

June 2020

Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning
(Applications: Prescribed Forms and
Procedure) Regulations 2009**

**The A1 in Northumberland: Morpeth to Ellingham
Development Consent Order 20[xx]**

Environmental Statement

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5 AIR QUALITY

5.1 INTRODUCTION

- 5.1.1. This chapter presents the assessment of likely significant effects due to Part B: Alnwick to Ellingham (Part B) on air quality. The air quality assessment covers the assessment of construction impacts and operational impacts of Part B.
- 5.1.2. This chapter summarises the legislative and policy framework and describes the methodology followed for the assessment along with the assessment assumptions and limitations. The model results presented in this chapter are based on traffic modelling of Part B, as set out in **Chapter 4 of the Case for the Scheme (Application Document Reference: TR010041/APP/7.1)**. The chapter identifies the potential impacts as a result of Part B, details the design, mitigation and enhancement measures that have been identified and reports the assessment of the significant effects of Part B. This chapter is intended to be read as part of the wider Environmental Statement (ES) and in conjunction with its associated figures and appendices.
- 5.1.3. This chapter should be read together with the associated appendices (**Appendix 5.1: Traffic Data, Appendix 5.2: Construction Traffic Assessment, Appendix 5.3: Methodology and Verification, Appendix 5.4: Receptors, Appendix 5.5: Operational Impacts – Human Receptors and Appendix 5.6: European Union Limit Value Compliance Risk Assessment, Volume 8** of this ES (**Application Document Reference TR010041/APP/6.8**)).
- 5.1.4. **Section 4.3 of Chapter 4: Environmental Assessment Methodology, Volume 1** of this ES (**Application Document Reference: TR010041/APP/6.1**) identifies any differences in the assessment methodology employed for Part A: Morpeth to Felton (Part A) and Part B. Further to this, there are other differences between the chapters for Part A and Part B. All key differences include:
- a. There are differences between Part A and Part B that relate to the scoping process, for example elements that are scoped in and out of the assessment. Refer to the **Scoping Report (Application Document Reference: TR010041/APP/6.10)** and **Scoping Opinion (Application Document Reference: TR010041/APP/6.12)** for Part A, and the **Scoping Report (Application Document Reference: TR010041/APP/6.11)** and **Scoping Opinion (Application Document Reference: TR010041/APP/6.13)** for Part B.
- 5.1.5. A full description of Part B, along with the Scheme as a whole is set out in **Chapter 2: The Scheme, Volume 1** of this ES (**Application Document Reference: TR010041/APP/6.1**). An assessment of combined effects of Part B is set out in **Chapter 15: Assessment of Combined Effects** of this ES and combined and cumulative effects of the Scheme are set out in **Chapter 16: Assessment of Cumulative Effects, Volume 4** of this ES (**Application Document Reference: TR010041/APP/6.4**).

5.2 COMPETENT EXPERT EVIDENCE

5.2.1. **Table 5-1** below demonstrates that the professionals contributing to the production of this chapter have sufficient expertise to ensure the completeness and quality of this assessment.

Table 5-1 - Relevant Experience

Name	Role	Qualifications and Professional Membership	Relevant Experience
Luc Porter	Author	MSc Environmental Diagnostics and Management BSc Biochemistry Chartered Environmentalist, member of the Institute of Air Quality Management (IAQM)	Principal Consultant Nine years' experience of undertaking Design Manual for Roads and Bridges (DMRB) assessments at various stages of development. Other recent relevant experience includes: <ul style="list-style-type: none"> - Modeller and author on assessments of A27 Worthing-Lancing - Modeller and author on assessments of M27 Smart Motorway - Modeller and author on assessments of A27 Arundel bypass
Andy Talbot	Reviewer	MSc Environmental Water Management BSc Geology Chartered Scientist, member of the Institute of Air Quality Management Practitioner of the Institute of Environmental Management and Assessment.	Associate Director 24 years' experience in impact assessment. Other recent relevant experience includes: <ul style="list-style-type: none"> - Technical lead on air quality assessments for M25 Design Build Finance Operate (DBFO) Sections 2 and 5 Later Upgrade Sections - Technical lead for M62 J25-30 Managed Motorway - Technical lead for M4/M5 Managed Motorway - Technical lead for M3 J9 Improvement

Name	Role	Qualifications and Professional Membership	Relevant Experience
			<ul style="list-style-type: none"> - Technical lead for M2 J5 Improvement - Technical lead for A27 Worthing-Lancing - Technical lead for Tranche 5 Smart Motorways Programme M62 J20-25 - Technical lead for A27 East of Lewes

5.3 LEGISLATIVE AND POLICY FRAMEWORK

INTERNATIONAL LEGISLATION

European Union Ambient Air Quality Directive

5.3.1. The European Union (EU) Ambient Air Quality Directive (**Ref. 5.1**) sets limit values for the concentration of pollutants in ambient air for the protection of health and ecosystems. The Directive is transposed into legislation in the Air Quality Standards (England) Regulations 2010 (**Ref. 5.2**) (as amended) (**Ref. 5.3**). Compliance with the EU limit values for pollutants is mandatory and this is ultimately the responsibility of the Secretary of State. Failure to comply will result in infraction proceedings by the EU with potentially a substantial financial penalty.

5.3.2. The EU limit values that are relevant to this assessment are included in **Table 5-2** as 'relevant ambient air quality thresholds.'

NATIONAL LEGISLATION

Environment Act and UK Air Quality Strategy

5.3.3. Under the requirements of the Environment Act 1995, the UK government published an Air Quality Strategy (AQS) (**Ref. 5.4**). The AQS sets out the UK's national standards and objectives for ambient air quality, and measures to help achieve the objectives. The overall aim of the AQS is to achieve steady improvement in air quality into the long-term. The objectives are transcribed into regulations in the Air Quality (England) Regulations 2000 (**Ref. 5.5**) (as amended) (**Ref. 5.6**).

5.3.4. The Environment Act 1995 also sets out the principles for Local Air Quality Management (LAQM) (**Ref. 5.7**) under which Local Authorities are required to review current and future air quality within their area against the air quality objectives. Where it is anticipated that an air quality objective will not be met, the Local Authority is required to declare an Air Quality Management Area (AQMA) and to produce an Action Plan in pursuit of the achievement of the air quality objectives.

5.3.5. The air quality objectives that are relevant to this assessment - and which are numerically the same as the EU limit values - are included in **Table 5-2** as 'relevant ambient air quality thresholds'.

Table 5-2 – Relevant Ambient Air Quality Thresholds

Pollutant	Concentration (µg/m ³)	Measured As	Number of Exceedances Allowed in a Calendar Year
Set for the protection of human health			
Nitrogen dioxide (NO ₂)	40	Annual mean	None
	200	1-hour mean	No more than 18
Particulates less than 10 micrometres in diameter (PM ₁₀)	40	Annual mean	None
	50	24-hour mean	No more than 35
Particulates less than 2.5 micrometres in diameter (PM _{2.5})	25	Annual mean	None
Set for the protection of ecosystems (critical level)			
Nitrogen oxides (NO _x)	30	Annual mean	None

Environmental Protection Act

5.3.6. Air pollution can constitute a 'statutory nuisance', as set out in the Environmental Protection Act 1990 (**Ref. 5.8**), where fumes, dust or deposits are "*prejudicial to health or a nuisance*" (Part III Statutory Nuisances and Clean Air, Section 79). Local authorities are required to detect any such nuisances within their area. Dust generated by construction and demolition work, such as resulting from activities such as earthworks, the cutting of materials and vehicles using haul roads which results in re-suspension of deposited dust can constitute a statutory nuisance. Local Authorities have the power to serve an abatement notice, requiring the abatement of a nuisance or requiring works to be executed to prevent their occurrence. To avoid causing a statutory nuisance the main contractor would need to demonstrate 'Best Practicable Means' in mitigating emissions. The Development Consent Order (DCO) application is accompanied by a **Statement Relating to Statutory Nuisance (Application Document Reference: TR010041/APP/6.15)** which sets out how the Scheme would mitigate against any potential nuisance identified under the Environmental Protection Act 1990 (**Ref. 5.8**).

POLICY

National

- 5.3.7. National policy relevant to air quality and the significance of Part B on the policy objectives is outlined in **Table 5-3**.

Local

- 5.3.8. Local policy relevant to air quality and the significance of Part B on the policy objectives is outlined in **Table 5-4**.

Table 5-3 – National Planning Policy Relevant to Air Quality

Policy	Relevant Policy Objectives	Significance of Part B on Policy Objective
<p>National Policy Statement for National Networks (NPS NN) Requirements of the Highways England's assessment - paragraph 5.7 and 5.9 (Ref. 5.9)</p>	<p>Paragraph 5.7 outlines that the environmental statement should include a description of:</p> <ul style="list-style-type: none"> - <i>“Existing air quality levels;</i> - <i>“Forecasts of air quality at the time of opening, assuming that the scheme is not built (the future baseline) and taking account of the impact of the scheme; and</i> - <i>“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 road traffic generated by the project”</i> <p>Paragraph 5.9 states: <i>“In addition to information on the likely significant effects of a project in relation to EIA, the Secretary of State must be provided with a judgement on the risk as to whether the project would affect the UK’s ability to comply with the Air Quality Directive.”</i></p>	<p>The assessment includes all aspects set out in NPS NN paragraph 5.7:</p> <ul style="list-style-type: none"> - Existing air quality levels are described in Section 5.7 of this chapter. - The assessment considers both “Do Minimum” (without Part B) and “Do Something” (with Part B) scenarios, as set out in Section 5.4 of this chapter. - Significant effects, mitigation (where required), and residual effects are set out in Section 5.9 and Section 5.10 of this chapter. <p>An assessment of the likely significant effects, including the UK’s compliance with the Air Quality Directive is provided in Section 5.10 of this chapter.</p>
<p>National Policy Statement for National Networks (NPS NN) Secretary of State's responsibilities in decision making - Paragraphs 5.12 and 5.13 (Ref. 5.9)</p>	<p>Paragraph 5.12 of the NPS NN states: <i>“The Secretary of State must give air quality considerations substantial weight where a project would lead to a significant air quality impact in relation to EIA and/or where they lead to a deterioration in air quality in a zone/agglomeration.”</i></p> <p>Paragraph 5.13 of the NPS NN states: <i>“The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will: result in a zone /agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant; or affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision.”</i></p>	<p>An assessment of the likely significant effects, including the UK’s compliance with the Air Quality Directive is provided in Section 5.10 of this chapter.</p> <p>The results of the assessment confirm that Part B would not have a significant impact in relation to Environmental Impact Assessment (EIA) and would not affect the UK’s compliance with the limit values set out in the Air Quality Directive.</p>
<p>National Planning Policy Framework (NPPF) (Ref. 5.10)</p>	<p>The NPPF has an overarching environmental objective to protect and enhance our environment and to minimise pollution.</p> <p>In relation to air quality, paragraph 181 of the NPPF states: <i>“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... 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.”</i></p>	<p>An assessment of the likely significant effects, including the UK’s compliance with the Air Quality Directive is provided in Section 5.10 of this chapter.</p> <p>Part B would sustain future compliance with air quality objectives and EU limit values.</p> <p>The assessment addresses the impacts of cumulative traffic growth. Part B does not affect air quality within any AQMAs.</p>
<p>UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations (UK Plan) (Ref. 5.11)</p>	<p>The UK Plan sets out measures for bringing NO₂ levels within the EU limit values in the shortest possible time.</p> <p>Under the UK Plan, Highways England has a responsibility to improve air quality on the strategic road network. This includes exploration and testing of innovative technologies and ideas for improving air quality.</p>	<p>An assessment of the likely significant effects, including the UK’s compliance with the Air Quality Directive is provided in Section 5.10 of this chapter.</p> <p>Part B would not affect the UK’s compliance with the limit values set out in the Air Quality Directive.</p> <p>There are no national measures in the UK plan that would be affected by Part B.</p>

Policy	Relevant Policy Objectives	Significance of Part B on Policy Objective
Clean Air Strategy 2019 (Ref. 5.12)	The Strategy sets out the comprehensive action required from all parts of government and society to help meet legally binding targets of the five most damaging air pollutants (fine particulate matter, ammonia, nitrogen oxides, sulphur dioxide, and non-methane volatile organic compounds).	An assessment of the likely significant effects, including the UK's compliance with the Air Quality Directive is provided in Section 5.10 of this chapter. There are no national measures in the UK plan that would be affected by Part B.
Highways England Air Quality Strategy (Ref. 5.13)	In August 2017, Highways England published 'Our strategy to improve air quality'. This follows on from the Department for Transport Road Investment Strategy and the Highways England Delivery Plan 2015-2020. The strategy recognises the critical importance of air quality to the UK and sets out the approach to "achieving cleaner air for our customers and our neighbours who live alongside our network."	An assessment of the likely significant effects, including the UK's compliance with the Air Quality Directive is provided in Section 5.10 of this chapter. Part B would sustain future compliance with air quality objectives and EU limit values, whilst increasing capacity on the strategic network.

Table 5-4 – Local Planning Policy Relevant to Air Quality

Local Policy	Relevant Policy Objectives	Significance of Part B on Policy Objective
NCC Local Plan (2019) Policy STP 5 (Health and Wellbeing) (Ref. 5.14)	<i>"Development proposals will be required to demonstrate that they: ...g. [...] do not have a negative impact upon ground instability, ground and water contamination, vibration, air and noise pollution."</i>	An assessment of the likely significant effects, including the UK's compliance with the Air Quality Directive is provided in Section 5.10 of this chapter. Part B would not impact significantly on any of the actions within the Local Plan.
NCC Local Plan (2019) Policy TRA2 – The effects of development on the transport network (Ref. 5.14).	<i>"1. In assessing development proposals, all developments affecting the transport network will be required to:f. Minimise any adverse impact on communities and the environment, including noise and air quality."</i>	The assessment identifies any adverse impacts and specifies mitigation, as set out in Section 5.9 of this chapter, to ensure no significant residual effects.
NCC Local Plan (2019) Policy POL 2 - 'Pollution and Air, soil and water quality' (Ref. 5.14)	<i>"1. Development proposals in locations where they would cause, or be put at unacceptable risk of harm from, or be adversely affected by pollution by virtue of the emissions of fumes, particles, effluent, radiation, smell, heat, light, noise or noxious substances will not be supported. 2. Development proposals that may cause pollution of water, air or soil, either individually or cumulatively, are required to incorporate measures to prevent or reduce their pollution so as not to cause nuisance or unacceptable impacts on the environment, people or biodiversity. 3. Development proposed where pollution levels are unacceptable, and unable to be mitigated to acceptable levels, will not be supported." 4. Development will be required to help: a. Maintain soil quality standards; b. Improve water quality standards in line with the requirements of Policy WAT 1; and c. Maintain air quality standards and support improvements in any identified Air Quality Management Areas consistent with any local air quality action plans."</i>	The assessment identifies any adverse impacts and specifies mitigation to ensure no significant residual effects. Refer to Section 5.8 and Section 5.10 of this chapter.

5.4 ASSESSMENT METHODOLOGY

5.4.1. This section sets out the scope of the air quality assessment which has been determined via the **Scoping Report (Application Document Reference: TR010041/APP/6.11)** and **Scoping Opinion (Application Document Reference: TR010041/APP/6.13)** and subsequent consultation as detailed in **Appendix 4.2: Environmental Consultation, Volume 1** of this ES (**Application Document Reference: TR010041/APP/6.1**). **Appendix 4.1: Scoping Opinion Response Tracker, Volume 1** of this ES (**Application Document Reference: TR010041/APP/6.1**) provides a summary of the Scoping Opinion comments received from the Planning Inspectorate, along with the responses which have informed the scope, methodology and assessment in this chapter.

SCOPE OF ASSESSMENT

5.4.2. The following topics have been assessed in this chapter:

Construction

a. Construction dust on existing air quality receptors

Operation

a. Changes in roadside pollutant concentrations from operational traffic (local air quality assessment)

b. Emissions from operational traffic (regional air quality assessment)

5.4.3. A review of the construction traffic determined that potential construction traffic impacts on air pollutants could be screened out of the assessment as the predicted construction traffic flows fell well below the DMRB HA 207/07 scoping criteria (**Ref. 5.15**). Refer to **Appendix 5.2: Construction Traffic Assessment, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**) for further details and justification of this approach.

5.4.4. Since production of the **Scoping Report (Application Document Reference: TR010041/APP/6.11)**, the level of assessment was changed from 'simple' to 'detailed' due to potential impacts on ecological receptors as part of the Cumulative Scenario. The results presented in this chapter are based on the detailed modelling outputs.

5.4.5. The assessment of roadside air quality considers NO_x, NO₂ and particulate matter (PM₁₀ and PM_{2.5}) impacts on human health, ecological receptors, and EU limit value compliance. The assessment of regional vehicle emissions considers the changes in CO₂, NO_x and PM₁₀.

CONSULTATION

5.4.6. Consultation relating to potential air quality impacts on human receptors was undertaken with NCC. This is presented in **Appendix 4.2: Environmental Consultation, Volume 1** of this ES (**Application Document Reference: TR010041/APP/6.1**).

5.4.7. Consultation relating to ecological receptors is presented in **Chapter 9: Biodiversity** of this ES.

METHODS OF BASELINE DATA COLLECTION

- 5.4.8. The baseline data collected and presented in this chapter were sourced by desktop study of publicly available records obtained from NCC and documents from previous stages of this assessment.

DATA SOURCES

- 5.4.9. The following sources of data have been used for this assessment:
- a. Part B traffic modelling, as set out in **Chapter 4** of the **Case for the Scheme (Application Document Reference: TR010041/APP/7.1)**.
 - b. NCC's Air Quality Annual Status Report (ASR) (**Ref. 5.16**).
 - c. Part B specific NO₂ diffusion tube monitoring undertaken by the Applicant between February 2017 and August 2017.
 - d. National forecasts for roadside and background pollutant concentrations based on the Pollution Climate Mapping (PCM) model (**Ref. 5.17**) published by the Department for Environment, Food and Rural Affairs (Defra).
 - e. MAGIC Website (**Ref. 5.18**) provides locations of statutory designated sites such as Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Ramsar sites, and National and Local Nature Reserves (NNRs and LNRs).
 - f. Nitrogen deposition and NO_x data published by the online Air Pollution Information System (APIS) (**Ref. 5.19**) for designated ecological sites.
 - g. Interim Advice Note (IAN) 185/15 – updated vehicle emission rates (**Ref. 5.20**).
 - h. Defra's NO_x to NO₂ conversion calculator (version 6.1) (**Ref. 5.21**).

METHODOLOGY

- 5.4.10. The NPS NN requires an assessment of the air quality impacts of a scheme to be undertaken to determine if it is compliant with the policy. This is undertaken in accordance with the DMRB HA 207/07 guidance (**Ref. 5.15**). The assessment should include a description of existing air quality, future air quality with and without Part B in place, and any significant effects, mitigation, and residual effects. The assessment should distinguish between construction and operation. The assessment methodology set out below is compliant with these requirements. This DCO application is accompanied by a **Statement Relating to Statutory Nuisance (Application Document Reference: TR010041/APP/6.15)** which sets out how the Scheme would mitigate against any potential nuisance identified under the Environmental Protection Act 1990 (**Ref. 5.8**).
- 5.4.11. The NPPF requires the assessment to give consideration to the impacts of cumulative traffic growth. The assessment set out in this chapter covers the Do-Something (with Part B) traffic scenario for the Part B ARN only. However, an assessment of the Do-Something traffic scenarios for the Scheme as a whole is set out in **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme, Volume 4** of this ES (**Application Document Reference TR010041/APP/6.4**). In addition, other committed developments were included in both the Do-Minimum (without Part B but including other committed schemes and

developments) and Do-Something scenarios, as set out in **Chapter 4** of the **Case for the Scheme (Application Document Reference TR010041/APP/7.1)**.

- 5.4.12. The methodology for detailed level of assessment is in accordance with DMRB HA 207/07 (**Ref. 5.15**). The following IANs have also been followed:
- a. IAN 170/12v3 Updated Air Quality Advice on the Assessment of Future NO_x and NO₂ Projections for Users of DMRB Volume 11, Section 3, Part 1 'Air Quality' (**Ref. 5.22**).
 - b. IAN 174/13 Updated Advice for Evaluating Significant Local Air Quality Effects for DMRB Volume 11, Section 3, Part 1 'Air Quality' (**Ref. 5.23**).
 - c. IAN 175/13 Updated air quality advice on risk assessment related to compliance with EU Directive on ambient air quality and on the production of scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 'Air Quality' (**Ref. 5.24**).
 - d. IAN 185/15 Updated Traffic, Air Quality and Noise Advice on the Assessment of Link Speeds and Generation of Vehicle Data into 'Speed bands' for Users of DMRB Volume 11, Section 3, Part 1 'Air Quality' and Volume 11, Section 3, Part 7 'Noise' (**Ref. 5.20**).
- 5.4.13. IAN 170/12v3 (**Ref. 5.22**) advises on the projection of NO_x and NO₂ and provides a 'Gap Calculator' to account for the gap between current projected vehicle emission reductions and projections on the annual rate of improvements in ambient air quality. The calculator utilises projection factors for annual mean NO₂ and NO_x concentrations between 2008 and 2030. Updated projection factors were provided by the Applicant in May 2015 and have been used for this assessment. These updated factors reflect the latest predicted long-term trends from the introduction of Euro 6/VI vehicles (termed 'LTT_{E6}'). The results presented in this chapter are based on outputs of the Gap Calculator.
- 5.4.14. IAN 174/13 (**Ref. 5.23**) advises on the significance of effects and is discussed below in **paragraph 5.4.43**.
- 5.4.15. IAN 175/13 (**Ref. 5.24**) has been withdrawn. However, in the absence of published updated advice, IAN 175/13 has been used to assess the impact of Part B on compliance with the Air Quality Directive on ambient air quality.
- 5.4.16. IAN 185/15 (**Ref. 5.20**) includes vehicle emission rates for defined traffic conditions for NO_x, PM₁₀ and CO₂ for use in air quality assessments. Speed band emission factors, associated with IAN 185/15, as issued by Highways England in May 2018 were used for the assessment¹. As IAN 185/15 does not give emission rates for PM_{2.5} it was assumed that these are the same as for PM₁₀.
- 5.4.17. Traffic data for the air quality assessment were provided with a base year of 2015.
- 5.4.18. The assessment has also taken into account Local Air Quality Management Technical Guidance LAQM.TG (16) (**Ref. 5.25**) in the processing of monitoring data, and the verification of dispersion models.

¹ Updated emission factors were issued by Highways England in September 2019. The differences between the September 2019 and May 2018 emission factors are too slight to materially affect the findings of the assessment presented in this chapter.

UPDATED DMRB GUIDANCE

- 5.4.19. Since the assessments reported in this ES were completed, the DMRB methodology HA 207/07 (**Ref. 5.15**) has been superseded and replaced with updated guidance. The updated guidance (DMRB LA 105 Air Quality (**Ref. 5.26**)) was released in November 2019 and provides an all-encompassing guidance document bringing together HA 207/07 (**Ref. 5.15**), IAN 170/12 (**Ref. 5.22**), IAN 174/13 (**Ref. 5.23**), IAN 175/13 (**Ref. 5.24**) and part of IAN 185/15 (**Ref. 5.20**).
- 5.4.20. To determine the implications of the updated guidance to the conclusions of the ES, a sensitivity test has been undertaken to identify key changes in the assessment methodology and determine whether there would be changes to the significant effects reported in this ES if the updated guidance had been used for the assessment.
- 5.4.21. The findings of the sensitivity test are detailed in **Appendix 4.5: DMRB Sensitivity Test, Volume 1** of this ES (**Application Document Reference: TR010041/APP/6.1**) and summarised in **Appendix 5.7: Air Quality DMRB Sensitivity Test, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**) and in **Section 5.10** of this chapter.

CONSTRUCTION

- 5.4.22. The assessment of construction dust impacts has been undertaken qualitatively following guidance in DMRB HA 207/07 paragraph 3.45 (**Ref. 5.15**). This has accounted for sensitive receptors such as housing, schools, hospitals and sensitive features within a designated site within 200 metres (m) of the Order Limits of Part B.

OPERATION

Assessment Scenarios

- 5.4.23. Operational impacts have been assessed (at both a local and regional level) in relation to the following scenarios:
- a. Baseline (2015)
 - b. Opening year (2023) Do-Something (Part B) compared to the Do-Minimum
 - c. Design year (2038) Do-Something (Part B) compared to the Do-Minimum
- 5.4.24. In considering local air quality impacts, DMRB HA 207/07 (paragraph 3.5) (**Ref. 5.15**) requires *“the worst year in the first 15 years from opening”* to be assessed. In general, the worst year from opening is the opening year itself, as it is anticipated that reductions in vehicle emission in later years would offset the impacts of traffic growth. Consequently, the assessment of local air quality impacts addresses the opening year only as the worst-case. For the regional air quality assessment, emissions have also been calculated for the design year (15 years from the opening year).

Air Quality Modelling

- 5.4.25. The operational assessment has been based on traffic data representative of morning peak, inter-peak, afternoon peak and off-peak periods for the scenarios described above. The data have been derived from the traffic model for Part B (refer to **Chapter 4** of the **Case for**

the Scheme (Application Document Reference: TR010041/APP/7.1)). Vehicle emissions have been modelled in accordance with IAN 185/15.

- 5.4.26. For the local air quality assessment, dispersion modelling using ADMS-Roads v4.1.1.0 (**Ref. 5.27**) was used to predict roadside concentrations of NO_x in the baseline and opening years. For the regional assessment, total emissions of NO_x, PM₁₀ and CO₂ were calculated for all roads within the Study Area for the baseline, opening and design year scenarios.
- 5.4.27. The dispersion modelling used meteorological data for 2015 from Newcastle Airport.
- 5.4.28. The modelling of the baseline scenario was verified against monitoring data taken from Local Authority and the Applicant's surveys. Three different adjustment (or 'verification') factors were derived to address systematic differences between modelled and monitored pollutant concentrations in three different settings:
- a. Morpeth Town ('Group 1')
 - b. Receptors near monitoring site 'A4' (Earsdon Moor) on the A1 to account for road gradient ('Group 2')
 - c. All other locations ('Group 3')
- 5.4.29. Further details of the model setup and verification are provided in **Appendix 5.3: Methodology and Verification, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**).

Selection of Sensitive Receptors

Human Receptors

- 5.4.30. The Air Quality Regulations (**Ref. 5.6**) make clear that likely exceedances of the air quality objectives should be assessed at locations outside of buildings or other natural or man-made structures above or below the ground, and where members of the public are regularly present. Air quality assessments should, therefore, focus on those locations where members of the public are likely to be regularly present and are likely to be exposed for a period relevant to the averaging period of the objective (i.e. with 'relevant exposure'). The assessment does not need to consider locations where regular public exposure would not be realistic.
- 5.4.31. The relevant sensitive receptors considered as part of the local air quality assessment were identified using Ordnance Survey data. They comprise locations accessible to the public and locations where those more vulnerable to the effects of poor air quality, such as the young and the elderly, are likely to be present such as residential properties, schools, hospitals and care homes within 200 m of the ARN (**Section 5.7**). For further details of the ARN refer to **Section 5.6** below.
- 5.4.32. It is not necessary to quantify impacts at all such receptors, rather a sub-set of receptors is selected for the analysis. Based on the ARN, ten representative human receptors have been selected. These receptors represent worst-case locations with likely relevant human exposure to air pollutants from the ARN. Details of these receptors can be found in **Appendix 5.4: Receptors, Volume 8** of this ES (**Application Document Reference:**

TR010041/APP/6.8) with locations shown in **Figure 5.2: Human Receptors Assessed, Volume 6** of this ES (**Application Document Reference: TR010041/APP/6.6**).

- 5.4.33. Further consideration of human health impacts is set out in **Chapter 12: Population and Human Health** of this ES and considered for the Scheme as a whole in **Chapter 16: Assessment of Cumulative Effects, Volume 4** of this ES (**Application Document Reference: TR010041/APP/6.4**).

Ecological Receptors

- 5.4.34. In relation to sensitive ecological receptors, Annex F of DMRB HA 207/07 (**Ref. 5.15**) states *“The sites that should be considered for assessment are those for which the designated features are sensitive to air pollution, either directly or indirectly, and which could be adversely affected by the effect of local air pollution on vegetation within the following nature conservation sites SAC (SCI or cSAC), SPA, pSPA, SSSIs and Ramsar sites.”*
- 5.4.35. In the **Scoping Opinion (Application Document Reference: TR010041/APP/6.13)** from the Planning Inspectorate, it was requested that *“in addition to designated sites which may be impacted by changes in air quality, the ES should additionally assess locally and non-designated sites that could be affected by the Proposed Development”*. Therefore, other non-designated nature conservation sites were considered, including Local Wildlife Sites (LWS), LNRs, and ancient woodland.
- 5.4.36. There are no designated sites within 200 m of the ARN, with features potentially sensitive to air quality impacts. There are also no non-statutory and ancient woodland sites within 200 m of the ARN. As such, ecological receptors are not assessed any further in this chapter. The sites that are located within the Cumulative ARN are assessed in **Chapter 16: Assessment of Cumulative Effects, Volume 4** of this ES (**Application Document Reference: TR010041/APP/6.4**).

Determination of Total Pollutant Levels

- 5.4.37. Total pollutant levels have been determined through adjustment of model outputs using the adjustment factors derived in model verification (refer to **Appendix 5.3: Methodology and Verification, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**)).
- 5.4.38. Following IAN 170/12v3 (**Ref. 5.22**), future year total annual mean NO_x and NO₂ concentrations have been adjusted to take account of the impact of alternative long-term trends in vehicle NO_x emissions to address the uncertainty in forecast reductions in vehicle NO_x emissions. This is a robust and worst-case approach.
- 5.4.39. Modelled concentrations of NO_x have been converted to NO₂ using Defra’s NO_x to NO₂ Calculator v6.1 (**Ref. 5.21**), with incorporation of background concentrations of NO₂.
- 5.4.40. Total annual mean concentrations of NO_x and particulates were determined by adding the relevant background concentrations.
- 5.4.41. To determine nitrogen deposition rates at ecological receptors the methodology in the DMRB HA 207/07 Annex F (**Ref. 5.15**) has been followed.

SIGNIFICANCE OF EFFECTS

Human Receptors

5.4.42. The assessment of the significance of air quality effects follows IAN 174/13 (**Ref. 5.23**).

Construction

5.4.43. DMRB HA 207/07 (**Ref. 5.15**) does not provide guidance on impact magnitude for construction dust impacts. The assessment has assumed that where sensitive receptors are present within 200 m of construction works; any impacts would risk causing a significant effect in terms of loss of amenity and require mitigation. Such measures have been incorporated into the **Outline Construction Environmental Management Plan (Outline CEMP) (Application Document Reference: TR010041/APP/7.3)**, which accompanies the DCO application, to ensure no significant effects from dust.

Operation

5.4.44. IAN 174/13 (**Ref. 5.23**) provides guidance on describing the magnitude of local air quality impacts and determining the significance of effects for human and designated site receptors. There is no guidance on determining the significance of effects from impacts on regional emissions of NO_x, PM₁₀ or CO₂. The impacts are presented for each option and scenario in terms of total emissions and differences between the Do-Something (with Part B) and Do-Minimum (without Part B).

5.4.45. The magnitude of local air quality impacts was assigned for each human receptor according to **Table 5-5**.

5.4.46. A significant effect may be adverse or beneficial. In accordance with IAN 174/13 (**Ref. 5.23**), impacts that are not imperceptible and where the Do-Minimum and/or Do-Something concentration is greater than the relevant annual mean threshold (**Table 5-2**) were considered in determining the significance of effect. Imperceptible impacts are discounted from the judgment of significant effects.

5.4.47. Determination of an overall significant effect is largely down to professional judgement using guidance (IAN 174/13 and 175/13) to consider the scale and likely duration of the impact(s), the numbers of sensitive receptors affected, and EU limit value compliance risk. IAN 174/13 (**Ref. 5.23**) suggests ranges for the number of human receptors that could constitute a significant effect according to the magnitude of impact, refer to **Table 5-5**. IAN 175/13 (**Ref. 5.24**) provides an approach for assessing EU limit value compliance risk - with focus on annual mean NO₂. IAN 174/13 (**Ref. 5.23**) advises that where the compliance risk is determined to be 'high' then the effect of a scheme is more likely to be significant than if the risk is 'low'.

Table 5-5 - Magnitude of Change and Guideline Significance Criteria

Classification of Magnitude	Change in Annual Mean NO ₂ or PM ₁₀ Concentration (µg/m ³)	Number of Receptors Constituting a Significant Effect	
		Worsening of air quality objective already above objective or creation of new exceedance	Improvement of air quality objective already above objective or removal of existing exceedance
Large	>4	1 to 10	1 to 10
Medium	>2 – 4	10 to 30	10 to 30
Small	>0.4 – 2	30 to 60	30 to 60
Imperceptible	≤0.4	Not included in the judgement of significant effects	

FUTURE BASELINE

- 5.4.48. The future baseline describes the conditions that are expected if Part B was not to proceed. In the future baseline, vehicle emissions are projected to be lower than at present due to cleaner vehicle technologies becoming more pervasive within the vehicle fleet. Current emissions projections do not extend beyond 2030 after which they have been assumed to stay the same. Traffic data have taken into account future development that are likely to be progressed along the ARN.
- 5.4.49. Where the assessment of effects has drawn on the results of other technical assessments, any forecasting undertaken for those assessments applies.

5.5 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

- 5.5.1. The dispersion modelling has been based on traffic data approved for use as set out in **Chapter 4 of the Case for the Scheme (Application Document Reference: TR010041/APP/7.1)**. Whilst there may be some residual uncertainty in the traffic data this has been minimised as far as is practicable.
- 5.5.2. In the baseline year, systematic uncertainties in the model inputs and process are accounted for by verifying the modelled roadside concentrations against measured NO₂ concentrations. This process produces an adjustment factor which can then be applied to all model results. This assumes that the underlying reasons for the over or under-prediction of concentrations in the baseline year persist into the future. Different verification factors have

been applied to account for local conditions. The verification factors for Part B are all greater than 1, implying that concentrations in the baseline are under-predicted prior to adjustment. Details of the model verification process are provided in **Appendix 5.3: Methodology and Verification, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**).

- 5.5.3. In future years, a further uncertainty relates to the projection of vehicle emissions and, in particular the rate at which emissions per vehicle will improve over time. This has been accounted for through the application of the guidance set out in IAN 170/12v3 (**Ref. 5.22**). This IAN provides advice on the adjustment of modelled concentrations of NO₂ (and NO_x) to take account of recent trends in roadside pollutant concentrations and evidence on future vehicle emissions. The latest annual projection factors (LTT_{E6}) have been used for this assessment. Of the available datasets, LTT_{E6} best reflects the most recent evidence on the impacts of Euro 6/VI vehicles entering the fleet, whilst retaining an appropriate level of conservatism.
- 5.5.4. For the calculation of regional emissions projections for the UK fleet mix and vehicle emissions are not available beyond 2030. Therefore, emissions in the design year (2038) have been modelled using projections for 2030. This is a conservative assumption, since the emission rates per vehicle are anticipated to decline beyond 2030 as the number of 'zero emissions' (fully electric) vehicles increases.
- 5.5.5. The ADMS-Roads models assume that height differences between modelled roads and receptors are minimal. For human receptors a height of 1.5 m was assumed which corresponds to the standard breathing zone (**Ref. 5.25**).
- 5.5.6. In order to undertake a conservative assessment, PM_{2.5} emissions were assumed to be the same as PM₁₀ emissions. For assessment purposes, background concentrations of PM_{2.5} were also assumed to be the same as for PM₁₀. As PM₁₀ comprises PM_{2.5} and particle sizes between 2.5 and 10 micrometres, the air quality assessment is likely to have overestimated PM_{2.5} concentrations.

5.6 STUDY AREA

- 5.6.1. In accordance with DMRB HA 207/07 (**Ref. 5.15**), Study Areas were defined for the air quality impacts in construction and operational phases of Part B scoped into the assessment (**Section 5.4**).

CONSTRUCTION

- 5.6.2. The Study Area for construction dust consists of an area within 200 m of the Order Limits of Part B. Beyond 200 m any dust impacts are very unlikely to give rise to a significant effect, as stated in DMRB HA 207/07 (**Ref. 5.15**).

OPERATION

- 5.6.3. The extent of the road network to be included in the Study Area for operational local and regional air quality impacts has been determined using the DMRB HA 207/07 (**Ref. 5.15**) scoping criteria to identify the ARN. These criteria have been applied to only those road

links within the Traffic Reliability Area (TRA), as outlined in IAN 185/15 (**Ref. 5.20**). The ARN is shown in **Figure 5.1: Affected Road Network, Volume 6** of this ES (**Application Document Reference: TR010041/APP/6.6**).

- 5.6.4. A road link qualifies as part of the ARN if one or more of the following criteria are satisfied:
- a. Road alignment will change by 5 m or more
 - b. Daily traffic flows will change by 1,000 annual average daily traffic (AADT) flow or more
 - c. Heavy duty vehicle (HDV) flows will change by 200 AADT or more
 - d. Daily average speed will change by 10 km/h or more
 - e. Peak hour speed will change by 20 km/h or more
- 5.6.5. Ambient concentrations of air pollutants emitted by road traffic sources decline rapidly with increasing distance away from the road edge within the first 20 to 30 m. Beyond 30 m the decline is less pronounced but by about 200 m the contributions are nominal. The Study Area for local air quality impacts has been therefore defined as a corridor extending 200 m either side the ARN. Beyond this distance any local air quality impacts would be imperceptible.
- 5.6.6. Information on daily traffic flows for the affected road links within the Study Area is provided in **Appendix 5.1: Traffic Data, Volume 8** of this ES (**Application Document Reference: TR010041/APP/ 6.8**).

5.7 BASELINE CONDITIONS

EXISTING BASELINE

- 5.7.1. The following baseline section considers the Study Area for Part B.
- #### Local Air Quality Management
- 5.7.2. There are no AQMA's within 200 m of the ARN. The nearest is Newcastle City Council's AQMA No.5 (Gosforth), which is approximately 46 kilometres (km) to the south of Part B.
- 5.7.3. NCC undertakes air quality monitoring using a network of continuous (automatic) monitors and non-automatic (i.e. diffusion tubes) monitoring sites. Within 200 m of the ARN, there are no monitoring stations, the closest, 8N, being 1.6 km away from the ARN.
- 5.7.4. NCC undertakes monitoring of PM₁₀ and PM_{2.5} at two sites within its jurisdiction: Blyth Library (urban centre) and Cowpen Road (roadside). Recorded concentrations for PM₁₀ and PM_{2.5} were less than 14 µg/m³ and 6.5 µg/m³ at both locations respectively. Both concentrations are well below the respective annual mean AQS objective levels of 40 µg/m³ and 25 µg/m³. 24-hour mean PM₁₀ concentrations also met the objective in the same period.
- 5.7.5. According to NCC air quality monitoring data, baseline air quality in the general area of Part B is likely to be good. There are no clear long-term trends indicated by the monitoring data.

Table 5-6 - NCC NO₂ Diffusion Tube Monitoring Data

Site	Type	Co-ordinates		Annual Mean NO ₂ Concentration (µg/m ³)				
		X	Y	2013	2014	2015	2016	2017
8N	Roadside	419025	613070	28	30	30	31	31
CM2	Roadside	419525	586380	22	23	19	24	25
CM4	Roadside	419947	585937	28	26	22	21	26
CM5	Roadside	420134	586329	-	-	21	26	22
CM6	Roadside	420077	585814	-	-	25	26	19
CM7	Roadside	420371	582725	-	-	26	27	20

Part B Specific Monitoring

5.7.6. Part B specific monitoring was commissioned by the Applicant over a six-month period between February and August 2017. To provide an estimate of annual mean concentrations for the assessment base year of 2015, and to account for seasonal variations across the year, the data were annualised in accordance with the approach given in Defra's LAQM.TG (16) guidance (Ref. 5.25). The monitoring extent covered both Part B and Part A to ensure the dataset is technically robust and was used for model verification.

5.7.7. **Table 5-7** includes data for the monitoring sites within 200 m of the Order Limits of Part B. These locations are indicated in **Figure 5.3: Air Quality Monitoring, Volume 6** of this ES (Application Document Reference: TR010041/APP/6.6).

Table 5-7 – Part B Specific Monitoring Data

Site	Type	X	Y	2015 Annual Mean NO ₂ Concentration (µg/m ³)
B1 – A1 North Charlton	Roadside	416924	622976	8.5
B2 – A1 to the south of North Charlton	Roadside	417144	621909	10.1
B3 – A1 near West Link Hall	Roadside	417396	621297	6.4

Site	Type	X	Y	2015 Annual Mean NO ₂ Concentration (µg/m ³)
B4 – A1 near Charlton Mires	Roadside	417755	620610	11.1
B5 – B6341 near South Charlton	Roadside	417802	620014	9.0
B6 – B6341	Roadside	418139	618240	6.7
B7 – Broxfield	Roadside	417351	596921	6.7
BG (B) – Moorhouse	Background	421041	616322	5.0

5.7.8. **Table 5-7** indicates that the maximum measured annual mean concentration within the ARN is 11.1 µg/m³ at site B4. All measured concentrations are well below the relevant 40 µg/m³ objective.

5.7.9. Overall, baseline air quality along Part B is likely to be good.

DEFRA Pollution Climate Mapping

Roadside Concentrations

5.7.10. The PCM model is used by Defra, in combination with monitoring data, for the assessment of compliance with EU limit values. Compliance information is reported within 43 zones and urban agglomerations across the UK.

5.7.11. The PCM model also includes a module for the modelling of roadside pollutant concentrations. Around 18,000 links are included in the model in the UK, none of which are within the ARN. Defra provide roadside projections of pollutant concentrations at annual intervals, from 2015 to 2030.

5.7.12. PCM data for 2015 are available from Defra's UK-Air website (**Ref. 5.17**). The data indicate maximum roadside annual mean NO₂ concentrations in the Study Area up to 21.7 µg/m³ in the baseline, which does not exceed the 40 µg/m³ EU limit value. None of the PCM data for links within the air quality Study Area exceed or are at risk of exceeding the EU limit value in the opening year.

Background Concentrations

5.7.13. The pollutant concentration at any location has two components, namely a contribution from the local (modelled) sources and a contribution from more distant sources. Background pollutant concentrations for this assessment, that is those resulting from distant sources and pollutant transport, have been taken from the mapped PCM data provided by Defra on a 1 x 1 km grid covering the UK.

5.7.14. The background data are provided by Defra for all years from 2010 to 2030 from the output of the PCM Model.

5.7.15. **Table 5-8** shows a summary of the background data for the assessment years 2015 (baseline), 2023 (opening year) and 2030 (assumed representative of the design year, 2038) with both total pollutant concentrations, and the concentration with the contribution of major roads removed. Background concentrations are currently well within the air quality objectives for the protection of human health and ecological receptor for all pollutants. It is predicted that pollutant concentrations will improve over time due to a reduction in emissions from all emission sources and sectors, both in the UK and in Europe.

Table 5-8 – Annual Mean Background Pollutant Concentrations ($\mu\text{g}/\text{m}^3$)

Year	NO _x	NO ₂	PM ₁₀	PM _{2.5}
Objective	40	30	40	25
Total Pollutant concentrations				
2015	5.4 - 20.9	4.2 - 15.1	6.8 - 13.5	4.6 - 7.9
2023	4.1 - 16.1	3.3 - 11.8	6.5 - 13.6	4.3 - 7.5
2030	3.5 - 14.6	2.8 - 10.8	6.4 - 13.9	4.2 - 7.4
Concentrations with major road contribution removed				
2015	5.4 - 18.8	-	6.8 - 13.5	4.6 - 7.9
2023	4.1 - 15.3	-	6.5 - 13.6	4.3 - 7.5
2030	3.5 - 14	-	6.4 - 13.9	4.2 - 7.4

Human Receptors

5.7.16. Baseline (without Part B) annual mean NO₂ and PM₁₀/PM_{2.5} concentrations for 2015 at receptors are presented in **Table 5-9**. Further data are provided in **Appendix 5.5: Operational Impacts – Human Receptors, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**). Receptor locations are shown in **Figure 5.2: Human Receptors Assessed, Volume 6** of this ES (**Application Document Reference: TR010041/APP/6.6**).

5.7.17. Concentrations of all pollutants are well below their respective objectives for all pollutants. The highest annual mean concentrations of 12.2 $\mu\text{g}/\text{m}^3$ for NO₂ and 10.5 $\mu\text{g}/\text{m}^3$ for PM₁₀/PM_{2.5} occurs at R13 (420271, 614293) situated on the A1 at the junction with the B1340 at Denwick. 24-hour mean PM₁₀ concentrations are compliant with the objective at all receptors.

Table 5-9 – Baseline Annual Mean NO₂, PM₁₀ and PM_{2.5} Concentrations (µg/m³) for 2015

Receptor ID	NO ₂	PM ₁₀ / PM _{2.5}
R05	7.6	9.5
R06	9.8	10.5
R07	5.8	8.4
R08	5.7	9.9
R09	8.5	10.4
R10	6.6	10
R11	5.9	10.2
R12	6.8	9.8
R13	12.2	10.5
R14	7.3	10.2

FUTURE BASELINE

Human Receptors

- 5.7.18. Future baseline annual mean NO₂, PM₁₀ and PM_{2.5} concentrations for 2023 are presented in **Table 5-10**. Data are also provided in **Appendix 5.5: Operational Impacts – Human Receptors, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**). Receptor locations are shown in **Figure 5.2: Human Receptors Assessed, Volume 6** of this ES (**Application Document Reference: TR010041/APP/6.6**).
- 5.7.19. With forecast replacement of older, more polluting technologies in the vehicle fleet with cleaner technologies, pollutant concentrations in 2023 are predicted to be lower than in 2015. The highest annual mean concentrations of 9.6 µg/m³ for NO₂ and 10.1 µg/m³ for PM₁₀ and PM_{2.5} are predicted at both R06 and R13. 24-hour mean PM10 concentrations are compliant with the objective at all receptors.

Table 5-10 – Future Baseline Annual Mean NO₂, PM₁₀ and PM_{2.5} Concentrations (µg/m³) for 2023

Receptor	NO ₂	PM ₁₀ and PM _{2.5}
R05	5.9	9.2
R06	7.8	10.1
R07	4.3	8
R08	4.3	9.6
R09	6.6	10
R10	5	9.7

Receptor	NO ₂	PM ₁₀ and PM _{2.5}
R11	4.5	9.8
R12	5.2	9.5
R13	9.6	10.1
R14	5.6	9.8

5.8 POTENTIAL IMPACTS

CONSTRUCTION

- 5.8.1. Air quality impacts due to construction of Part B would be temporary, and typically include an increase in emissions of dust from earthworks and general construction activity and a loss of amenity due to increased dust levels.
- 5.8.2. There are 68 receptors within 200 m of the Order Limits, with 67 receptors being residential premises and one being the Alnwick Community Fire Station. These are illustrated on **Figure 5.4: Construction Receptors, Volume 6** of this ES (**Application Document Reference: TR010041/APP/6.6**).

OPERATION

Human Receptors

- 5.8.3. Part B has the potential to cause a change in concentrations of NO₂, PM₁₀ and PM_{2.5}, through changes to vehicle emission rates as a result of traffic re-routing and changes to fleet mix and speeds.
- 5.8.4. Results for annual mean NO₂, PM₁₀ and PM_{2.5} at human receptors are presented in **Table 5-11** and **Table 5-12** below. Receptor locations are shown in **Figure 5.2: Human Receptors Assessed, Volume 6** of this ES (**Application Document Reference: TR010041/APP/6.6**). All results for both NO₂ and PM₁₀ and PM_{2.5} are provided in **Appendix 5.5: Operational Impacts – Human Receptors, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**).
- 5.8.5. The potential impacts of Part B have been assessed in relation to the air quality assessment thresholds (**Table 5-2**).

Table 5-11 – Predicted Annual Mean NO₂ Concentrations (µg/m³) for 2023

Receptor	Do-Minimum	Do-Something	Change with Do-Something
R05	5.9	6	0.1
R06	7.8	6.4	-1.4
R07	4.3	4.3	0
R08	4.3	4.3	0

Receptor	Do-Minimum	Do-Something	Change with Do-Something
R09	6.6	6.4	-0.2
R10	5	4.8	-0.2
R11	4.5	4.5	0
R12	5.2	5.3	0.1
R13	9.6	9.8	0.2
R14	5.6	5.6	0

Table 5-12 – Predicted Annual Mean PM₁₀ and PM_{2.5} Concentrations (µg/m³) for 2023

Receptor	Do-Minimum	Do-Something	Change with Do-Something
R05	9.1	9.1	0.0
R06	10.1	9.8	-0.3
R07	8	8	0.0
R08	9.6	9.6	0.0
R09	10	9.9	-0.1
R10	9.7	9.6	-0.1
R11	9.8	9.8	0.0
R12	9.5	9.5	0.0
R13	10	10	0.0
R14	9.8	9.8	0.0

5.8.6. For 2023, annual mean NO₂ and PM₁₀ concentrations at all receptors would be well below the threshold set for both pollutants of 40 µg/m³. Annual mean PM_{2.5} concentrations would be well below the threshold of 25 µg/m³. The highest modelled NO₂ concentration is 9.8 µg/m³ at R13 and the highest PM₁₀/PM_{2.5} concentration is 10 µg/m³ at the same receptor. 24-hour mean PM₁₀ concentrations would comply in all scenarios.

5.8.7. Three receptors would experience an improvement in air quality, as a result of reductions in traffic flows and changes in speed band as a result of Part B along the:

- a. B6347 (R06)
- b. B6341 (R09, R10)

5.8.8. The greatest improvement is at R06 with a reduction in annual mean NO₂ concentration of 1.4 µg/m³ (from 7.8 to 6.4 µg/m³) and annual mean PM₁₀/PM_{2.5} concentration of 0.3 µg/m³

(from 10.1 to 9.8 µg/m³). This is due to a change in speed band from Free Flow to High Speed.

5.8.9. Three receptors are predicted to experience increases in annual mean NO₂ concentrations as a result of Part B along the:

- a. A1 (R05)
- b. B6341 (R12)
- c. B1340 towards Denwick (R13)

5.8.10. Receptor R13 experiences the largest increase in annual mean NO₂ concentration of 0.2 µg/m³. Receptor R13 also experiences the largest increase in PM₁₀ concentration of 0.03 µg/m³. The increase is a result of the overall increase in flows of approximately 600 vehicles per day.

5.8.11. Imperceptible change (as defined in **Table 5-5**) in annual mean NO₂ concentrations occur at 4 of the 10 receptors as a result of Part B. For annual mean PM₁₀, all receptors would experience imperceptible change.

REGIONAL AIR QUALITY

5.8.12. At a regional level, Part B would increase emissions of all pollutants, refer to **Table 5-13**. This is due to the increase in vehicle-km travelled having a greater effect than the improvements in traffic flows brought by Part B.

Table 5-13 - Impacts on Regional Emissions with Part B

Scenario	CO ₂		NO _x		PM ₁₀	
	Tonnes	Change	Tonnes	Change	Tonnes	Change
Base 2015	190,770	-	515.1	-	36.7	-
DM 2023	194,579	2,102	282.8	3.5	31.4	0.3
DS 2023	196,681		286.2		31.7	
DM 2038	226,903	3,091	199.4	3.3	35.8	0.5
DS 2038	229,994		202.7		36.3	

PCM COMPLIANCE RISK

5.8.13. The compliance risk assessments, following IAN 175/13 (**Ref. 5.24**) are provided in **Appendix 5.6: European Union Limit Value Compliance Risk Assessment, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**). There are no links at risk of exceeding the EU limit value for annual mean NO₂ with Part B. As such, Part B poses a **low risk** in relation to EU limit value compliance.

5.9 DESIGN, MITIGATION AND ENHANCEMENT MEASURES

DESIGN

Construction

- 5.9.1. The following mitigation would be required to reduce emissions of dust from construction works. These would be based on best practice measures for reducing emissions of dust as set out in the Annex 1 of the Minerals Policy Statement (**Ref. 5.28**) and summarised below. These measures are set out below and are detailed in the **Outline CEMP (Application Document Reference: TR010041/APP/7.3)**.

Site Management

- a. Records of dust and air quality complaints would be kept, including likely causes and mitigation measures to reduce impacts if appropriate.
- b. Site perimeter, fences etc. would be kept clean.
- c. A dust audit programme would be devised and implemented by the main contractor and would include visual inspections of offsite dust deposition. This may need to be supplemented by automatic monitoring of PM₁₀ if the risk of impacts increases, such as during prolonged dry weather.

Site Planning

- a. Consideration of weather conditions and the dust generating potential of material to be excavated would be ensured prior to commencement of works.
- b. Plan site layout to maximise distance from plant and stockpiles etc. to sensitive receptors.
- c. Dusty materials would be removed from site as soon as possible.

Construction Traffic

- a. Loads entering and leaving the site with dust generating potential would be covered and wheel washing facilities made available.
- b. There would be no idling of vehicles.
- c. Vehicles would comply with site speed limits (15 mph on hard surfaces, 10 mph on unconsolidated surfaces).
- d. Water assisted sweeping of local roads would be undertaken if material tracked out of site.
- e. Hard surfacing would be installed as soon as practicable on site and ensured it is maintained in good condition.

Site Activities

- a. Exposed soils would be protected from winds until sealed or re-vegetated.
- b. Dust generating activities would be minimised, particularly near residential receptors and sensitive ecosystems during prolonged dry, dusty weather unless damping or other suppressants are used.
- c. An adequate water supply to site would be ensured and water would be used as dust suppressant where applicable.

- d. Any site machinery would be well maintained and in full working order.
- e. Sand and aggregates would be stored away from sensitive receptors and screened or shielded. Similarly, concrete batching would take place away from receptors.

5.9.2. In addition, traffic management measures would be required during the construction phase of Part B, taking into account the cumulative effects of construction traffic from other developments, including Part A. Details of these are included in the **Construction Traffic Management Plan (Application Document Reference: TR010041/APP/7.4)**.

Operation

5.9.3. No mitigation measures relevant to air quality are proposed as part of the design of Part B.

MITIGATION

Construction

5.9.4. There is no requirement for Part B specific mitigation as no significant effects are anticipated.

Operation

5.9.5. There is no requirement for Part B specific mitigation as no significant effects are anticipated.

ENHANCEMENT MEASURES

5.9.6. No enhancement measures are proposed for the construction and operation of Part B.

5.10 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION

5.10.1. Part B could result in potential impacts from construction works. However, with the application of mitigation measures indicated in **Section 5.9** above, **no significant effects** are likely.

OPERATION

5.10.2. IAN 174/13 (**Ref. 5.23**) sets out key criteria for the assessment of the significance of effects of schemes in terms of impacts to human health. The criteria draw together the results of the assessment of local air quality impacts on population exposure, compliance with EU limit values and impacts on ecological receptors.

Human Health

5.10.3. IAN 174/13 (**Ref. 5.23**) requires the significance of effects to be assessed at properties where exceedances of the air quality assessment thresholds (**Table 5-2**) are predicted. As determined in **Section 5.8**, pollutant concentrations would be below the assessment thresholds at all receptors in the opening year of Part B (NO₂ and PM₁₀/PM_{2.5}). There are no properties that experience a worsening or improvement of air quality where pollutant concentrations are already above an assessment threshold, or a creation/removal of an exceedance. Furthermore, Part B is at low risk of impacting on compliance with EU limit values (refer to **Appendix 5.6: European Union Limit Value Compliance Risk**

Assessment, Volume 8 of this ES (**Application Document Reference: TR010041/APP/6.8**)).

EU Limit Value Compliance

- 5.10.4. No PCM links within the Study Area exceed the EU limit value for annual mean NO₂. Part B is at low risk of affecting compliance with EU limit values.

ASSESSMENT SUMMARY

- 5.10.5. Overall, following the guidance on the evaluation of significant effects in IAN 174/13 (**Ref. 5.23**), the effects of Part B are **not significant**.

ASSESSMENT PARAMETERS

- 5.10.6. The Assessment Parameters are presented in **Chapter 2: The Scheme, Volume 1** of this ES (**Application Document Reference: TR010041/APP/6.1**) presents minor amendments to the design which would not affect the outcomes of the air quality modelling. Parameter 3 would represent in additional earthworks, but it would not result in a change in anticipated vehicle flows as a result of the Part B. Nor would it cause potentially sensitive receptors to be further or nearer to the affected road network. Consequently, the conclusions of the operational assessment would remain unchanged. Based on professional judgement the parameters presented do not alter the findings of the air quality assessment.

UPDATED DMRB GUIDANCE

- 5.10.7. Refer to **Appendix 5.7: Air Quality DMRB Sensitivity Test, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**) for further details of the sensitivity test as discussed in **Section 5.4**.
- 5.10.8. The key differences relevant to the assessment between the DMRB HA 207/07 (**Ref. 5.15**) and LA 105 (**Ref. 5.26**) are summarised in **Table 5.14** below.

Table 5-14 – Key Differences of HA 207/07 and LA 105 DMRB Methodology

Topic	DMRB HA 207/07	LA 105	Summary of Sensitivity Test Findings
Construction Dust	<ul style="list-style-type: none"> - Identification of receptors within 200 m of construction site, and application of mitigation measures 	<ul style="list-style-type: none"> - Definition of construction dust risk potential. - Identification of all sensitive receptors 0-50 m, 50-100 m and 100-200 m of all construction activity. - Definition of the receiving environment sensitivity to construction dust. 	<p>The updated guidance on the assessment of construction dust has been considered through the specification of mitigation as detailed in Section 5.9. Therefore, the conclusions of the assessment would not change.</p>
Compliance Risk Assessment	<ul style="list-style-type: none"> - Difference between do-something and do-minimum annual mean NO₂ concentration at the nearest relevant receptor is added to the PCM baseline roadside concentration to determine compliance. 	<ul style="list-style-type: none"> - Validation of scheme AQ model against the PCM model; - Selection of qualifying features adjacent to AQ model links overlapping PCM links. - Comparison of scheme impact at modelled receptor and at 4m 	<p>The findings of the sensitivity test in relation to the Compliance Risk Assessment are summarised as follows:</p> <ul style="list-style-type: none"> - No PCM links within the model ARN and therefore conclusion of the assessment would remain the same.
Assessment of Ecological Receptors	<ul style="list-style-type: none"> - Only considers internationally or nationally designated sites SSSI, SAC, SPA and RAMSAR. If NO_x concentration close or greater than critical level of 30µg/m³ then assess nitrogen deposition. Background deposition assumed to reduce by 2% per year. - Deposition velocity of 0.001m/s used for all vegetation. 	<ul style="list-style-type: none"> - Definition of designated sites expanded to include local designations, including nature improvement areas and veteran trees (referred to as designated habitats). - Screen of NO_x concentrations against critical level removed. - Background deposition assumed to remain constant from base year. - Differentiation of deposition velocities between long and short vegetation. 	<p>The findings of the sensitivity test in relation to the revisions to the ecological habitat assessment, with the changes to background projections and application of varying deposition rates, are summarised as follows:</p> <ul style="list-style-type: none"> - With the application of the updated guidance, the assessment of four additional veteran trees was required. This exercise was carried out as part of the sensitivity test, as reported in Appendix 5.7: Air Quality DMRB Sensitivity Test, Volume 8 of this ES (Application Document Reference: TR010041/APP/6.8), and Appendix 9.12: Biodiversity DMRB Sensitivity Test: Part B, Volume 8 of this ES. - The sensitivity test determined that there would be no significant effects (refer to Chapter 9: Biodiversity of this ES for full details) and therefore the conclusions of the assessment would remain the same.

5.11 MONITORING

- 5.11.1. During construction of Part B, monitoring would be required to determine the effectiveness of the proposed mitigation, or requirement for further mitigation.
- 5.11.2. In the first instance, monitoring would be limited to visual inspections of emissions and dust soiling of local roads or properties. This would be undertaken daily for the duration of the construction of Part B.
- 5.11.3. If risk levels rise, for example during prolonged dry weather, or the visual monitoring indicates persistent soiling, it may be necessary to install continuous monitoring of particulate matter (as 15-minute average PM₁₀ and PM_{2.5}). The monitors would be equipped with an alert mechanism, set to agreed thresholds with NCC.
- 5.11.4. The construction monitoring regime and reporting requirements are set out in the **Outline CEMP (Application Document Reference: TR010041/APP/7.3)**.
- 5.11.5. No significant effects have been identified for the operational stage of Part B and therefore no additional monitoring is necessary.

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