

A1 in Northumberland: Morpeth to Ellingham

Scheme Number: TR010041

6.4 Environmental Statement – Appendix 16.6 Biodiversity Likely Significant Effects of the Scheme

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 - Appendix

Regulation Reference:	APFP Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010041
Application Document Reference	TR010041/APP/6.4
Author:	A1 in Northumberland: Morpeth to Ellingham Project Team, Highways England

Version	Date	Status of Version
Rev 0	June 2020	Application Issue

CONTENTS

1	BIODIVERSITY LIKELY SIGNIFICANT EFFECTS OF THE SCHEME	1
1.1	INTRODUCTION	1
1.2	ASSESSMENT METHODOLOGY	1
1.3	STUDY AREA	1
1.4	BASELINE CONDITIONS	1
1.5	POTENTIAL WITH TOPIC COMBINED IMPACTS	2
1.6	DESIGN, MITIGATION AND ENHANCEMENT MEASURES	2
1.7	ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS FROM OPERATIONAL AIR QUALITY	2
1.8	MONITORING	8
1.9	CONCLUSION	9
	REFERENCES	10

1 BIODIVERSITY LIKELY SIGNIFICANT EFFECTS OF THE SCHEME

1.1 INTRODUCTION

- 1.1.1. This appendix presents the assessment of Within Topic combined effects of the Scheme on biodiversity. A full description of the Scheme is provided in **Chapter 2: The Scheme, Volume 1** of this ES (**Application Document Reference: TR010041/APP/6.1**).
- 1.1.2. As detailed in **Chapter 16: Assessment of Cumulative Effects** of this ES, with the exception of operational air quality impacts, there are anticipated to be no Within Topic combined effects on ecological receptors due to the approximate 15 km distance between Part A of the Scheme and Part B of the Scheme. Therefore, this appendix presents potential effects on ecological receptors arising from operational air quality only.
- 1.1.3. All other potential effects of the Scheme are presented within the biodiversity chapters for Part A **Chapter 9: Biodiversity, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and Part B **Chapter 9: Biodiversity, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**). Further details of competent expert evidence, legislative and policy framework, methodology and assessment assumption and limitations may also be found in these chapters.

1.2 ASSESSMENT METHODOLOGY

- 1.2.1. The assessment methodology for determining the potential effects of operational air quality is the same as that presented within **Section 9.4** of Part A **Chapter 9: Biodiversity, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).

1.3 STUDY AREA

- 1.3.1. The Study Area is defined as 200 m from the air quality affected road network (ARN) as established by the air quality modelling and presented in **Figure 16.2: Scheme Air Quality Affected Road Network** of this ES.

1.4 BASELINE CONDITIONS

- 1.4.1. Twenty-four ecological receptors were identified within the Study Area including: six statutory sites (two Sites of Special Scientific Interest (SSSIs) and four Local Nature Reserves (LNRs)); eight non-statutory sites (Local Wildlife Sites (LWSs)); and 10 ancient woodland sites. Ecological receptors identified for this assessment are detailed in **Tables 9.7** and **9.8** of Part A **Chapter 9: Biodiversity, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and shown on **Figure 5.2: Human and Ecological Receptors Assessed, Volume 5** of this ES (**Application Document Reference: TR010041/APP/6.5**). There were no additional ecological receptors identified in the biodiversity chapter for Part B relevant to this assessment.

1.5 POTENTIAL WITH TOPIC COMBINED IMPACTS

- 1.5.1. The assessment considered increased nitrogen deposition. Nitrogen is a major growth nutrient and changes in nitrogen deposition can result in negative impacts on biodiversity, including: loss of sensitive species, changes to habitat structure and function, the homogenisation of vegetation types, changes in soil chemistry and an increased sensitivity to abiotic and biotic stresses (such as pests and climate) (**Ref. 1**).

1.6 DESIGN, MITIGATION AND ENHANCEMENT MEASURES

- 1.6.1. There are no design, mitigation or enhancement measures specific to the assessment of impacts on ecological receptors as a result of operational air quality.

1.7 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS FROM OPERATIONAL AIR QUALITY

- 1.7.1. This appendix identifies changes in air quality that may lead to significant effects on biodiversity as a result of the Scheme. Unless an explanation is considered necessary, where ecological receptors would not experience a change in annual mean NO_x concentrations above the critical level of 30 µg/m³ due to the Scheme (therefore effects would be **Neutral (not significant)**), these have not been documented below.

STATUTORY SITES, NON-STATUTORY SITES AND ANCIENT WOODLAND

River Coquet & Coquet Valley Woodlands Site of Special Scientific Interest

- 1.7.2. Air quality modelling (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES) showed that there would be an increase in nitrogen deposition as a result of the Scheme. The River Coquet and Coquet Valley Woodlands SSSI is located within 200 m of the ARN at three locations, hereafter referenced as Eco1, Eco9 and Eco12 (refer to **Figure 5.2: Human and Ecological Receptors Assessed, Volume 5** of this ES (**Application Document Reference: TR010041/APP/6.5**)). The SSSI is located both east and west of the ARN at each of the three locations.
- 1.7.3. A critical load cannot be given for nitrogen with respect to rivers, as quantitative relationships between biology and nitrogen concentrations are poorly understood. The River Coquet is surrounded by arable farmland and therefore is likely subject to water-run off and introduction of nutrients. As such, nitrogen is unlikely to be the limiting nutrient and increased aerial nitrogen deposition is therefore unlikely to be of significance. On this basis, the below impact assessment, which assesses against the critical load for the woodland habitat of the SSSI, can be extrapolated to encompass the watercourse. Potential impacts to the watercourse due to nutrient enrichment or sedimentation from surface water runoff would be mitigated through measures within the drainage design for Part A. Such measures are detailed in full within Part A **Chapter 10: Road Drainage and Water Environment, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) but include appropriate pollution prevention and control measures deployed during construction (presented within the **Outline Construction Environmental Management Plan**

(**Application Document Reference: TR010041/APP/7.3**) for the Scheme and vegetated detention basins with sediment forebays to mitigate potential operational impacts. As such, Part A **Chapter 10: Road Drainage and Water Environment, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) concludes **Neutral** effects (**not significant**) in relation to drainage.

Eco1

- 1.7.4. At Eco 1, the Scheme results in predicted NO_x levels above the critical level (30 µg/m³) to the east of the existing A1 (affected road) in comparison to the future baseline (without the Scheme), where levels are below the critical level (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES). NO_x levels to the west are only exceeded at 0 m from the road, both with or without the Scheme, and therefore not considered further.
- 1.7.5. At Eco1, the Scheme addresses the loss of all SSSI woodland (ancient woodland) within the Order Limits adjacent to the existing A1 (0.27 ha) and provides woodland planting as compensation (detailed within the **Ancient Woodland Strategy** for Part A (**Appendix 9.21: Ancient Woodland Strategy, Volume 7** of this ES (**Application Document Reference: TR010041/APP/6.7**)). The area for which compensation has been provided is excluded from the assessment because habitat that has been removed can no longer be affected by operational changes in air quality. As such, the closest point affected by increased NO_x levels from the existing A1 is at the Order Limits boundary, approximately 25 m distance. At this distance, NO_x levels do not exceed the critical level (30 µg/m³). Therefore, in accordance with DMRB (**Ref. 2**), no further assessment in terms of impact is required at Eco1.
- 1.7.6. It is considered valid to take the compensatory planting into account within the assessment of likely significant effects, given that this provision is afforded to compensate for habitat lost as a result of the Scheme during construction. Therefore, woodland that has been removed can no longer be affected by operational changes in air quality. If not all of the SSSI habitat within the Order Limits was removed, this would lessen overall impacts on the SSSI, given that the construction impacts would be reduced. Any retention of the SSSI habitats within the Order Limits would not reduce the provision of compensatory planting. Therefore, impacts to retained SSSI habitat within the Order Limits due to changes in air quality would be compensated by the woodland planting proposed. The proposed compensatory habitat for SSSI habitat loss (Woodland Creation Area) would also be located in an area that would not experience air quality impacts in excess of 1% of critical load. As such, a worst-case scenario has been assessed. This approach has also been taken for other ecological receptors, discussed below.

Eco9

- 1.7.7. At Eco9, NO_x levels do not exceed the critical level to the east or west of the ARN (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES). In addition, total nitrogen deposition loads are decreased because of the Scheme, with this

modelled as significant (reduction by >1% of lower critical load) within 0 m east of the ARN only (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES). The decrease in total nitrogen deposition is due to the ability of the Scheme (A1) to draw traffic from other roads within the local network. Therefore, this causes a reduced traffic flow on some roads radiating from the A1, thereby a reduction in associated nitrogen deposition. As such, the Scheme would potentially result in a slight beneficial effect to the SSSI.

Eco12

- 1.7.8. At Eco12, NO_x levels do not exceed the critical level to the east or west of the ARN with or without the Scheme (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES). Total nitrogen deposition loads exceed the lower critical load without the Scheme but are decreased with the Scheme. The model shows that the decrease in total nitrogen deposition is significant within 0 m east of the ARN only (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES). As such, the Scheme would potentially result in a slight beneficial effect to the SSSI.

Summary of Air Quality Assessment for River Coquet and Coquet Valley Woodlands SSSI

- 1.7.9. Combined, following successful implementation of compensatory woodland planting, the Scheme would potentially result in a slight beneficial effect at two locations (Eco9 and Eco12) of the SSSI. Although, these are only detectable at 0 m from the affected road. As such, it is considered that the Scheme would result in a **Neutral effect (not significant)** to the River Coquet and Coquet Valley Woodlands SSSI as a result of changes in air quality.

Duke's Bank Wood Ancient Woodland

- 1.7.10. Air quality modelling (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES) showed that there would be an increase in nitrogen deposition as a result of the Scheme. Duke's Bank Wood ancient woodland is 9.43 ha in size and located within the boundaries of the SSSI. In relation to air quality, the Ancient Woodland site is located east and west of the existing A1 at Eco1 (refer to **Figure 5.2: Human and Ecological Receptors Assessed, Volume 5** of this ES (**Application Document Reference: TR010041/APP/6.5**)). In accordance with the air quality changes presented above in relation to Eco1, the area of the ancient woodland affected by a significant increase in nitrogen deposition is captured within the Ancient Woodland Strategy, which provides compensatory woodland planting to address the direct loss of 0.27 ha of Duke's Bank Wood as a result of the Scheme.
- 1.7.11. As the area impacted by increased nitrogen deposition has been captured within the mitigation strategy for the construction of the Scheme, the effects in relation to air quality and Duke's Bank Wood ancient woodland are considered **Neutral (not significant)**.

Coquet River Felton Park LWS

- 1.7.12. Air quality modelling (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES) showed that there would be an increase in nitrogen deposition as a result of the Scheme. Coquet River Felton Park LWS is 18.02 ha in size and located to the east and west of the existing A1 (ARN) where it crosses the River Coquet, model reference of Eco1 (refer to **Figure 5.2: Human and Ecological Receptors Assessed, Volume 5** of this ES (**Application Document Reference: TR010041/APP/6.5**)). The LWS includes the woodland on the northern bank of the river that has been considered as ancient woodland within this ES.
- 1.7.13. The Scheme addresses the loss of all LWS woodland within the Order Limits adjacent to the existing A1 (0.41 ha) and provides woodland planting as compensation (detailed within the Ancient Woodland Strategy for Part A (refer to **Appendix 9.21: Ancient Woodland Strategy, Volume 7** of this ES (**Application Document Reference: TR010041/APP/6.7**))). As such, the closest point affected by increased NO_x levels from the existing A1 is at the Order Limits boundary, approximately 15 m distance. At this distance, NO_x levels do not exceed the critical level (30 µg/m³). As the area impacted by increased nitrogen deposition has been captured within the mitigation strategy for the construction of the Scheme, the effects in relation to air quality and Coquet River Felton Park LWS are considered to be **Neutral (not significant)**.

Wansbeck and Hartburn Woods LWS/Borough Wood ancient woodland/Borough Wood LNR

- 1.7.14. Air quality modelling (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES) showed that there would be an increase in nitrogen deposition as a result of the Scheme (Eco7). Wansbeck and Hartburn Woods LWS (161.6 ha), which encompasses Borough Wood ancient woodland (16.1 ha), is bisected by the existing A1 (affected road) to the south of the Scheme. As such, modelling was undertaken to both the east and west of the existing A1. Borough Wood Local Nature Reserve (LNR) (18.35 ha) is only located to the east of the existing A1.
- 1.7.15. A critical load cannot be given for nitrogen with respect to rivers / streams, as quantitative relationships between biology and nitrogen concentrations are poorly understood. The River Wansbeck is surrounded by arable farmland and therefore is likely subject to water-run off and introduction of nutrients. As such, nitrogen is unlikely to be the limiting nutrient and increased nitrogen deposition is therefore unlikely to be of significance. On this basis, the below impact assessment, which assesses against the critical load for the woodland habitat, can be extrapolated to encompass the watercourse.
- 1.7.16. Total nitrogen deposition loads are predicted to exceed the lower critical load (10 kgN/ha/yr.) without the Scheme, although with the Scheme results in increases of significance from the future baseline up to 5 m east of the affected road (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme**). Modelling on the western

side shows that the increase from the future baseline is only significant at 0 m from the road (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES).

- 1.7.17. Modelling shows that NO_x levels are predicted to be double the critical level at 0 m to the east of the existing A1 without the Scheme, although construction of the Scheme incurs a large magnitude of change (**Ref. 3**) at 0 m from the future baseline (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES). Both the future baseline and Scheme construction models show that the critical level is exceeded up to 10 m east of the road in either scenario. However, the Scheme results in a large magnitude of change to the baseline at 5 m (43.0 µg/m³ to 46.6 µg/m³) that reduces to a medium magnitude at 10 m (33.3 µg/m³ to 36.0 µg/m³) (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES). From 15 m east, the NO_x levels fall below the critical level. NO_x levels to the west only exceed the critical level at 0 m from the road, both with or without the Scheme (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES) and therefore are not of significance with regards to the LWS / ancient woodland.
- 1.7.18. The area of the LWS affected by a significant increase in nitrogen deposition (>1% of the lower critical load) would be 0.05 ha (representing 5 m to the east of the existing A1). The area of ancient woodland affected would be 0.02 ha. The area of LNR affected would be 0.03 ha. This equates to 0.03% of the LWS, 0.12% of the ancient woodland and 0.16% of the LNR.
- 1.7.19. In accordance with the DMRB (**Ref. 4**), the Scheme would result in a **Slight** indirect, permanent adverse effect (**not significant**) to the Wansbeck and Hartburn Woods LWS as a result of changes in air quality.
- 1.7.20. DMRB impact criteria would require a significance effect of Very Large in relation to the ancient woodland, due to an impact to a habitat of National importance. However, this is not considered comparable to the impact level given the small area of ancient woodland impacted by the changes in air quality and the exceedance of the critical level / critical loads without the Scheme. As such, the significance is downgraded on the basis of professional judgement. It is considered that the Scheme would, at worst, result in a **Slight** indirect, permanent adverse effect (**not significant**) to Borough Woods ancient woodland as a result of changes in air quality.
- 1.7.21. DMRB impact criteria would require a significance effect of Moderate in relation to the LNR, due to an impact to a site of County importance. However, this is not considered comparable to the impact level given the small area of the designation potentially impacted by the changes in air quality and the exceedance of the critical level / critical loads without the Scheme. As such, the significance is downgraded on the basis of professional judgement. It is considered that the Scheme would result in a **Slight** indirect, permanent adverse effect (**not significant**) to Borough Woods LNR as a result of changes in air quality.

Cawledge Burn LWS

- 1.7.22. Air quality modelling (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES) showed that there would be a potential increase in nitrogen deposition as a result of the Scheme. Cawledge Burn LWS (approximately 10 ha in size) is located either side of the existing A1 (affected road) to the south of Alnwick. The LWS is designated primarily for its geological interest, although the citation does include biological features of interest. DMRB states that sites designated for geological purposes need not be assessed, however, given that the LWS supports biological interest, the site has been scoped in to ensure a robust assessment.
- 1.7.23. Total nitrogen deposition loads are predicted to exceed the lower critical load (10 kgN/ha/yr.) without the Scheme (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES). Construction of the Scheme results in an increase in nitrogen deposition of significance up to 10 m east and 5 m west of the affected road (Eco18) (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES).
- 1.7.24. Modelling shows that NO_x levels would exceed the critical level without the Scheme up to 5 m to the east of the existing A1, with Scheme construction resulting in a medium increase above the future baseline (32.1 µg/m³ to 36.0 µg/m³) (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES). The model shows that the Scheme construction would result in an increase in NO_x levels above the critical level in comparison to the future baseline up to 5 m west of the affected road, with a moderate increase calculated (29.1 µg/m³ to 32.7 µg/m³) (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES).
- 1.7.25. The area of the LWS affected by increased NO_x levels above the critical level would be 0.24 ha (0.1 ha representing 5 m to the west of the existing A1 and 0.14 ha representing 10 m to the east). This equates to 2.4% of the LWS. The Scheme is considered to incur a **Slight** indirect, permanent adverse effect (**not significant**) to Cawledge Burn LWS as a result of changes in air quality.

Well Wood Ancient Woodland

- 1.7.26. Air quality modelling (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES) shows that there would be a potential increase in nitrogen deposition as a result of the Scheme (Eco8). Well Wood ancient woodland (52.7 ha in size) is located to the east of the existing A1 (affected road) to the south of Morpeth (approximately 10 km to the south of the Scheme).
- 1.7.27. Total nitrogen deposition loads are predicted to exceed the lower critical load (10 kgN/ha/yr.) without the Scheme (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES). Construction of the Scheme does not result in an increase of significance (i.e. change in comparison to the baseline is less than 1%).

- 1.7.28. Modelling shows that NO_x levels would exceed the critical level without the Scheme up to 25 m to the east of the existing A1, with Scheme construction resulting in a small increase above the future baseline (30.2 µg/m³ to 31.2 µg/m³) (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES).
- 1.7.29. The area of ancient woodland affected by increased NO_x levels above the critical level would be 0.3 ha (representing 25 m to the west). This equates to 0.6% of the total ancient woodland of Well Wood. DMRB impact criteria would require a significance effect of Very Large in relation to the ancient woodland, due to an impact to a site of National importance. However, this is not considered comparable to the impact level given the small area of the designation potentially impacted by the changes in air quality and the exceedance of the critical level / critical loads without the Scheme. As such, the significance is downgraded on the basis of professional judgement. The Scheme is considered to incur a **Slight** indirect, permanent adverse effect (**not significant**) to Well Wood ancient woodland as a result of changes in air quality.

Ulgham Meadow LNR

- 1.7.30. Air quality modelling (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES) showed that there would be a decrease in nitrogen deposition as a result of the Scheme (Eco10). Ulgham Meadow LNR (approximately 3.7 ha) is located to the immediate east of the B1337 to the northeast of the village of Ulgham.
- 1.7.31. Total nitrogen deposition loads are predicted to exceed the lower critical load (10 kgN/ha/yr.) without the Scheme. However, construction of the Scheme results in decreased levels of deposition compared to the future baseline, with significance (change >1% of the lower critical load) up to 5 m from the affected road (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES). NO_x levels do not exceed the critical level in either the future baseline of Scheme construction models (refer to **Appendix 16.4: Air Quality Likely Significant Effects of the Scheme** of this ES).
- 1.7.32. The area of the LNR affected by a significant decrease in nitrogen deposition would be 0.05 ha (representing 5 m from the affected road), which equates to 1.35% of the LWS. DMRB impact criteria would require a significance effect of Moderate in relation to the LNR, due to an impact to a site of County importance. However, this is not considered comparable to the impact level given the small area of the designation potentially impacted by the changes in air quality and the exceedance of the critical level / critical loads without the Scheme. As such, the significance is downgraded on the basis of professional judgement. The Scheme is considered to incur a **Slight** indirect, permanent beneficial effect (**not significant**) to Ulgham Meadow LNR as a result of changes in air quality.

1.8 MONITORING

- 1.8.1. There is no monitoring identified relevant to this assessment.

1.9 CONCLUSION

- 1.9.1. The assessment identified that the Scheme would not have significant effects on ecological receptors as a result of operational air quality.

REFERENCES

- Ref. 1** Whitfield, C. (2014). Nitrogen deposition impacts on biodiversity. JNCC, November 2014.
- Ref. 2** Highways Agency (2007) Design Manual for Roads and Bridges, Volume 11 Section 3 Part 1 Air Quality.
- Ref. 3** Highways England (2013) Interim Advice Note 174/13. Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 'Air Quality (HA 207/07).
- Ref. 4** Highways England (2010) Interim Advice Note 130/10 Ecology and Nature Conservation: Criteria for Impact Assessment.

© Crown copyright 2020.

You may re-use this information (not including logos) free of charge in any format or medium, under the terms of the Open Government Licence. To view this licence:

visit www.nationalarchives.gov.uk/doc/open-government-licence/

write to the **Information Policy Team, The National Archives,**

Kew, London TW9 4DU, or email

psi@nationalarchives.gsi.gov.uk.

This document is also available on our website at www.gov.uk/highways

If you have any enquiries about this document A1inNorthumberland@highwaysengland.co.uk or call **0300 470 4580***.

*Calls to 03 numbers cost no more than a national rate call to an 01 or 02 number and must count towards any inclusive minutes in the same way as 01 and 02 calls.

These rules apply to calls from any type of line including mobile, BT, other fixed line or payphone. Calls may be recorded or monitored.

Registered office Bridge House, 1 Walnut Tree Close, Guildford GU1 4LZ

Highways England Company Limited registered in England and Wales number 09346363