A1 in Northumberland: Morpeth to Ellingham

Scheme Number: TR010041

6.8 Environmental Statement – Appendix 9.12 Biodiversity DMRB Sensitivity Test

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 - Appendix

Regulation Reference:	APFP Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010041
Application Document Reference	TR010041/APP/6.8
Author:	A1 in Northumberland: Morpeth to Ellingham Project Team, Highways England

Version	Date	Status of Version
Rev 0	June 2020	Application Issue

CONTENTS

TABLES

1 INTRODUCTION

1.1.1. This Appendix identifies the key changes in the assessment methodology and presents the assessment of the potential for additional likely significant environmental effects of the A1 in Northumberland: Alnwick to Ellingham (Part B) on biodiversity with regards to air quality as a result of the updated Design Manual for Roads and Bridges (DMRB) guidance LA 105 Air Quality (**Ref. 1**). This was undertaken as part of the DMRB sensitivity test, as detailed in **Chapter 9: Biodiversity, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**).

1.1.2. 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**).

2 ASSESSMENT METHODOLOGY

SCOPE OF ASSESSMENT

2.1.1. In accordance with LA 105, the air quality assessment should include an assessment of the impacts on “designated habitats” of international, national and local ecological conservation interest for protected / notable species and habitats within 200 m of the Part B Affected Road Network (ARN) as determined by the air quality modelling (**Appendix 5.8: Air Quality DMRB Sensitivity Test** of this ES). In accordance with LA 105 Air Quality, designated habitats include Ramsar sites, Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Sites of Special Scientific Interest (SSSIs), Local Nature Reserves (LNRs), Local Wildlife Sites (LWSs), Nature Improvement Areas, ancient woodland and veteran trees.

2.1.2. The Woodland Trust classifies trees of special interest as ‘ancient’, ‘veteran’ and ‘notable’ (**Ref. 2**). Both ancient and veteran trees are considered of similar and high ecological importance and are irreplaceable (much the same as ancient woodland). As such, both ancient and veteran trees (which were not considered within the original air quality assessment presented in **Chapter 9: Biodiversity, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)) have been scoped into the assessment. Notable trees are of importance within their local environment in comparison to their surroundings. However, as notable trees may be young and not necessarily serve the same ecological function as that of an ancient or veteran tree, notable trees are not included within this assessment.

METHODOLOGY

Guidance

2.1.3. The ecological assessment detailed within this Appendix has been undertaken using the approach detailed in the CIEEM Guidelines for Ecological Impact Assessment (**Ref. 3**) and LA 105 Air Quality (**Ref. 1**).

2.1.4. To characterise and assess the impacts of Part B, LA 104 Environmental Assessment and Monitoring (**Ref. 4**) and LA 108 Biodiversity (**Ref. 5**) have been used, which make reference to CIEEM guidance.

Desk Study

2.1.5. A desk study exercise was undertaken in March 2020 to identify Nature Improvement Areas and ancient / veteran trees. Nature Improvement Areas were identified from the Natural England website (**Ref. 6**). Ancient / veteran trees were identified from the Woodland Trust Ancient Tree Inventory (**Ref. 7**) and baseline information collected in Part B (refer to **Appendix 7.1: Arboricultural Report, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**)).

2.1.6. There were no Ramsar sites, SPAs, SACs, SSSIs, LNRs, LWSs or areas of ancient woodland identified within 200 m of the ARN as part of the existing ecological impact assessment (**Chapter 9: Biodiversity, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)).

Nature Conservation Evaluation

2.1.7. The same method of determining the importance of an ecological receptor has been followed, as detailed in **Section 9.4** and **Table 9-4** of **Chapter 9: Biodiversity, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**). The methodology for assigning importance complies with the approach in the updated DMRB guidance presented in LA 108 Biodiversity (**Ref. 5**).

Characterisation of Potential Impacts

2.1.8. Characterisation of potential impacts included whether the impact was positive (beneficial) or negative (adverse), the probability of the impact occurring (certain, probable, unlikely), its complexity (direct, indirect, cumulative), extent, size, duration, reversibility and timing / duration.

2.1.9. As detailed in **Section 5.4** of **Chapter 5: Air Quality**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**), it was determined that the potential local air quality impacts from construction traffic emissions would be unlikely to give rise to significant effects and therefore no further assessment was required in relation to construction. While the determination in these chapters was a result of analysis against the now superseded DMRB HA 207/07 (**Ref. 8**) scoping criteria, the DMRB sensitivity test for **Chapter 5: Air Quality, Volume 3** of this ES concluded that this conclusion remained valid under the updated guidance (LA 105 Air Quality (**Ref. 1**)). As such, only operational impacts on air quality are considered.

SIGNIFICANCE OF EFFECTS

2.1.10. The significance of effects assessment in this Appendix had due regard to Figure 2.98 of LA 105 Air Quality (**Ref. 1**).

2.1.11. For designated habitats, nitrogen deposition is used as the main basis for evaluating significant effects in relation to air quality. Significance of effects were considered where the change in total nitrogen deposition (kg N/ha/yr.) with Part B only ('Do Something' (with Part B) scenario) in comparison to the future baseline ('Do Minimum' (without Part B) scenario) was greater than 1% (as an absolute number) of the critical load[1] for the site / habitat and

[1] APIS (**Ref. 10**) cites the definition of the critical load as "*a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*".

the critical load is exceeded. In all instances, the critical load of the designated habitat was exceeded with or without Part B. Critical loads for sites / habitats were ascertained from the Air Pollution Information System (APIS) database (**Ref. 9**). Where a range in the critical load was provided for a particular ecological receptor, the lowest value in the range was used to give a worst-case assessment (known as the lower critical load). Where the lower critical load of a site or habitat is exceeded with Part B but an increase in deposition of less than 1% of the critical load occurs, the impact is considered imperceptible and unlikely to be significant (**Ref. 1**).

2.1.12. For each designated site, the air quality assessment modelled predicted changes in air quality along 200 m length linear transects perpendicular to the affected road starting from the nearest point of the designated habitat. The modelling was undertaken at 5 m intervals between 0 m and 50 m and at 10 m intervals between 50 m and 200 m. For ancient / veteran trees, nitrogen deposition at the location of the tree was modelled. Further details and the findings of the air quality modelling are presented within **Appendix 5.8: Air Quality DMRB Sensitivity Test, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**) of this ES.

2.1.13. Where the change in nitrogen deposition is greater than 1% of the critical load, LA 105 Air Quality prescribes a need to identify whether the designated habitat air quality attribute is either ‘Restore’ or ‘Maintain’. Air quality attributes are generally determined for European designated sites (those protected at an international level) and are not usually attributed to locally or nationally designated sites for nature conservation or ancient woodland. As such, air quality attributes are not available for the designated habitats considered within this assessment. Where information is available, this has been used to inform a professional judgement to determine the air quality attribute for the designated habitat. The justification for the attribution has been presented within this Appendix. Where insufficient information is available, the air quality attribute has been set to ‘Restore’, as acknowledged in LA 105 Air Quality (**Ref. 1**). For transparency, both scenarios have been presented.

2.1.14. LA 105 Air Quality requires an assessment to determine if the change in nitrogen deposition would lead to the theoretical loss of one plant species, using Table 21 of the nitrogen deposition dose response report published by Natural England (**Ref. 11**). The study within the Natural England report only considered certain habitats: upland and lowland heath, sand dune grassland, bog (raised and blanket) and acid grassland. The designated habitats considered within this assessment are designated for their woodland habitat. The Natural England study does not provide comparable data to inform the dose of nitrogen deposition

that would theoretically lead to the loss of one species[2]. Therefore, in accordance with LA 105 Air Quality, using the Natural England dose response report, "*the habitat with the lowest change in nitrogen deposition likely to lead to the loss of one species, excluding nutrient impoverished sand dunes, shall be used to inform the judgement of significant air quality effects*."

2.1.15. Using the 'Restore' approach, as prescribed in LA 105 Air Quality, represents a reasonable worst-case assessment. This is because using the most sensitive habitat to nitrogen deposition as a proxy for the designated habitat being considered, is already a reasonable worst-case approach. In contrast, using the actual background deposition levels[3] (as for the 'Maintain' approach) rather than a theoretical deposition level of 5 kg N/ha/yr (as for the 'Restore' approach) is likely to better reflect the conditions at the ecological receptors considered within this assessment. As such, the findings in accordance with the 'Maintain' approach within are presented for comparison against the findings under the 'Restore' approach.

2.1.16. **Table 2-1**, based on Table 21 of the Natural England dose response report, summarises the criteria used to determine if the change in nitrogen deposition would lead to the theoretical loss of one plant species. It should be noted that Table 21 provides the lowest change in nitrogen deposition likely to lead to a reduction of species-richness of one at different background nitrogen levels, to be used for those designated habitats covered by the Natural England dose response report. This is not the same as causing the loss of one species.

2.1.17. In accordance with LA 105 Air Quality, for the 'Restore' scenario the lowest change in nitrogen deposition that would bring about a change theoretically equivalent to the loss of one plant species (0.4 kg N/ha/yr.) is used regardless of background nitrogen deposition. Therefore, an increase of 0.4 kg N/ha/yr. is used as the threshold for the theoretical loss of one plant species and determination of a potentially significant effect.

2.1.18. In accordance with LA 105 Air Quality, for the 'Maintain' scenario the lowest change in nitrogen deposition that would bring about a change theoretically equivalent to the loss of one plant species corresponding to the background nitrogen deposition is used as the threshold. Where the background nitrogen deposition falls between two categories, the lower category has been used, as a precautionary approach.

[2] It should be noted that the information presented in Table 21 of NECR210 (**Ref. 10**) does not actually refer to doses of nitrogen that would theoretically lead to the loss of one species. The data presented refers to doses of nitrogen, based on a combination of experimental data reviewed in the report, that would reduce species richness in each habitat by one. This is an important distinction which should not be lost sight of when interpreting Table 21 of NECR 210.
[3] Which represents 5 km average deposition data taken from APIS.

Table 2-1 - Nitrogen Deposition Changes that may Result in the Theoretical Loss of Species Richness[4]

Increase in nitrogen (N) deposition (kg N/ha/yr.) required to reduce measured species richness by one at different background N deposition levels					
5 kg N	**10 kg N**	**15 kg N**	**20 kg N**	**25 kg N**	**30 kg N**
0.4	0.8	1.3	1.7	2.0	2.4

2.1.19. Where Part B would result in a theoretical reduction in species richness equivalent to the loss of one plant species, this is identified as a potentially significant effect. Professional judgement has been used to provide a qualified statement regarding the potential level of significance of the effects identified in accordance with the categories presented in LA 104 Environmental Assessment and Monitoring (**Ref. 4**) (Neutral, Slight, Moderate, Large or Very Large).

MITIGATION

2.1.20. The same approach to mitigation has been followed, as detailed in Section 9.4 of **Chapter 9: Biodiversity, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**).

[4] Based on Table 21 of the Natural England dose response report (**Ref. 10**)

3 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

3.1.1. The assessment assumptions in relation to the air quality modelling is provided within Appendix 5.8: Air Quality DMRB Sensitivity Test, Volume 8 of this ES (Application Document Reference: TR010041/APP/6.8).

3.1.2. Due to the size of the Study Area, the identification of ancient / veteran trees was informed by the Woodland Trust's Ancient Tree Inventory (**Ref. 7**) and baseline data gathered for Part B (refer to **Appendix 7.1: Arboricultural Report, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**)). This is considered proportionate and appropriate for this assessment.

3.1.3. The designated habitats considered within this assessment are exclusively ancient / veteran trees and as such, the Natural England study does not provide comparable data to inform the dose of nitrogen deposition that would theoretically lead to a reduction in species richness equivalent the loss of one species. The lowest change in nitrogen deposition likely to trigger this criteria from Table 21 of the Natural England dose response report was used as a proxy threshold (**Table 2-1**), as per LA 105 Air Quality guidance. There is insufficient scientific data or studies to verify that the thresholds used are correct or appropriate when applied to woodland or tree habitats.

4 STUDY AREA

4.1.1. The Study Area is defined as 200 m from the ARN as required under LA 105 Air Quality (**Ref. 1**) and presented in **Figure 5.1: Air Quality Affected Road Network, Volume 6** of this ES (**Application Document Reference: TR010041/APP/6.6**).

4.2 BASELINE CONDITIONS

4.2.1. A total of four ancient / veteran trees were identified within the Study Area and are presented in **Table 4-1** below. There were no additional ecological receptors identified within **Chapter 9: Biodiversity, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**). As ancient and veteran trees are irreplaceable habitat, they are considered of comparable importance to ancient woodland. As such, ancient and veteran trees are considered of **National importance.**

4.2.2. At present, there are no Nature Improvement Areas located within the Study Area.

Table 4-1 – Ancient and Veteran trees within the Study Area

Tree Reference	Tree Type	Grid Reference	Distance from ARN (m)
93294	Veteran common sycamore	NU1882118160	185
93296	Veteran common horse chestnut	NU1881118140	168
T195	Ancient beech	NU1725721405	98
T196	Veteran sycamore	NU1729721417	58

5 POTENTIAL IMPACTS

5.1.1. The assessment for Part B 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. 9.12**).

6 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

6.1.1. This section identifies changes in nitrogen deposition that may lead to potentially significant effects as a result of Part B. All four of the ancient / veteran trees did not experience a change in nitrogen deposition greater than 1% of the critical load for either the ‘Restore’ or ‘Maintain’ approaches. As such, the change in nitrogen deposition would result in **Neutral** (**not significant**) effects.

7 CONCLUSION

7.1.1. The assessment in relation to LA 105 Air Quality (**Ref. 1**) demonstrated that there would be no significant effects on ecological receptors due to operational air quality.

REFERENCES

Ref. 1 Highways Agency et. al. Design Manual for Roads and Bridges (2019). LA 105 Air Quality. Revision 0, November 2019. Available at: https://standardsforhighways.co.uk/dmrb/search?q=LA%20105&pageNumber=1

Ref. 2 Woodland Trust (2008). *Ancient tree guide 4: What are ancient, veteran and other trees of special interests*. November 2008. Woodland Trust.

Ref. 3 CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1*. Chartered Institute of Ecology and Environmental Management, Winchester.

Ref. 4 Highways Agency et. al. Design Manual for Roads and Bridges (2019). LA 104 Environmental Assessment and Monitoring. Revision 1, July 2019.

Ref. 5 Highways Agency et. al. Design Manual for Roads and Bridges (2020). LA 108 Biodiversity. Revision 1, March 2020.

Ref. 6 Natural England. Nature Improvement Areas: locations and progress. https://www.gov.uk/government/publications/nature-improvement-areas-improved-ecological-networks/nature-improvement-areas-locations-and-progress [Accessed March 2020].

Ref. 7 Woodland Trust. Ancient Tree Inventory. https://ati.woodlandtrust.org.uk/tree-search/ [Accessed March 2020].

Ref. 8 Highways Agency. Design Manual for Roads and Bridges. Volume 11 Section 3 Part 1 Air Quality (HA 207/07). Superseded by LA 105 Air Quality (**Ref. 1**).

Ref. 9 Air Pollution Information System (APIS) website. http://www.apis.ac.uk/ [Accessed March 2020].

Ref. 10 APIS. 2020. *Critical Loads and Critical Levels - a guide to the data provided in APIS*. Available online at: http://www.apis.ac.uk/critical-loads-and-critical-levels-guide-data-provided-apis#_Toc279788050 [Accessed March 2020].

Ref. 11 Natural England (2016). *Assessing the effects of small increments of atmospheric nitrogen deposition (above the critical load) on semi-natural habitats of conservation importance.* Natural England Commissioned Report NECR210, 23 March 2016.

Ref. 12 Whitfield, C. (2014). *Nitrogen deposition impacts on biodiversity*. JNCC, November 2014.

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