A1 in Northumberland: Morpeth to Ellingham

Scheme Number: TR010041

6.4 Environmental Statement – Appendix 16.5 Noise and Vibration 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

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1 NOISE AND VIBRATION

1.1 INTRODUCTION

1.1.1. This appendix presents an assessment of the A1 in Northumberland: Morpeth to Ellingham Scheme (the Scheme), specifically the potential effects of operational road traffic noise, with some consideration also given to construction traffic noise. The appendix should be read in conjunction with Part A: Morpeth to Felton (Part A) **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and Part B: Alnwick to Ellingham (Part A), **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**).

1.1.2. Relevant competent expert evidence, legislative and policy framework, methodology and assessment assumption and limitations may be found in Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**).

1.2 ASSESSMENT METHODOLOGY

CONSTRUCTION TRAFFIC NOISE

1.2.1. Other than for construction traffic, it is not expected that there would be the potential for any material changes to the construction noise and vibration assessments presented within Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**) as a result of the Scheme. Within the noise and vibration chapters for Part A and Part B, the assessment of on-site construction activities has considered all anticipated key noise generative construction activities along the length of the Scheme. Similarly, given that construction diversion routes have been considered on a qualitative basis, changes to the assessment of construction diversion routes presented within Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES and Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES are not required. There is potential for diversion routes to be used by both Parts A and B, however, the assessments and associated mitigation presented within Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES and Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES are also applicable to the combined use of diversion routes.

1.2.2. The assessment of construction traffic noise has been undertaken adopting the methodology set out within Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**). This assessment considers construction traffic associated with the Scheme.

OPERATIONAL ROAD TRAFFIC NOISE

1.2.3. The assessment of operational road traffic noise has been undertaken adopting the methodology set out within Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**).

1.2.4. This Within Topic combined effects assessment uses traffic data for the Scheme, and a Scheme Study Area has also been adopted. The Scheme Study Area for the operational noise and vibration assessment is made up of three elements: Scheme Study Area: Part A; Scheme Study Area: Part B; and Wider Network Affected Links. This approach has been taken because, in accordance with DMRB HD 213/11 (**Ref. 1**), the operational road traffic noise Study Area is predominantly derived based on a distance buffer around the physical works applicable to the Scheme (i.e. Part A and Part B), and also incorporates affected wider network routes outside this buffer. The Scheme Study Area: Part A corresponds to the Study Area defined within Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and the Scheme Study Area: Part B corresponds to the Study Area: Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**) because the general arrangement remains unchanged for the Scheme. The noise and vibration assessment also considered road links outside the Scheme Study Area: Part A and Scheme Study Area: Part B that would be affected by changes in traffic flows due to the Scheme, as shown on **Figure 16.1: Cumulative Assessment Applications** of this ES. These Wider Network Affected Links have been identified using the methodology defined in DMRB HD 213/11 (**Ref. 1**).

1.2.5. Noise levels have been predicted for both the do-minimum and do-something scenarios in both the opening (2023) and future years (2038) at every sensitive receptor identified within the Scheme Study Area: Part A and Part B. Wider network affected links that could be affected by the Scheme have also been assessed. The future traffic levels for the assessment of the Scheme are based upon an opening year predicted to be in 2023. Since the assessments reported in this ES were completed, the Scheme opening year has been put back to 2024. The assessment is based on traffic modelling for an opening year of 2023 and reported on that basis. However, as explained in **Section 4.1** in **Chapter 4: Environmental Assessment Methodology, Volume 1** of this ES (**Application Document Reference: TR010041/APP6.1**) it is considered that the assessments remain valid for an opening year of 2024. Noise level predictions have been undertaken adopting the calculation methodology detailed within Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**).

1.2.6. Predicted noise levels have been assessed adopting the DMRB HD 213/11 (**Ref. 1**) methodology in conjunction with that presented within Interim Advice Note 185/15 (IAN 185/15) (**Ref. 2**).

1.2.7. The Scheme assessment is formed of three elements:

a. An assessment of impacts affecting the Scheme Study Area: Part A.
b. An assessment of impacts affecting the Scheme Study Area: Part B.
c. An assessment of impacts affecting the Wider Network Affected Links, outside of the Scheme main Study Area.

1.3 STUDY AREA

CONSTRUCTION TRAFFIC NOISE

1.3.1. The assessment of construction traffic noise has considered routes which are expected to be used by vehicles associated with the construction of the Scheme.

OPERATIONAL ROAD TRAFFIC NOISE

1.3.2. As detailed in **paragraph 1.2.4**, the Scheme Study Area for the operational noise and vibration assessment is made up of three elements: Scheme Study Area: Part A; Scheme Study Area: Part B; and Wider Network Affected Links.

1.3.3. The Scheme Study Area: Part A corresponds to the Study Area defined within **Part A Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and the Scheme Study Area: Part B corresponds to the Study Area: Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**). The wider network affected links are shown on **Figure 16.1: Cumulative Assessment Applications** of this ES.

1.4 BASELINE CONDITIONS

1.4.1. For areas remote from existing road traffic routes, existing baseline noise and vibration levels are expected to be low. As well as road traffic noise from the A1, other local roads in the area are expected to dominate the existing noise and vibration environment for many receptors local to the Scheme.

1.4.2. The existing road traffic noise climate has primarily been determined using a 3D noise model populated with traffic flow data. Details of the noise modelling process are presented in **Appendix 6.5: Source Information and Assumptions for Operational Road Traffic Noise Assessment, Volume 7** of this ES (**Application Document Reference: TR0141/APP/6.7**) and **Appendix 6.5: Source Information and Assumptions for Operational Road Traffic Assessment, Volume 8** of this ES **(Application Document Reference: TR010041/APP/6.8**). However, noise surveys have also been undertaken as detailed within Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**).

1.5 POTENTIAL WITHIN TOPIC COMBINED IMPACTS

CONSTRUCTION TRAFFIC NOISE

1.5.1. Construction traffic movements applicable to Part A and Part B are set out within Part A **Chapter 6: Noise and Vibration**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**) respectively.

1.5.2. Given that the majority of construction traffic associated with the Scheme would be routed along the A1, which has comparatively high traffic flows, including a substantial proportion of Heavy Goods Vehicles (HGVs), it is likely that additional vehicle movements associated with construction operations would be well diluted. This coupled with a proposed speed reduction from 70 mph to 40 mph through the works, during the construction stage, indicates that based on currently available typical daily construction traffic movements, associated changes in road traffic levels are unlikely to generate a 1 dB increase or greater from current noise levels. Therefore, effects as a result of the Scheme construction traffic movements are expected to be insignificant.

ASSESSMENT OF IMPACTS AFFECTING SCHEME STUDY AREA: PART A FOR THE OPERATIONAL ROAD TRAFFIC NOISE

1.5.3. Detailed pre-mitigation noise predictions have been undertaken for a total of 383 residential receptors and six non-residential noise-sensitive receptors within the operational road traffic noise Scheme Study Area: Part A.

1.5.4. It should first be noted that the Scheme traffic flows are largely similar to Part A only traffic flows. This means that the changes in noise level predictions between Part A only and the Scheme are generally small.

Comparison of the Operational Road Traffic Noise Effects with the aims of the National Policy Statement for England (NPSE)

1.5.5.

1.5.6. **Table** 1-1 and **Table 1-2** present, for the short-term and long-term respectively, the number of dwellings within the Scheme Study Area: Part A which are above and below the operational Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL). The corresponding numbers of dwellings applicable to the same Part A Study Area, as taken from **Table 6.27** and **Table 6.28**, in **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) are presented in brackets within the same tables. As for the Part A assessment, this Within Topic combined assessment has been based on the highest noise level predicted on any façade being representative of a particular sensitive receptor. This is considered appropriate as it represents a worst-case scenario for potential health effects.

1.5.7. Whilst residential dwellings and Other Sensitive Receptors are dealt with in the same results tables in Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application**

Document Reference: TR010041/APP/6.2), for simplicity they have been presented separately here.

1.5.8. Beneath each table, the data presented within

1.5.9. **Table** 1-1 and **Table 1-2** have been considered in terms of the following comparisons:

a. Between do-minimum (DM) and do something (DS) results
b. Between the Scheme and Part A results.

Table 1-1 - Short-Term NPSE Summary – Number of Dwellings – Scheme Study Area: Part A

Noise Level	Daytime			Nighttime		
	DM2023	DS2023	Difference	DM2023	DS2023	Difference
Equal to or above SOAEL	42	32 (32)	-10 (-10)	44	33 (33)	-11 (-11)
Between LOAEL and SOAEL	222	225 (223)	+3 (+1)	331	335 (335)	+4 (+4)
Below LOAEL	123	130 (132)	+7 (+9)	12	19 (19)	+7 (+7)

Short-Term Do-Minimum V Do-Something Scheme Comparison

1.5.10. In the short-term, the Scheme relative to the do-minimum scenario, is predicted to result in a decrease in the number of properties equal to or above the SOAEL which indicates a slight beneficial effect as a result of the Scheme. This is due to the offline section of the A1 moving away from a number of properties.

Short-Term Scheme V Part A Comparison

1.5.11. It is evident from comparing the unbracketed and bracketed values that the predictions for the Scheme do not differ greatly from the Part A assessment, with the same number of properties predicted to be equal to or exceed the SOAEL. Two fewer properties are predicted to be below the daytime LOAEL which reflects a very slight worsening in terms of the Scheme compared to Part A alone.

Table 1-2 - Long-term NPSE Summary – Number of Dwellings – Scheme Study Area: Part A

Noise Level	Daytime			Nighttime		
	DM2023	DS2038	Difference	DM2023	DS2038	Difference
Equal to or above SOAEL	42	41 (41)	-1 (-1)	44	44 (43)	0 (-1)
Between LOAEL and SOAEL	222	251 (247)	+29 (+25)	331	331 (331)	0 (0)
Below LOAEL	123	95 (99)	-28 (-24)	12	12 (13)	0 (+1)

Long-Term Do-Minimum V Do-Something Scheme Comparison

1.5.12. In the long-term during the day, the Scheme relative to the do-minimum scenario is predicted to result in a decrease of one dwelling equal to or above the SOAEL. In the daytime, fewer properties are predicted to experience noise levels below the LOAEL in the long-term. This increase in noise level is due to both the Scheme and natural traffic growth in the area.

Long-Term Scheme V Part A Comparison

1.5.13. It is evident from comparing the bracketed and unbracketed values that the predictions for the Scheme do not differ greatly from the Part A assessment, although as for the short-term the Scheme represents a slight worsening compared to the Part A assessment during the daytime, with little change predicted during the nighttime.

1.5.14. **Table 1-3** and **Table 1-4** show the same comparisons for the Other Sensitive Receptors within the operational road traffic noise Scheme Study Area: Part A. The corresponding number of Other Sensitive Receptors applicable to the Part A assessment as taken from **Table 6.27** and **Table 6.28** (bracketed values) in Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) are presented in brackets within the same tables.

1.5.15. As for dwellings, the data presented within **Table 1-3** and **Table 1-4** have been considered for the following comparisons:

a. Between do-minimum (DM) and do-something (DS) results
b. Between the Scheme and Part A results.

Table 1-3 - Short-term NPSE Summary – Number of Other Sensitive Receptors – Scheme Study Area: Part A

Noise Level	Daytime			Nighttime		
	DM2023	DS2023	Difference	DM2023	DS2023	Difference
Equal to or Above SOAEL	2	0 (0)	-2 (-2)	2	0 (0)	-2 (-2)
Between LOAEL and SOAEL	2	5 (5)	+3 (+3)	2	4 (4)	+2 (+2)
Below LOAEL	2	1 (1)	-1 (-1)	0	0 (0)	0 (0)
Note: As the school and church are understood not to be in use during the nighttime, these receptors have been excluded from the nighttime columns. Results are only presented for the two hospital buildings and the two holiday cottages.						

Short-Term Do-Minimum V Do-Something Scheme Comparison

1.5.16. In the short-term, the Scheme relative to the do-minimum scenario causes two receptors (the two holiday cottages) to move from equal to or above the SOAEL to between LOAEL and SOAEL and one receptor (one of the Northgate Hospital buildings) to move from below the LOAEL to between the LOAEL and SOAEL.

Short-Term Scheme V Part A Comparison

1.5.17. It is evident from comparing the unbracketed and bracketed values that the Scheme relative to Part A causes no change in receptor threshold levels.

Table 1-4 - Long-term NPSE Summary – Number of Other Sensitive Receptors – Scheme Study Area: Part A

Noise Level	Daytime			Nighttime		
	DM2023	DS2038	Difference	DM2023	DS2038	Difference
Equal to or above SOAEL	2	0 (0)	-2 (-2)	2	0 (0)	-2 (-2)
Between LOAEL and SOAEL	2	5 (5)	+3 (+3)	2	4 (4)	+2 (+2)
Below LOAEL	2	1 (1)	-1 (-1)	0	0 (0)	0 (0)
Note: As the school and church are understood not to be in use during the nighttime, these receptors have been excluded from the nighttime columns. Results are only presented for the two hospital buildings and the two holiday cottages.						

Long-Term Do-Minimum V Do-Something Scheme Comparison

1.5.18. In the long-term, the Scheme relative to the do-minimum scenario causes two receptors (the two holiday cottages) to move from equal to or above the SOAEL to between LOAEL and SOAEL and one receptor (one of the Northgate Hospital buildings) to move from below the LOAEL to between the LOAEL and SOAEL.

Long-Term Scheme V Part A Comparison

1.5.19. It is evident from comparing the unbracketed and bracketed values that the Scheme relative to Part A causes no change in receptor threshold levels.

SUMMARY

1.5.20. Overall, in terms of the LOAEL and SOAEL threshold levels, the Scheme is not expected to change the category into which most receptors would fall. The Scheme relative to the do-minimum has a slight beneficial effect in the short-term and a slight adverse effect in the long-term (mainly due to the number of properties exceeding the LOAEL).

1.5.21. Four of the five properties within the two NIAs along Part A of the Scheme are above SOAEL in both the do-minimum and Scheme do-something scenarios in both the opening and future years during the daytime and nighttime. The other property in NIA 10002 at Causey Park is predicted to be below the SOAEL in the Scheme do-something opening year but above the SOAEL in all other scenarios in both the daytime and nighttime.

OPERATIONAL ROAD TRAFFIC NOISE – DMRB HD 213/11 ASSESSMENT

1.5.22. Whilst the above summary of pre-mitigation noise levels in terms of the LOAEL and SOAEL suggests that, in general, the Scheme compared to the do-minimum scenario would have a slight beneficial impact in the short-term and a slight adverse impact in the long-term, when the individual changes in noise level at each receptor are considered, the assessment indicates a much wider array of beneficial and adverse impacts. This is because noise levels can change notably, but still fall in the same absolute noise level threshold band (e.g. remain within the equal to or above SOAEL band).

1.5.23. **Table 1-5** shows the predicted short-term change in noise level as a result of the Scheme for all modelled receptors within the Scheme Study Area: Part A, sorted into relevant bands following the DMRB HD 213/11 (**Ref. 1**) magnitude of impact categories. The corresponding analysis applicable to the Part A assessment as taken from **Table 6-29** of Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and is presented in brackets within the same table. Although negligible noise changes are referred to in the tables and discussion, it should be noted that these changes would most likely be imperceptible at sensitive receptors.

Table 1-5 - Short-term Traffic Noise Changes (DMRB HD 213/11 Table A1.1)

Change in Noise Level		Magnitude of Impact	Daytime	
			Number of Dwellings	Number of Other Sensitive Receptors
Increase in Noise Level $L_{A10,18h}$	0.1 – 0.9	Negligible	293 (290)	2 (2)
	1 – 2.9	Minor	28 (26)	1 (1)
	3 – 4.9	Moderate	1 (1)	0 (0)
	>=5	Major	3 (3)	0 (0)
No Change	= 0	No change	5 (4)	0 (0)
Decrease in Noise Level $L_{A10,18h}$	0.1 – 0.9	Negligible	28 (34)	0 (0)
	1 – 2.9	Minor	12 (12)	0 (0)
	3 – 4.9	Moderate	4 (4)	2 (1)
	>=5	Major	9 (9)	1 (2)

1.5.24. The Scheme compared to the do-minimum ranges from major adverse effects to major beneficial effects due to the re-aligning of the A1. The majority of noise sensitive receptors are predicted to experience a negligible increase in noise level (i.e. an increase which they are unlikely to perceive).

1.5.25. It is evident from comparing the Scheme against Part A (un-bracketed v. bracketed values) that the Scheme shows a slight worsening in noise levels as some receptors move from negligible decrease or no change to negligible increase and minor increase. It is worth noting that there is no change in the number of moderate and major beneficial or adverse impacts, which are considered likely to be significant effects.

1.5.26. **Table 1-6** shows the predicted long-term changes in noise level as a result of the Scheme for all modelled receptors within the Scheme Study Area: Part A, sorted into relevant bands following the DMRB HD 213/11 (**Ref. 1**) magnitude of impact categories. The corresponding analysis applicable to the Part A assessment as taken from **Table 6-30** of **Chapter 6: Noise and Vibration**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and is presented in brackets within the same table.

Table 1-6 - Long-term Traffic Noise Changes (DMRB HD 213/11 Table A1.2)

Change in Noise Level		Magnitude of Impact	Daytime		Nighttime
			Number of Dwellings	Number of Other Sensitive Receptors	Number of Dwellings
Increase in Noise Level $L_{A10,18h}$	0.1 – 2.9	Negligible	343 (344)	3 (3)	39 (38)
	3 – 4.9	Minor	6 (6)	0 (0)	0 (0)
	5 – 9.9	Moderate	3 (2)	0 (0)	0 (0)
	>=10	Major	1 (1)	0 (0)	0 (0)
No Change	= 0	No change	1 (0)	0 (0)	0 (0)
Decrease in Noise Level $L_{A10,18h}$	0.1 – 2.9	Negligible	17 (18)	0 (0)	1 (1)
	3 – 4.9	Minor	4 (3)	3 (3)	0 (0)
	5 – 9.9	Moderate	6 (7)	0 (0)	10 (10)
	>=10	Major	2 (2)	0 (0)	2 (2)

1.5.27. The long-term impacts are similar to those anticipated in the short-term, with the majority of properties experiencing a negligible change in noise level.

1.5.28. It is evident from comparing the Scheme against Part A (un-bracketed vs. bracketed values) that there is very little change in impacts. There is one additional moderate adverse increase as a result of the Scheme. The predicted long-term increase in noise level as a result of the Scheme at this receptor is only 0.1 dB greater than for Part A alone. The daytime noise level is predicted to be below the LOAEL and the nighttime level only 2 dB above the LOAEL for this receptor. The majority of the façades on this property would experience a beneficial change in noise levels as a result of the Scheme. Therefore, the noise level change at this receptor is not deemed significant.

1.5.29. The predicted noise levels from the Scheme are less than 0.5 dB higher than Part A alone. This shows that, whilst the Scheme would cause higher noise levels in the Scheme Study Area: Part A, the increase is only slight.

SIGNIFICANT EFFECTS WITHIN THE SCHEME STUDY AREA: PART A

1.5.30. Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) predicted that Part A would lead to three properties having an operational road traffic noise significant adverse effect, which correspond to the three short-term major adverse impacts. Further details of these effects are presented in Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES.

1.5.31. As described above, the changes, in terms of noise levels comparing the Scheme against the Part A assessment as a result of the Scheme traffic data are generally slight. Therefore, the three adverse significant effects (the three short-term major adverse impacts) identified for Part A alone remain significant for the Scheme. The short-term moderate adverse impact (which corresponds to the additional long-term moderate adverse impact discussed in **paragraph 1.5.28**) is not predicted to be significant for the Scheme (or Part A alone) due to the noise level changes on other façades (which range from minor adverse to major beneficial in the short-term) and the absolute noise levels at this receptor (which are below the daytime LOAEL).

1.5.32. Four noise barriers are proposed in **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**). Two barriers (PNB2 and PNB3) have been proposed to reduce noise levels at the three properties likely to experience significant adverse effects at Causey Park and New Houses Farm. Whilst these barriers provide a meaningful reduction in noise levels, they do not mitigate the noise impact sufficiently such that these receptors are predicted not to experience a significant adverse effect. Two further barriers (PNB1 and PNB4) are proposed at Northgate Farm and Felmoor Park and Bockenfield Holiday Park in accordance with the aims of the NPSE.

1.5.33. As no additional significant adverse effects are predicted as a result of the Scheme, and the changes in terms of the assessment of noise levels with regard to the LOAEL and SOAEL do not require additional mitigation measures to be considered, no additional operational road traffic mitigation measures are proposed for the Scheme.

1.5.34. **Table 1-7** presents a summary of the significant beneficial and adverse residual effects which remain the same for both Part A alone and the Scheme (within the Scheme Study Area: Part A). This summary does not include the potential benefits from PNB1 at Northgate Farm or PNB4 at Felmoor Park and Bockenfield Holiday Park as, due to potential design constraints, these barriers have not yet been confirmed for the Scheme.

Table 1-7 - Part A Specific Noise Sensitive Receptor Summary and Determination of Residual Significance (within the Scheme Study Area: Part A)

Part A Receptor Group	Number of Receptors[1]	Short-term Magnitude of Impact and Contextual Factors	Summary of Residual Impacts	Significance
Group 1	13 (3 - Tritlington C of E School and 2 holiday cottages)	Major and Moderate (Decrease)	The Scheme could improve the noise climate at these properties. As the magnitudes of impact are predicted to be moderate or major, the noise level	**Significant (beneficial)**

Part A Receptor Group	Number of Receptors[1]	Short-term Magnitude of Impact and Contextual Factors	Summary of Residual Impacts	Significance
			changes are deemed significant.	
Group 7 (The Cottage and Joiners Cottage, Causey Park Loop Road)	2	The Cottage - Major (Increase) Joiners Cottage – Moderate[2] (Increase)	The noise barrier (PNB2) improves noise levels at these properties in the short-term Scheme do-something scenario by over 3 dB on at least one façade of each property. However, the noise level change still presents a major magnitude of impact for one property and moderate for the other. Consequently, the noise level changes at these properties are deemed a significant effect.	**Significant (adverse)**
Group 8 (New Houses Farm)	1	Moderate[2] (Increase)	The noise barrier (PNB3) improves noise levels at this property in the short-term Scheme do-something scenario by over 3 dB on one façade but this still presents a major magnitude of impact. Consequently, the noise level change at these properties is deemed a significant effect.	**Significant (adverse)**

Note: [1] Bracketed values in the second column represent Other Sensitive Receptors, unbracketed values represent residential dwellings.

[2] The moderate increases are residual impacts including the benefits from the proposed noise barriers. Prior to the barrier benefits being accounted for, these were classified as major adverse impacts. Notwithstanding the benefits provided by the barriers these remain significant adverse effects.

ASSESSMENT OF IMPACTS AFFECTING SCHEME STUDY AREA: PART B FOR THE OPERATIONAL ROAD TRAFFIC NOISE

1.5.35. Detailed pre-mitigation noise predictions have been undertaken for a total of 77 residential receptors and 11 non-residential noise-sensitive receptors within the operational road traffic noise Scheme Study Area: Part B.

Comparison of the Operational Road Traffic Noise Effects with the Aims of the NPSE

1.5.36. **Table 1-8** and **Table 1-9** present for the short-term and long-term respectively, the number of dwellings within the Scheme Study Area: Part B, which are above and below the operational LOAEL and SOAEL. These data are applicable to the Scheme and therefore the Scheme traffic data. The corresponding numbers of dwellings applicable to the same Part B Study Area, as taken from **Table 6.31** and **Table 6.32** of **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**), are presented in brackets within the same tables. As for the Part B assessment, this Within Topic combined assessment has been based on the highest noise level predicted on any façade being representative of a particular sensitive receptor. This is considered appropriate as it represents a worst-case for potential health effects.

1.5.37. Beneath each table, the data presented within **Table 1-8** and **Table 1-9** have been considered in terms of the following comparisons:

a. Between do-minimum (DM) and do-something (DS) results
b. Between the Scheme and Part B results.

Table 1-8 - Short-Term NPSE Summary – Number of Dwellings – Scheme Study Area: Part B

Noise Level	Daytime			Nighttime		
	DM2023	DS2023	Difference	DM2023	DS2023	Difference
Equal to / greater than SOAEL	5	3 (3)	-2 (-2)	6	3 (3)	-3 (-3)
Between LOAEL and SOAEL	34	34 (32)	0 (-2)	45	49 (48)	+4 (+3)
Below LOAEL	38	40 (42)	+2 (+4)	26	25 (26)	-1 (0)

Short-Term Do-Minimum V Do-Something Scheme Comparison

1.5.38. In the short-term, the Scheme, relative to the do-minimum scenario, is predicted to result in a decrease in the number of properties equal to or above the SOAEL, which indicates a slight overall beneficial effect as a result of the Scheme. This is due to the Scheme moving

the A1 to the east and away from the existing A1 alignment within the vicinity of Patterson Cottage and West Link Hall Cottages.

Short-Term Scheme V Part B Comparison

1.5.39. In the short-term, comparing the dwelling counts for the Scheme with those applicable to the Part B assessment (presented in brackets) it is evident that, during the day, the Scheme would result in there being two additional dwellings experiencing noise levels between the LOAEL and SOAEL and a decrease of two dwellings experiencing noise levels below the LOAEL. During the night, the same comparison shows there would be an increase of one dwelling experiencing noise levels between the LOAEL and SOAEL and a decrease of one dwelling experiencing noise levels below the LOAEL. This comparison indicates that, for the Scheme, overall beneficial effects are expected to be slightly less than for Part B alone.

Table 1-9 - Long-Term NPSE Summary – Number of Dwellings – Scheme Study Area: Part B

Noise Level	Daytime			Nighttime		
	DM2023	DS2038	Difference	DM2023	DS2038	Difference
Above SOAEL	5	8 (3)	+3 (-2)	6	9 (6)	+3 (0)
Between LOAEL and SOAEL	34	34 (38)	0 (+4)	45	43 (46)	-2 (+1)
Below LOAEL	38	35 (36)	-3 (-2)	26	25 (25)	-1 (-1)

Long-Term Do-Minimum V Do-Something Scheme Comparison

1.5.40. In the long-term, during the day and night, the Scheme relative to the do-minimum scenario, is predicted to result in an overall increase in the number of dwellings above the SOAEL. For both the day and night, there is predicted to be a reduction in the number of dwellings subject to noise levels below the LOAEL. At night, there is also predicted to be a reduction in the number of dwellings between the LOAEL and SOAEL. This indicates an overall adverse effect at a small number of dwellings.

Long-Term Scheme V Part B Comparison

1.5.41. In the long-term, comparing the dwelling counts for the Scheme with those applicable to the Part B assessment (presented in brackets) it is evident that, during the day, the Scheme results in there being an additional five dwellings experiencing noise levels above the SOAEL and there being four fewer dwellings experiencing noise levels between the LOAEL and SOAEL. There is also a reduction of one dwelling experiencing noise levels below the LOAEL. During the night, the same comparison shows there to be three additional dwellings above the SOAEL and three fewer dwellings between the LOAEL and SOAEL. This comparison indicates that, for the Scheme, there are likely to be slightly more adverse

effects than for Part B. Such effects are however predicted at only a small number of receptors.

1.5.42. **Table 1-10** and **Table 1-11** show the same comparisons for the Other Sensitive Receptors within the operational road traffic noise Scheme Study Area: Part B.

1.5.43. As for dwellings, the data presented within **Table 1-10** and **Table 1-11** have been considered for the following comparisons:

a. Between do-minimum (DM) and do-something (DS) results.
b. Between the Scheme and Part B results.

Table 1-10 - Short-term NPSE Summary – Number of Other Sensitive Receptors – Scheme Study Area: Part B

Noise Level	Daytime			Nighttime		
	DM2023	DS2023	Difference	DM2023	DS2023	Difference
Above SOAEL	1	1 (0)	0 (-1)	1	1 (0)	0 (-1)
Between LOAEL and SOAEL	6	7 (7)	+1 (+1)	8	8 (9)	0 (+1)
Below LOAEL	4	3 (4)	-1 (0)	2	2 (2)	0 (0)

Short-Term Do-Minimum V Do-Something Scheme Comparison

1.5.44. In the short-term, during the day, the Scheme relative to the do-minimum scenario, is predicted to result in an increase of one receptor between the LOAEL and SOAEL and a reduction of one receptor experiencing noise levels below the LOAEL. At night, the Scheme is expected not to result in any changes in the number of receptors falling within each category.

Short-Term Scheme V Part B Comparison

1.5.45. In the short-term, comparing the Other Sensitive Receptor counts for the Scheme with those applicable to the Part B assessment (presented in brackets) it is evident that, during the day and night, the Scheme results in there being one additional receptor experiencing noise levels above the SOAEL. During the night, there is a decrease of one receptor experiencing noise levels between the LOAEL and SOAEL, and during the day, there is a decrease of one receptor experiencing noise levels below the LOAEL. This indicates that the Scheme results in slightly higher noise levels at Other Sensitive Receptors than for Part B alone, but that, in general, levels are such that changes in categories are only predicted for a small number of receptors. Furthermore, changes in category are associated with only small changes in predicted noise levels.

Table 1-11 - Long-term NPSE Summary – Number of Other Sensitive Receptors – Scheme Study Area: Part B

Noise Level	Daytime			Nighttime		
	DM2023	DS2038	Difference	DM2023	DS2038	Difference
Above SOAEL	1	1 (1)	0 (0)	1	1 (1)	0 (0)
Between LOAEL and SOAEL	6	7 (7)	+1 (+1)	8	8 (8)	0 (0)
Below LOAEL	4	3 (3)	-1 (-1)	2	2 (2)	0 (0)

Long-Term Do-Minimum V Do-Something Scheme Comparison

1.5.46. In the long-term during the day, the Scheme relative to the do-minimum scenario, is predicted to result in an overall increase of one Other Sensitive Receptor experiencing noise levels between the LOAEL and SOAEL and a reduction of one Other Sensitive Receptor experiencing noise levels below the LOAEL. During the night, no changes in category are predicted.

Long-term Scheme v Part B comparison

1.5.47. Comparing the Other Sensitive Receptor counts with those applicable to the Part B assessment (presented in brackets) it is evident that there are no differences in the number of receptors falling within each category for the day and night.

SUMMARY

1.5.48. Overall, assessment in terms of the NPSE shows that the Scheme is not expected to change the category into which most receptors fall.

1.5.49. The Scheme in the short-term, particularly during the day is predicted to result in a small reduction in the number of receptors experiencing noise levels above the SOAEL and a small increase in receptors experiencing noise levels below the LOAEL, thus suggesting a beneficial effect at a small number of properties.

1.5.50. In the long-term, the Scheme is predicted to result in an increase in receptors predicted to experience noise levels above the SOAEL and a reduction in receptors experiencing noise levels below the LOAEL, thus indicating an adverse effect at a small number of receptors.

OPERATIONAL ROAD TRAFFIC NOISE – DMRB HD 213/11 ASSESSMENT

1.5.51. The above summary of pre-mitigation noise levels in terms of the LOAEL and SOAEL suggests that, in general, the Scheme compared to the do-minimum scenario would not have a particularly adverse or beneficial impact on noise-sensitive receptors. However, when the individual changes in noise level at each receptor are considered, there is potential for a slightly different appraisal. This is because noise levels can change notably,

but still fall in the same absolute noise level threshold band (e.g. remain within the equal to or above SOAEL band).

1.5.52. **Table 1-12** shows the predicted short-term change in noise level as a result of the Scheme for all modelled receptors within the Scheme Study Area: Part B, sorted into relevant bands following the DMRB HD 213/11 (**Ref. 1**) magnitude of impact categories. The corresponding analysis applicable to the Part B assessment is taken from **Table 6-35** of **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**) and is presented in brackets within the same table. Although negligible noise changes are referred to in the tables and discussion, it should be noted that these changes would most likely be imperceptible at sensitive receptors.

Table 1-12 - Short-term Traffic Noise Changes (DMRB HD 213/11 Table A1.1)

Change in Noise Level		Magnitude of Impact	Daytime	
			Number of Dwellings	Number of Other Sensitive Receptors
Increase in Noise Level $L_{A10,18h}$	0.1 – 0.9	Negligible	41 (43)	6 (5)
	1 – 2.9	Minor	5 (0)	0 (0)
	3 – 4.9	Moderate	0 (0)	0 (0)
	>=5	Major	0 (0)	0 (0)
No Change	= 0	No change	3 (2)	0 (0)
Decrease in Noise Level $L_{A10,18h}$	0.1 – 0.9	Negligible	18 (20)	1 (2)
	1 – 2.9	Minor	7 (7)	3 (3)
	3 – 4.9	Moderate	3 (5)	0 (0)
	>=5	Major	0 (0)	1 (1)

1.5.53. From the table above, it is evident that the Scheme ranges from having minor adverse impacts to major beneficial impacts (at Patterson's Cottage Boarding Kennels) due to the online widening of the A1 in the do-something scenario and in the absence of mitigation. The majority of noise-sensitive receptors are predicted to experience a negligible increase in noise level (i.e. an increase which is unlikely to be perceptible). Minor increases are predicted at five dwellings (Broomhouse Farm and 1 – 4 Broomhouse Farm Cottages). Major decreases are predicted at one Other Sensitive Receptor (Patterson Cottage Boarding Kennels) located to the west of the existing A1. Moderate decreases are predicted to be experienced at three dwellings. These beneficial impacts are as a consequence of the new online widening distributing traffic further to the east and at a greater distance from dwellings to the west of the existing A1.

1.5.54. In the short-term, comparing the analysis applicable to the Scheme with that for Part B (presented in brackets) it is evident that there are five dwellings predicted to experience minor adverse noise level changes (i.e. Broomhouse Farm and Cottages). For Part B alone, negligible adverse changes were predicted at worst. There are also slightly fewer dwellings and Other Sensitive Receptors experiencing beneficial noise level changes for the Scheme when compared to Part B alone. This comparison indicates that, for the Scheme, overall beneficial effects are expected to be slightly less than for Part B, with there also being a slight increase in predicted adverse effects.

1.5.55. **Table 1-13** shows the predicted long-term changes in noise level as a result of the Scheme for all modelled receptors within the Scheme Study Area: Part B, sorted into relevant bands following the DMRB HD 213/11 (**Ref. 1**) magnitude of impact categories. The corresponding analysis applicable to Part B assessment as taken from **Table 6-36** of **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**) and are presented in brackets within the same table.

Table 1-13 - Long-term Traffic Noise Changes (DMRB HD 213/11 Table A1.2)

Change in Noise Level		Magnitude of Impact	Daytime		Nighttime
			Number of Dwellings	Number of Other Sensitive Receptors	Number of Dwellings
Increase in Noise Level $L_{A10,18h}$	0.1 – 2.9	Negligible	60 (52)	6 (6)	8 (6)
	3 – 4.9	Minor	0 (0)	0 (0)	0 (0)
	5 – 9.9	Moderate	0 (0)	0 (0)	0 (0)
	>=10	Major	0 (0)	0 (0)	0 (0)
No Change	= 0	No change	3 (1)	1 (0)	0 (0)
Decrease in Noise Level $L_{A10,18h}$	0.1 – 2.9	Negligible	12 (22)	3 (4)	3 (1)
	3 – 4.9	Minor	2 (2)	1 (0)	1 (2)
	5 – 9.9	Moderate	0 (0)	0 (1)	0 (1)
	>=10	Major	0 (0)	0 (0)	0 (0)

1.5.56. The long-term impacts are similar to those anticipated in the short-term, with the majority of properties experiencing a negligible change in noise level. There are no predicted increases of minor, moderate or major magnitude of impact in the long-term.

1.5.57. In the long-term, comparing the analysis applicable to the Scheme with that for Part B (presented in brackets) it is evident that there are slightly more receptors experiencing noise level changes of negligible adverse magnitude of impact and fewer receptors experiencing

beneficial noise level changes. This comparison indicates that, for the Scheme, overall beneficial effects are expected to be slightly less than for Part B alone, with there also being a slight increase in predicted adverse noise level changes, albeit of negligible magnitude of impact.

1.5.58. In general, the predicted noise levels from the Scheme are less than 0.5 dB higher than for Part B alone, in both the short-term and long-term. The greatest predicted increase in noise level is 0.6 dB in the long-term comparison, all other increases are of 0.5 dB or less. Although the predicted increases are only slight, they do lead to there being five receptors predicted to experience adverse noise level changes of minor magnitude in the short-term, where previously impacts of negligible adverse magnitude were predicted at worst. Given that, at these receptors, the absolute noise level remains below SOAEL and the noise level increases are unlikely to cause residents to change their behaviour (with respect to noise), the predicted adverse noise level changes for the Scheme are deemed to be not significant.

WIDER NETWORK AFFECTED LINKS NOISE LEVEL CHANGES

1.5.59. To determine whether road links on the wider road network are affected by the Scheme, DMRB HD 213/11 (**Ref. 1**) requires that the Basic Noise Level (BNL)[1] is calculated for road links which fall outside of the operational road traffic noise Scheme Study Area.

1.5.60. Several road links (seven in the short-term) are predicted to experience beneficial noise level changes of moderate or major magnitude as a result of the Scheme.

1.5.61. Minor adverse impacts are predicted for 32 road links in the short-term and 15 road links in the long-term. Adopting the assessment methodology presented within Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**), noise level changes of minor magnitude of impact are considered not to be significant, therefore, none of the noise level changes on these road links are deemed to be significant.

1.5.62. Moderate adverse impacts are predicted for two road links in the short-term. **Table 1-14** - presents the road links expected to experience moderate adverse impacts as well as the calculated BNL (determined at 10 m from the kerb and including for low flow and surface corrections as applicable).

[1] The Basic Noise Level is described in the CRTN. It does not relate to any specific receptor, but rather is a measure of source noise, at a reference distance of 10 m from the nearside carriageway edge of a specific length of highway. It is determined by obtaining the estimated noise level from the 18-hour traffic flow and then applying corrections for vehicle speed, percentage of heavy vehicles, gradient and road surface as described in CRTN.

Table 1-14 - Short-Term Moderate Adverse Wider Network Affected Links Noise Level Changes

Road Link	Road Name	DM2023 BNL, dB $L_{A10,18h}$	DS2023 BNL, dB $L_{A10,18h}$	Short-term Change, dB
4596-4595	B1341 leading off the A1	53.5	57.1	3.6
1457-1395	Minor road between Bolton and Glanton west of the Scheme	55.7	59.0	3.3

1.5.63. There are five dwellings and one Other Sensitive Receptor (Bolton Chapel) which fall within 50 m of road link 1457-1395. There are no noise sensitive receptors falling within 50 m of link 4596-4595, which has therefore not been considered further.

1.5.64. Link 1457-1395 is a rural road located over 9 km to the west of the Scheme and is predicted to be subject to a moderate adverse BNL change in the short-term only (the long-term BNL change is predicted to be minor adverse). Such a change is at the lower end of the moderate magnitude of impact noise change band, being only 0.3 dB above the upper threshold for a minor magnitude of impact. Furthermore, this link is subject to low traffic flows in both the do-minimum (2023) and do-something (2023) scenarios (the annual average weekday traffic (AAWT) 18-hour flow is below 2,000 vehicles in both scenarios). Given the low traffic flows on this link and the large distance from the Scheme, the noise level change is deemed to be not significant.

1.5.65. The location of link 1457-1395 is shown (marked as a solid green line) on **Figure 6.9: Moderate Adverse Wider Network Noise Level Changes, Volume 5** of this ES (**Application Document Reference: TR010041/APP/6.5**) as this link was also predicted to experience a moderate adverse impact using the Part A traffic data in isolation.

1.6 HLA 111 OPERATIONAL NOISE AND VIBRATION DMRB SENSITIVITY TEST

1.6.1. The DMRB HD 213/11 guidance (**Ref. 1**) has been adopted for the noise and vibration assessment. This guidance was current throughout the assessment work undertaken to determine the noise and vibration effects of the Scheme. The consultation process described within Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**) also refers to HD 213/11 (**Ref. 1**). However, updated guidance in the form of DMRB LA 111 Noise and Vibration Revision 0 (LA 111) was released in November 2019 and then superseded by

Revision 1 in February 2020 (**Ref. 4**). This new guidance supersedes DMRB HD 213/11 (**Ref. 1**) and Interim Advice Note 185/15 (**Ref. 2**).

1.6.2. To understand the potential implications of this new guidance on the assessment, a separate appraisal has been undertaken with the following aims:

a. To identify the key changes in the assessment methodology, comparing the HD 213/11 (**Ref. 1**) and LA 111 guidance (**Ref. 4**).
b. To determine whether any additional significant effects might arise if the new DMRB LA 111 (**Ref. 4**) methodology had been used.

1.6.3. The identified key changes in the new LA 111 are largely associated with a change from using banded and pivoted speeds to just pivoted speeds as well as a change to the building façade which is to be selected for assessment when determining significance of effects. Further detail on the changes in assessment methodology are detailed within **Appendix 6.10: Noise and Vibration DMRB Sensitivity Test, Volume 7** of this ES (**Application Document Reference: TR010041/APP/6.7**) for Part A and **Appendix 6.10: Noise and Vibration DMRB Sensitivity Test, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**) for Part B, and **Appendix 4.5: DMRB Sensitivity Test, Volume 1** of this ES (**Application Document Reference: TR010041/APP/6.1**). Discussions on the implications for the Part A and Part B noise and vibration assessments are also presented within each respective appendix. These discussions remain relevant to the Scheme.

1.6.4. An appraisal of the potential for additional significant effects for the Scheme as a result of applying the new LA 111 methodology is presented separately for the Scheme Study Area: Part A and Part B within the following sections. This appraisal has been undertaken using the Scheme traffic data and concentrates on the Scheme Study Area: Part A and Part B for operational road traffic noise. A review of the wider network affected roads has however shown that, compared to the above assessment and those presented within Part A **Chapter 6: Noise and Vibration, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) and Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**), there are no additional significant adverse affected links as a result of the application of the LA 111 methodology.

DMRB SENSITIVITY TEST –SCHEME STUDY AREA: PART A

Absolute Noise Levels

1.6.5. It is first pertinent to consider the potential changes in absolute noise levels resulting from the use of banded speeds to pivoted speeds. This has the potential to impact the numbers of properties above the LOAEL and SOAEL thresholds, which in turn are used to assist in determining potential significant effects.

1.6.6. Following IAN 185/11 (**Ref. 2**) methodology, traffic data speeds were originally banded into the following speed bands (for non-motorway roads) - 20, 33, 63 and 97 kph.

1.6.7. The general pattern for the majority of the Scheme within the Scheme Study Area: Part A is that in the do-minimum opening year, the pivoted speeds were banded 'up' into the 97 kph speed band (i.e. a speed of 85 kph would be banded to 97 kph). In the do-something opening year, generally speeds were banded 'down' into the 97 kph speed band (i.e. a speed of 110 kph would be banded to 97 kph).

1.6.8. This means that for large sections of the Scheme within the Scheme Study Area: Part A, under the previous HD 213/11 (**Ref. 1**) and IAN 185/15 (**Ref. 2**) methodology the do-minimum and do-something opening year speeds were the same. This is no longer the case following LA 111 methodology, with the change in speeds generally leading to reduced do-minimum and increased do-something noise levels.

1.6.9. Whilst this outcome is not observed for all A1 links within the Scheme Study Area: Part A and some of the local roads in the model, it is anticipated that:

a. The number of properties above the daytime and nighttime LOAELs and SOAELs would reduce in the do-minimum opening and future years.

b. The number of properties above the daytime and nighttime LOAEL and SOAEL would increase in the do-something opening and future years.

1.6.10. Whilst this would certainly change the results reported in the assessment, it is unlikely to cause a significant change in the conclusions of this appendix. The NPSE (**Ref. 3**) notes that where properties are predicted to experience noise levels above the LOAEL and SOAEL, noise levels should be mitigated and minimised as far as possible, within the context of sustainable development.

1.6.11. The potential enhancement measures were investigated previously, but it is unlikely that the increase in do-something noise levels caused by the change from banded to pivoted speeds would lead to additional acoustic barriers in line with national noise policy.

Noise Level Changes

1.6.12. As the purpose of this document is to report the potential changes to the noise and vibration assessment presented for the Scheme in this appendix, for the Scheme Study Area: Part A, the full suite of tabulated results has not been replicated.

1.6.13. Instead, this section focusses on the minor, moderate and major beneficial and adverse impacts, which have the potential to be significant.

1.6.14. LA 111 (**Ref. 4**) notes that the short-term noise level changes should be used initially when determining potential significant effects. It is therefore appropriate to compare the results of the short-term noise level changes following both HD 213/11 (**Ref. 1**) and LA 111 methodology (**Ref. 4**). This analysis considers the different methods of selecting a representative noise change for each building as discussed within **Appendix 6.10: Noise and Vibration DMRB Sensitivity Test**, **Volume 7** of this ES (**Application Document Reference: TR010041/APP/6.7**). Only the daytime results are presented in the following table for residential properties. The differential between the calculated daytime and nighttime noise levels is such that the daytime appraisal is comparable to the nighttime

appraisal. The appraisal of significance applicable to the daytime $L_{A10,18h}$ results is also expected to be reflective of the nighttime appraisal. Nighttime noise levels have therefore not been included in the following appraisal.

Table 1-15 – Short-term Magnitude of Impact Due to the Scheme – HD 213/11 and IAN 185/15 Compared to LA 111 Methodology – Residential Receptors

Adverse / Beneficial	Magnitude of Impact	HD 213/11 and IAN 185/15 Methodology	LA 111 Methodology
Beneficial	Major	9	22
	Moderate	4	3
	Minor	12	47
	Negligible adverse / beneficial and no change	326	264
Adverse	Minor	28	41
	Moderate	1	2
	Major	3	4

1.6.15. It is immediately evident from the above table that the LA 111 methodology (**Ref. 4**) results in more receptors in the minor to major categories, than the HD 213/11 methodology (**Ref. 1**).

1.6.16. The increase in minor and major adverse results is thought to be caused mainly by the change from banded speeds to pivoted speeds as discussed above.

1.6.17. The increase in minor and major beneficial results is thought to be mainly due to selecting the façade with the greatest magnitude of change to represent each building rather than the least beneficial change (which would always favour an adverse result over a beneficial one, regardless of the magnitude).

1.6.18. The assessment of the Scheme following the HD 213/11 methodology within the Scheme Study Area: Part A (reported above) concluded that the three receptors with major adverse impacts were likely to experience significant adverse effects. No other significant adverse effects for operational road traffic noise impacts were identified.

Significance of Effects

1.6.19. The following paragraphs focus on the potential for the LA 111 methodology (**Ref. 4**) to give rise to additional significant adverse noise effects which would result in a change in the conclusions of this appendix. Whilst it appears likely that LA 111 methodology (**Ref. 4**) would increase the number of significant beneficial effects, these are less critical to the provision of mitigation and to the overall objectives of this document.

1.6.20. It is first appropriate to consider the major and moderate adverse impacts as LA 111 (**Ref. 4**) notes that these are likely to be significant:

a. The three previous major impacts (at Causey Park and New Houses Farm) are still major (and with higher noise level changes) meaning these three receptors remain significant adverse effects.

b. The one moderate impact previously is now the fourth major impact. Whilst this receptor is predicted to experience a major impact on one façade, as the noise level changes on other facades range from minor adverse to moderate beneficial and the absolute noise levels are less than 5 dB above the LOAEL, this is still considered non-significant.

c. One of the receptors predicted to experience a moderate impact is adjacent to the wider road network as opposed to the A1. This receptor is in the lower half of the moderate threshold on two façades and the noise levels around the property are only marginally above the daytime LOAEL. Therefore, this receptor is still considered non-significant.

d. The second moderate impact is located over 300 m from the A1 and is accessed via an access track. This receptor is only predicted to experience a moderate adverse impact (0.1 dB over the threshold) on one façade and the noise levels around the property are only marginally above the daytime LOAEL. Therefore, the effect at this receptor is considered to be non-significant.

1.6.21. LA 111 (**Ref. 4**) mentions that receptors with a minor short-term noise level change and which are also predicted to experience noise levels above the SOAEL have the potential to be significant. One receptor at Northgate Farm, within the Northgate Farm Noise Important Area (NIA 10003) is predicted to experience minor adverse noise level change in the short-term and experience noise levels above SOAEL. Although this property is deemed likely to experience a significant adverse effect, this would be mitigated by a noise barrier already included for the Scheme. This is discussed further below (under the heading 'Proposed Noise Barriers').

1.6.22. As highlighted by **Table 1-15** above, whilst there is an increase in adverse impacts of minor to major magnitude, there is also an increase in minor to major beneficial impacts.

1.6.23. Following HD 213/11, 13 dwellings were predicted to experience significant beneficial effects as a result of the Scheme within the Scheme Study Area: Part A. Following the LA 111 methodology, 24 significant beneficial effects are predicted at dwellings within the Scheme Study Area: Part A. These 24 dwellings correspond to the major and moderate beneficial impacts in **Table 1-15**. One of the receptors in the moderate beneficial impact category is deemed not to be significant due to contextual factors such as the noise level changes on other facades and the predicted absolute noise levels.

Other Sensitive Receptors

1.6.24. The results (following LA 111 methodology) for the six Other Sensitive Receptors were also compared with the HD 213/11 methodology (**Ref. 1**). Whilst the predicted noise levels have changed due to the factors discussed above, none of the six Other Sensitive Receptors are

predicted to experience moderate or major adverse impacts, meaning no significant adverse effects are predicted, as was the case following HD 213/11 methodology.

1.6.25. Three of the receptors, the two holiday cottages and Tritlington Church of England School are still predicted to experience significant beneficial effects following LA 111 methodology.

Proposed Noise Barriers

1.6.26. It should be noted that noise barriers PNB2 and PNB3 have been included to reduce noise levels for the three receptors predicted to experience significant adverse effects at Causey Park and New Houses Farm.

1.6.27. The potential significant adverse effect at Northgate Farm is mitigated by PNB1 such that the worst-case façade is only predicted to experience a negligible increase in noise level. This means that with mitigation, this receptor is not expected to experience a significant adverse effect. It is noted in Part A **Chapter 6: Noise and Vibration**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) that it cannot be confirmed whether a barrier can be built in this location until the detailed design stage. If PNB1 can be built, the attenuation afforded by the barrier would mean that Northgate Farm is not predicted to experience a significant adverse effect.

1.6.28. It is noted in the Part A **Chapter 6: Noise and Vibration**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) that Northgate Farm is likely to be eligible for compensation under the Noise Insulation Regulations 1975 (as amended) (**Ref. 5**) (NIR) if PNB1 cannot be built. Following LA 111 methodology for the Scheme, the same outcome would occur. If PNB1 can be built, Northgate Farm would not be eligible for compensation under the NIR (**Ref. 5**).

1.6.29. In addition, Strafford House is also predicted to be likely to be eligible for compensation under the NIR (**Ref. 5**), following the LA 111 assessment methodology for both the Scheme and Part A alone.

Summary

1.6.30. The three likely significant adverse effects identified in this appendix would remain significant adverse effects following LA 111 methodology (**Ref. 4**). There is the potential for one additional significant adverse effect at Northgate Farm if PNB1 cannot be built in this location, however, it is likely that this property would be eligible for compensation under the NIR (**Ref. 5**) if this is the case.

1.6.31. It is noted that 27 significant beneficial effects (24 dwellings and three Other Sensitive Receptors) are predicted following LA 111 methodology (**Ref. 4**). The total number has increased as a result of following LA 111 methodology (**Ref. 4**).

1.6.32. Whilst there is the potential for one additional significant adverse effect (at Northgate Farm if PNB1 cannot be built), the acoustic mitigation measures proposed in the Part A **Chapter 6: Noise and Vibration**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) (four noise barriers and a low noise road surface) remain appropriate.

1.6.33. As the predicted significant adverse and beneficial effects (for both dwellings and Other Sensitive receptors) are the same as those predicted for the Part A appraisal using LA 111 methodology, the locations of these receptors are shown within **Appendix 6.10: Noise and Vibration DMRB Sensitivity Test**, **Volume 7** of this ES (**Application Document Reference: TR010041/APP/6.7**).

DMRB SENSITIVITY TEST –SCHEME STUDY AREA: PART B

Absolute Noise Levels

1.6.34. It is first pertinent to consider the potential changes in absolute noise levels resulting in the change from banded speeds to pivoted speeds. This has the potential to impact the numbers of properties above the LOAEL and SOAEL thresholds, which in turn are used to assist in determining potential significant effects.

1.6.35. Following IAN 185/11 methodology, traffic speeds were originally banded into the following speed bands (for non-motorway roads) - 20, 33, 63 and 97 kph.

1.6.36. The general pattern for the majority of the Scheme within the Scheme Study Area: Part B is that in the do-minimum opening year for most sections of the A1, the banded speeds are representative of the pivoted speeds. In the do-something opening year, generally speeds were banded ‘down’ into the 97 kph speed band.

1.6.37. This means that for large sections of the Scheme within the Scheme Study Area: Part B, under the previous HD 213/11 (**Ref. 1**) and IAN 185/15 (**Ref. 2**) methodology the do-minimum and do-something opening year speeds were broadly the same. This is no longer the case following LA 111 methodology (**Ref. 4**), with the change in speeds generally leading to increased do-something noise levels from the A1.

1.6.38. Whilst this outcome is not observed for all A1 links within the Scheme Study Area: Part B, nor for some of the local roads in the model, it is anticipated that the number of properties above the daytime and nighttime LOAEL and SOAEL would increase in the do-something opening and future years when compared to the Scheme assessment adopting HD 213/11 (**Ref. 1**) as presented above.

1.6.39. However, whilst this would certainly change the results reported in the assessment, it is unlikely to cause a significant change in the conclusions of this noise and vibration appendix.

1.6.40. Potential mitigation / enhancement measures were investigated previously within Part B **Chapter 6: Noise and Vibration, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**) and it is unlikely that the increase in do-something noise levels caused by the change from banded to pivoted speeds would lead to the need for acoustic barriers in line with national noise policy.

Noise Level Changes

1.6.41. As the purpose of this document is to report potential changes to the noise and vibration assessment presented for the Scheme in this appendix, for the Scheme Study Area: Part B, the full suite of tabulated results has not been replicated.

1.6.42. Instead, this section focusses on the minor, moderate and major beneficial and adverse impacts, which have the potential to be significant.

1.6.43. LA 111 (**Ref. 4**) notes that the short-term noise level changes should be used initially when determining potential significant effects. It is therefore appropriate to compare the results of the short-term noise level changes following both HD 213/11 (**Ref. 1**) and LA 111 methodology (**Ref. 4**) as applicable to the Scheme. This analysis considers the different methods of selecting a representative noise change for each building as discussed within **Appendix 6.10: Noise and Vibration DMRB Sensitivity Test**, **Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8)**. Only the daytime results are presented in the following table for residential properties. The differential between the calculated daytime appraisal is comparable to the nighttime appraisal. The appraisal of significance applicable to the daytime La10, 18h results is also expected to be reflective of the nighttime appraisal. Nighttime noise levels have therefore not been included in the following appraisal.

Table 1-16 – Short-term Magnitude of Impact Due to the Scheme - HD 213/11 and IAN 185/15 compared to LA 111 Methodology – Residential Receptors

Adverse / Beneficial	Magnitude of Impact	HD 213/11 and IAN 185/15 Methodology	LA 111 Methodology
Beneficial	Major	0	1
	Moderate	3	2
	Minor	7	15
	Negligible adverse / beneficial and no change	62	40
Adverse	Minor	5	19
	Moderate	0	0
	Major	0	0

1.6.44. It is evident from the table above that the LA 111 methodology (**Ref. 4**) results in 19 receptors falling within the minor adverse magnitude of impact category, where previously there were five receptors falling within the same category. The use of the LA 111 methodology however does not result in any receptors falling within the moderate and major adverse magnitude of impact categories.

1.6.45. The increase in minor adverse results is likely to be caused mainly by the change from banded speeds to pivoted speeds as discussed above.

1.6.46. There is an increase in minor and major beneficial results which is likely to be mainly due to selecting the façade with the greatest magnitude of change to represent each building rather than the least beneficial change (which would always favour an adverse result over a beneficial one, regardless of the magnitude). Predicted beneficial changes at Patterson Cottage of major magnitude are considered to be significant, however, the moderate beneficial effects predicted at this property applying HD 213/11 methodology are also significant.

Significance of Effects

1.6.47. The following paragraphs focus on the potential for the LA 111 (**Ref. 4**) methodology to give rise to additional significant adverse noise effects which would result in a change in the conclusions of this appendix.

1.6.48. Whilst the LA 111 methodology also has the potential to very slightly increase the identified significant beneficial effects, these are less critical to the provision of mitigation and to the overall outcome of the appraisal.

1.6.49. LA 111 (**Ref. 4**) mentions that receptors with a minor short-term noise level change and which are also predicted to experience noise levels above the SOAEL have the potential to be significant. Following further consideration of the calculated receptor noise levels, it is evident that, for the 19 receptors which are predicted to experience minor adverse short-term noise level changes, noise levels at affected receptors would be below the SOAEL. Associated impacts at these receptors are therefore not considered to be significant. The LA 111 methodology is therefore expected not to change the conclusions of the noise and vibration assessment.

Proposed Mitigation

1.6.50. Given that the LA 111 methodology (**Ref. 4**) does not change the conclusions of the noise and vibration assessment with respect to significant adverse effects, there is no need to consider additional mitigation.

Summary

1.6.51. Considering the operational road traffic noise assessment undertaken adopting the DMRB HD 213/11 guidance (**Ref. 1**), it has been identified that significant adverse effects are not anticipated. It is expected that the assessment of significance would not change following the application of LA 111 (**Ref. 4**). Further assessment of mitigation is therefore expected not to be required following the application of LA 111.

REFERENCES

Ref. 1 - Highways Agency, Scottish Government, Welsh Assembly Government and the Department for Regional Development Northern Ireland (2011), Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7, HD 213/11 revision 1. Noise and Vibration.

Ref. 2 - Highways England (2015). Interim Advice Note (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. 3 - Defra (2010). Noise Policy Statement for England (March 2010). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf

Ref. 4 - Highways England, Transport Scotland, Welsh Government and the Department for Infrastructure (2020), Design Manual for Roads and Bridges, LA 111 revision 1. Noise and Vibration. Available at: https://standardsforhighways.co.uk/dmrb/search?discipline=SUSTAINABILITY_AND_ENVIRONMENT

Ref. 5 - HM Government (1975, as amended 1988). The Noise Insulation Regulations 1975 (as amended 1988). Available at: http://www.legislation.gov.uk/uksi/1975/1763/contents/made

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