TECHNICAL NOTE

TO	Northamptonshire County Council	**FROM**	WSP Acoustics team
DATE	**15 April 2019**	**CONFIDENTIALITY**	**Confidential**
SUBJECT	**A43 - Moulton bypass – Noise Assessment**		

1. Introduction

Parsons Brinckerhoff (PB) prepared the Environmental Statement (ES) for the A43 bypass in 2015. As part of this scope, a noise and vibration assessment was made. The likely noise impact arising from the operational phase of the scheme was studied.

Noise mitigation in the form of noise bund and barrier was included in the assessment and design of the scheme. Subsequently, changes are proposed to the mitigation measures related to the type and location of the noise bund and barriers. This note provides a sensitivity study to assess the noise impact at the nearest sensitive receptors due to these changes. In addition, noise predictions results for these two mitigation schemes, at the time of the ES and recent changes, have been compared.

2. Methodology

Modelling has been undertaken to establish the noise impact of the proposed noise barriers on the A43 Moulton bypass. Barrier alignment has been based upon the technical drawings provided, the drawings were imported into the previously constructed noise model CadnaA. Modelling predictions have been undertaken according to the Calculation of Road Traffic Noise (CRTN).

The revised barrier alignments are outlined in in Table 1. A 3m barrier height has been modelled for the barriers at Thorpeville and Overtone Lane and these are also specified in the table. A 2m barrier has also been included in the design between Ch. 690-860.

Table 1: Revised Barrier Alignment

Proposed Barriers			
Chainage	**Offset from carriageway (Bottom of barrier)**	**Modelling variants**	**Design Drawing File Name**
390 to 540	3.5m	3m	287512A-HHE-300-002 C03
540 to 680	14.5m	3m	
1330 to 1450	3.5m to 8m	3m	287512A-HHE-300-005 C04
1450 to 1480	8m to 10m	3m	287512A-HHE-300-006 C04
1480 to 1560	6m to 11.5	3m	

Proposed Barriers			
Chainage	**Offset from carriageway (Bottom of barrier)**	**Modelling variants**	**Design Drawing File Name**
690 to 870 (west of carriageway) 720 to 860 (east of carriageway)	6m to 30m (west of carriageway) 17m to 20m (east of carriageway)	2m Fence East and West of carriageway	287512A-HHE-300-004 C03
690 to 870 (west of carriageway) 720 to 860 (east of carriageway)	6m to 30m (west of carriageway) 17m to 20m (east of carriageway)	2m Fence East and West of carriageway	287512A-HHE-300-003 C02

Noise modelling results have been compared against the noise impact magnitude presented in DMRB HD 213/11 rev1, replicated in Table 2 and Table 3 below. The likely noise level changes were studied for the short-term (year of opening) and long-term (design year).

Table 2: Magnitude of Operational Noise Impacts in the Short Term

Noise Change, $L_{A10, 18h}$	**Magnitude of Impact**
0	No Change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 - 4.9	Moderate
5+	Major

Table 3: Magnitude of Operational Noise Impacts in the Long Term

Noise Change, $L_{A10, 18h}$	**Magnitude of Impact**
0	No Change
0.1 – 2.9	Negligible
3 – 4.9	Minor
5 – 9.9	Moderate
10+	Major

3. Results

In order to predict the noise impact due to the changes in the mitigation scheme, 20 noise sensitive receptors (NSRs) were chosen for analysis, see Table 4. The dwellings were identified as having a change in predicted noise level with the revised barrier mitigation design (3m barrier and 2 additional 2m barriers) when compared to the 5m mitigation feature used in the ES. Dwellings identified for the assessment are located between the existing A43 and the bypass, at Thorpeville and Overstone.

Table 4: Noise Sensitive Receptor - Address

NSR1	Ryedale House, Park View, NN3 7TN
NSR2	Byways, Overstone Lane, NN6 0AA
NSR3	Cotswold Overstone Lane, NN6 0AA
NSR4	Deran House Overstone Lane, NN6 0AA
NSR5	Langdene, Overstone Lane, NN6 0AA
NSR6	Mathon, Overstone Lane, NN6 0AA
NSR7	Park House Overstone Lane, NN6 0AA
NSR8	Almscliff, Park View, NN3 7TN
NSR9	10 Thorpeville, NN3 7TR
NSR10	12 Thorpeville, NN3 7TR
NSR11	14 Thorpeville, NN3 7TR
NSR12	4 Thorpeville, NN3 7TR
NSR13	6 Thorpeville, NN3 7TR
NSR14	8 Thorpeville, NN3 7TR
NSR15	16 Thorpeville, NN3 7TR
NSR16	18 Thorpeville, NN3 7TR
NSR17	24 Thorpeville, NN3 7TR
NSR18	18a Thorpeville, NN3 7TR
NSR19	30 Thorpeville, NN3 7TR
NSR20	Vardo, Overstone Lane, NN6 0AA

Façade noise levels were calculated for the scenarios Do-minimum Opening year (DMO), Do-Something Opening year (DSO) and Do-something Design (DSD) year so that short-term (ST) and long-term (LT) noise impacts could be determined. Noise prediction results are outlined in the tables below.

Table 5: Noise Impacts in the Short Term

Short term Increase		**5m noise mitigation feature (as assessed in the ES)**	**Revised barrier mitigation design (3m barrier and 2 additional 2m barriers)**
Noise Change, $L_{A10, 18h}$	Magnitude of Impact		
0	No Change	0	0
0.1 – 0.9	Negligible	3	2
1 – 2.9	Minor	10	8

Short term Increase		**5m noise mitigation feature (as assessed in the ES)**	**Revised barrier mitigation design (3m barrier and 2 additional 2m barriers)**
Noise Change, $L_{A10, 18h}$	Magnitude of Impact		
3 - 4.9	Moderate	3	4
5+	Major	0	2
Short term Decrease			
Noise Change, $L_{A10, 18h}$	Magnitude of Impact		
0	No Change	0	0
0.1 – 0.9	Negligible	1	3
1 – 2.9	Minor	2	1
3 - 4.9	Moderate	1	0
5+	Major	0	0

Results in 5 shows the likely short-term noise impact for the revised barrier locations. Results associated with a 5m noise barrier (from the ES), have also been included for reference.

The table shows that for the 5m noise mitigation feature scenarios, 3 NSRs are likely to be subject to an increase in noise levels of more than 3dB in the short term, classified as moderate and major. With the revised barrier mitigation design, this increases to 6 NSRs mainly located at Thorpeville. Those dwellings subject to a major impact are likely to receive an increase in noise levels of less than 6dB.

Table 6: Noise Impacts in the Long Term

Long term Increase		**5m noise mitigation feature (as assessed in the ES)**	**Revised barrier mitigation design (3m barrier and 2 additional 2m barriers)**
Noise Change, $L_{A10, 18h}$	Magnitude of Impact		
0	No Change	0	0
0.1 - 2.9	Negligible	8	9
3.0 - 4.9	Minor	9	7
5.0 - 9.9	Moderate	0	3
10 +	Major	0	0
Long term Decrease			
Noise Change, $L_{A10, 18h}$	Magnitude of Impact	0	0
0	No Change		
0.1 - 2.9	Negligible	2	1
3.0 - 4.9	Minor	1	0
5.0 - 9.9	Moderate	0	0
10 +	Major	0	0

Results in 6 shows the likely long-term noise impact for the revised barrier mitigation design. As above, the results associated with a 5m noise mitigation feature, have been included for reference.

The table shows that for the 5m noise mitigation feature scenario, a total number of 9 properties are likely to be subject to an increase in noise levels of more than 3dB in the long term, classified as minor, moderate and major. For the revised barrier mitigation design, the number of properties increases to 10. Only 3 properties would be subject to a moderate impact (greater than a 5dB increase), located at 4 – 8 Thorpeville. The increase in noise level for moderate impact is likely to be less than 7dB in the long term.

There are no major differences between the results for 5m noise mitigation feature scenario as assessed in the ES and the revised barrier mitigation design with the 3m and 2m barriers.

The number of properties likely to exceed a façade noise level of 68dB $L_{A10,18h}$ has been determined and they are shown in Table 7.

Table 7: Number of Properties exceeding Noise Insulation Regulations Threshold 68dB $L_{A10, 18h}$

5m (as assessed in the ES)	3m
0	0

It can be seen from the table that there would be no properties entitled under the Noise Insulation Regulations 1975, as amended 1988, in either noise barrier scenario studied. The 68 dB $L_{A10,18h}$ NIR threshold also represents the Significant Observed Adverse Effect Level (SOAEL) and no properties are predicted to exceed this SOAEL value.

Table 8: Revised Barrier Design Comparison - Predicted Road Traffic Noise Levels (dB $L_{A10,18h}$)

Predicted $L_{A10, 18h}$ Noise Level (dB)											
		ES Barrier Alignment				New Barrier Alignment				New Barrier - ES Barrier	
NSR	DMO	DSO	DSD	ST Change	LT Change	DSO	DSD	ST Change	LT Change		
NSR1	56.3	52.3	52.9	-4.0	-3.4	53.4	54.0	-2.9	-2.3	1.1	1.1
NSR2	60.4	57.7	58.2	-2.7	-2.2	60.3	60.9	-0.1	0.5	2.6	2.7
NSR3	59.1	59.1	59.7	0.0	0.6	60.1	60.7	1.0	1.6	1.0	1.0
NSR4	54.7	55.5	55.9	0.8	1.2	56.0	56.5	1.3	1.8	0.5	0.6
NSR5	59.0	57.8	58.4	-1.2	-0.6	59.6	60.1	0.6	1.1	1.8	1.7
NSR6	59.8	61.3	61.6	1.5	1.8	59.5	60.0	-0.3	0.2	-1.8	-1.6
NSR7	51.6	51.3	51.8	-0.3	0.2	51.4	51.9	-0.2	0.3	0.1	0.1
NSR8	54.2	57.9	58.4	**3.7**	4.2	58.1	58.6	**3.9**	4.4	0.2	0.2
NSR9	54.0	56.3	57.0	2.3	3.0	57.4	58.1	**3.4**	4.1	1.1	1.1
NSR10	54.0	56.3	57.0	2.3	3.0	57.4	58.1	**3.4**	4.1	1.1	1.1
NSR11	55.9	57.9	58.5	2.0	2.6	58.4	59.0	2.5	3.1	0.5	0.5
NSR12	52.1	56.0	56.9	**3.9**	4.8	57.6	58.3	**5.5**	**6.2**	1.6	1.4
NSR13	52.1	56.0	56.9	**3.9**	4.8	57.6	58.3	**5.5**	**6.2**	1.6	1.4
NSR14	57.5	60.0	60.8	2.5	3.3	61.9	62.5	**4.4**	**5.0**	1.9	1.7
NSR15	53.6	55.7	56.4	2.1	2.8	56.2	56.9	2.6	3.3	0.5	0.5
NSR16	55.5	56.7	57.3	1.2	1.8	57.1	57.6	1.6	2.1	0.4	0.3
NSR17	54.7	57.5	58.2	2.8	3.5	57.0	57.6	2.3	2.9	-0.5	-0.6
NSR18	56.6	59.1	59.7	2.5	3.1	59.2	59.9	2.6	3.3	0.1	0.2
NSR19	54.7	57.5	58.2	2.8	3.5	57.0	57.7	2.3	3.0	-0.5	-0.5
NSR20	63.7	63.7	64.4	0.0	0.7	64.2	64.8	0.5	1.1	0.5	0.4

NOTE: Bold text indicates moderate and major impact

Results in Table 8 show that the revised barrier alignment performance, when compared to the ES, is reduced. However, as reported in the previous tables, in the long term, the change in noise impact reported as moderate is only predicted at 3 properties at Thorpeville.

Noise model predictions were also made to establish the garden noise levels at the NSRs. The results are shown in Table 9. There are no major differences between the results for 5m noise mitigation feature scenario as assessed in the ES and the revised barrier mitigation design with the 3m and 2m barriers. Nine NSRs are already exposed to noise levels of 55dB $L_{Aeq,16h}$ or higher, considered as an upper limit for gardens, according to BS8233. It is noted that, BS8233 whilst is provides an indication of acceptable external noise levels for external amenity levels, its primary use is for the design of new buildings rather than for existing residential areas.

Table 9: Revised Barrier Design Comparison – Predicted garden noise levels (dB $L_{Aeq,16h}$)

Predicted $L_{Aeq,\ 16\ hr}$ Noise Level (dB)								
NSR	**DMO**	**ES Barrier Alignment**		**New Barrier Alignment**		**New Barrier - ES Barrier**		**New Barrier - DMO**
		DSO	**DSD**	**DSO**	**DSD**	**DSO**	**DSD**	**DSD**
NSR1	54	49	50	51	52	2	2	-2
NSR2	56	53	53	56	56	3	3	0
NSR3	58	54	55	55	56	1	1	-2
NSR4	66	53	54	53	54	0	0	-12
NSR5	57	55	60	55	56	0	-4	-1
NSR6	55	54	60	55	56	1	-4	1
NSR7	59	55	58	55	56	0	-2	-3
NSR8	56	56	57	57	57	1	1	1
NSR9	52	54	55	55	55	1	1	3
NSR10	52	54	54	55	55	1	1	3
NSR11	51	53	54	54	55	1	1	4
NSR12	55	57	58	59	60	2	2	5
NSR13	50	53	54	54	54	1	0	4
NSR14	53	55	56	57	58	2	2	5
NSR15	51	52	53	53	54	1	1	3
NSR16	51	52	53	53	54	1	2	3
NSR17	53	55	56	55	56	-1	-1	3
NSR18	53	55	55	55	56	0	1	3
NSR19	53	56	56	55	56	-1	-1	3
NSR20	65	60	61	61	62	2	1	-3

The table shows in column ‘New Barrier-ES Barrier’ the difference in noise levels likely to be experienced in gardens, implementing a 3m noise barrier in place of the mitigation scheme studied in the ES. The results show that at 5 receptors the ‘new barrier’ will perform better, for all other receptors the difference will range from 0 to 3dB. The table also presents a comparison between the noise levels achieved with the new barriers

against the noise levels in the Do-minimum scenario, ‘New Barrier-DMO’. This comparison shows that at 5 receptors, the noise levels with the mitigated scheme will be lower than those obtained if the scheme does not go ahead. For all other receptor the noise level difference range between 0 to 5dB.

Acoustic screening will be provided by the buildings of the new development. The screening effect for these new buildings has not been taken into account in the model, therefore, results should be considered as a worst-case.

4. Conclusions

An assessment has been undertaken to determine the magnitude of impact likely to be experience by noise sensitive receptors located between the existing A43 and the bypass, namely those at Thorpeville and Overstone. The analysis focused on a comparison between the previously assessed 5m noise mitigation feature presented in the ES with the revised mitigation design and the results classified according to DMRB HD 213/11 rev 1.

Results show that, in the long term, only 3 properties would be subject to a noise impact classified as moderate adverse. These are located at Thorpeville 4- 8. The noise level increase experienced at these properties is likely to be in the lower range of the moderate classification.

Garden noise levels have been assessed. The noise level increases between the ES and the revised mitigation scheme would range between 0 to 3dB. At 5 receptors the ‘new barrier’ will perform better. It should be noted that the noise model does not consider the acoustic screening effect provided by the new properties.

All receptors studied are predicted to experience noise levels below 68dB $L_{A10,18h}$ which is the threshold for qualification under the Noise Insulation Regulations 1975, as amended 1988, and also considered the threshold for the Significant Observed Adverse Effect Level in the Noise Policy Statement for England.

There are no major differences between the results obtained with 5m noise mitigation feature presented in the ES and the revised barrier mitigation design.