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Pogmoor Crossroads

Noise and Vibration assessment
Technical Note - Comparison of alternative noise mitigation options

Barnsley Metropolitan Borough Council

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Table of Contents

Figures

Tables

1. Introduction

1.1 AECOM was commissioned to undertake a noise and vibration assessment for the proposed junction improvements to the existing traffic-light controlled junction at the Broadway/Pogmoor Road crossroads, to the east of the M1, junction 37.

1.2 The results of the assessment, with proposals for mitigating adverse noise impacts of the junction improvement were set out in a report submitted to Barnsley Metropolitan Borough Council (BMBC) on 14th September 2018 (subsequently referred to as 'September 2018 assessment report'). The report identified a number of significant adverse effects which were likely to occur as a result of the junction improvement, primarily along Dodworth Road and Grosvenor Walk.

1.3 Following the submission of the September 2018 report, further discussions have been held between BMBC and AECOM to identify alternative options to reduce, or where possible, remove all significant adverse effects identified in the report.

1.4 This technical note summarises the noise impact of these alternative options and how these compare in terms of the resulting residual impacts and significant adverse effects.

2. Current mitigation option outcomes

2.1 The noise mitigation included in the current proposal as set out in the September 2018 assessment report is shown in Figure 1. This includes a 1.5m high gabion wall along the north perimeter of Penny Pie Park and a 2.4m high noise barrier along the east perimeter. This option also assumes that the proposed gyratory and surrounding roads will be surfaced with Hot Rolled Asphalt.

2.2 However, despite this mitigation, likely significant adverse effects as a result of the scheme were identified at:

2.2.1 20 residential properties as a result of the proposed scheme increasing road traffic noise levels by at least 3dB(A) in the short term and

2.2.2 56 properties at which high noise levels are currently experienced and are predicted to increase by at least 1dB(A) as a result of the scheme.

2.3 In relation to (a) above, significant adverse effects were identified at properties in Grosvenor Walk, Whitehill Avenue, Dodworth Road and Broadway. In relation to (b) above, significant adverse effects were identified a number of properties along Dodworth Road and Pogmoor Road, where there are existing high noise levels which are increased due to the scheme. However, it was noted in the assessment report that significant adverse effects at the latter 56 properties may be avoided through the implementation of a noise insulation scheme to the affected facades of the properties in line with the Noise Insulation Regulations (NIR) package of measures, assuming residents accept the offer of such measures.

3. Additional mitigation options considered

3.1 The alternative options which have been considered since the September 2018 assessment report, and for which noise impacts have been derived and summarised in subsequent sections of this technical note, are described below:

a) Option A: 3m high earth bund with a 1m noise barrier on top of the bund, 1.5m high gabion wall along existing Pogmoor Road near junction with Whitehill Avenue and 2.4m high noise barrier along driveway of Firs Care Home (see Figure 2)

b) Option B: 1.5m high gabion wall along the north perimeter of Penny Pie Park, 1.5m high gabion wall along existing Pogmoor Road near junction with Whitehill Avenue, 1.0m high gabion wall along outer perimeter of new gyratory link, a 2.4m high noise barrier along the east perimeter of Penny Pie Park and 2.4m high noise barrier along driveway of Firs Care Home (see Figure 3)

c) Option C: 1.5m high gabion wall along the north perimeter of Penny Pie Park, 1.5m high gabion wall along existing Pogmoor Road near junction with Whitehill Avenue, 1.0m high gabion wall along outer perimeter of new gyratory link, a 3.0m high noise barrier along the east perimeter of Penny Pie Park and 2.4m high noise barrier along driveway of Firs Care Home (see Figure 4)

3.2 Two sets of noise levels have been derived for each of the alternatives described in a), b) and c) above, one assuming reflective noise barriers and the second assuming absorptive noise barriers.

4. Methodology

4.1 The methodology set out in Section 3 of the September 2018 assessment report has been used to derive the noise impacts and significant effects of the alternative options set out in 3.1 a), 3.1b) and 3.1c) above, subject to the following limitations :

a) The impacts and significant effects of each of the alternative options have been derived comparing the with and without the alternative mitigation options in the opening year daytime only (2019), which is likely to yield more significant effects than would be encountered from comparing either the future year or night-time scenarios

b) The impacts of all the alternative options have also been described comparing the current situation (using Base Year 2014) traffic data with the with alternative mitigation options in opening year daytime only (2019). These impacts have been compared with those which would occur if the proposed scheme was not taken forward.

c) Results have been presented for residential properties only as no significant adverse effects have been identified at non-residential noise-sensitive properties in either the September 2018 assessment report or the alternative options set out in this technical note.

5. Results

Base Year vs 2019

5.1 A summary of the noise impacts resulting from comparing the current situation (Base Year 2014) with the ‘no scheme’ and the alternative options is presented in Table 1 below. The noise impact bands for short term change (see Table 6 in September 2018 assessment report) have been used to illustrate the differences between the options. However, this is for illustrative purposes only, given that the actual changes in impacts presented are over a 5 year period:

Change in noise level		Daytime			
		No Scheme	Option A	Option B	Option C
Increase in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 – 0.9	168	1413	1409	1413
	1.0 – 2.9	0	220	302	302
	3.0 - 4.9	0	1	8	4
	≥5	0	1	1	1
No change	0	287	179	155	155
Decrease in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 – 0.9	1697	338	277	277
	1.0 – 2.9	1	1	1	1
	3.0 - 4.9	0	0	0	0
	≥5	0	0	0	0

Table 1 Comparison of impacts for No Scheme and With Scheme options between Current Year (Base Year 2014) and Opening Year (2019)

5.2 The above table shows that the 'no scheme' option is the best performing in terms of noise impacts with a majority of the residential properties predicted to experience negligible noise decreases, with moderate decreases predicted to occur at properties to the west of the M1 junction 37. These changes in noise level result from changes in traffic flow around the junction and on the wider network between 2014 and 2019, with notably very small changes in traffic flow and speeds predicted on roads around the Pogmoor Road junction.

5.3 The introduction of all the alternative options in 2019 results in an overall worsening of the traffic noise exposure when compared to the 'no scheme' option over the 5 year period. These changes result from a number of factors, such as changes in alignment and traffic flow around the Pogmoor Road junction. The differences between these options are further explored in the following section.

Opening year impacts and significant effects

5.4 A summary of the noise impacts and significant effects derived from comparing the opening year (2019) 'Do Minimum' and 'Do Something' noise levels for all the alternative options are presented in Tables 2 and 3 below:

Change in noise level		Daytime			
		Current proposal (18th September 2018 assessment)	Option A	Option B	Option C
Increase in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 – 0.9	1658	1818	1717	1721
	1.0 – 2.9	404	236	351	350
	3.0 - 4.9	18	4	11	8
	≥5	2	1	1	1
No change	0	38	44	40	40
Decrease in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 – 0.9	33	50	33	33
	1.0 – 2.9	0	0	0	0
	3.0 - 4.9	0	0	0	0
	≥5	0	0	0	0

Table 2 Comparison of impacts for alternative mitigation options in Opening Year (2019)

	Current proposal (18th September 2018 report)	Option A	Option B	Option C
DS 2019 – DM 2019 (daytime)	56	49	54	54

Table 3 Comparison of number of residential buildings above SOAEL in Do Minimum scenarios and experience at least 1dB(A) increase due to scheme

5.5 The results presented in Table 2 show that all three alternative options are predicted to result in a reduction in the number of significant adverse effects at residential properties due to increases in road traffic noise of 3dB(A) or more, compared with the current proposal included in the September 2018 assessment report. The locations of the properties predicted to experience 3dB(A) or more increases for each of the options are shown on Figures 5, 6 and 7.

5.6 The introduction of the 1.5m high gabion to the east of Whitehill Avenue and the 2.4m high noise barrier along the drive of Firs Care Home in all the alternative options remove the significant adverse effects reported at properties in these locations in the 18th September assessment report.

5.7 In addition to removing the latter significant adverse effects, Option A also removes all the previously reported significant adverse effects at properties in Grosvenor Walk. In comparison, significant adverse effects remain at 6 residential properties in Grosvenor Walk with Option B, reducing to 4 with Option C.

5.8 However, although Option A results in the least number of significant adverse effects of all the scheme options, the footprint of the berm would require approximately 7700m^2 of parkland to the north and east of the proposed route through Penny Pie Park, resulting in the loss of a substantive amount of the park which can be retained for community use.

5.9 The results presented in Table 3 show that all three alternative options are predicted to result in a reduction in the number of significant adverse effects at residential properties due to increases in road traffic noise of 1dB(A) or more at properties already exposed to high noise levels, compared with the current proposal included in the September 2018 assessment report. The locations of the properties predicted to experience 1dB(A) increases for each of the options are shown on Figures 8, 9 and 10.

5.10 Most notably, the greatest reduction in number of significant adverse effects are as a result of the Option A which results in 7 properties no longer likely to experience such effects, 5 of these being along Dodworth Road. As noted in the September 2018 assessment report, significant adverse effects at the residential properties identified in all the alternative options may be avoided through the implementation of a noise insulation scheme to the affected facades of the properties in line with the Noise Insulation Regulations (NIR) package of measures, assuming residents accept the offer of such measures.

5.11 No feasible on or off-site mitigation options have been identified to remove the significant adverse effects previously identified at properties on Dodworth Road or Broadway in the vicinity of the junction with Pogmoor Road.

Effectiveness of different noise barrier and surfacing types

5.12 A comparison of the noise levels resulting from absorptive and reflective noise barriers has concluded that the changes are small, with a maximum reduction of absorptive barriers of 0.3dB(A) compared to reflective barrier observed. These small changes in noise level resulting from the absorptive barriers have not resulted in a change in the impacts or significant adverse effects identified for reflective barriers.

5.13 In addition, the performance of low noise surfacing has been considered as a possible means of further reducing the adverse impacts of the scheme reported for all alternative options. Low noise surfacing materials are most effective where road speeds are more than 75km/h and at these speeds, the noise reduction will be at least 3.5dB(A) better than Hot Rolled Asphalt, the latter being the proposed surfacing for the scheme. Low road noise surfaces will provide some noise reduction on roads with speeds less than 75km/h, but there is not likely to be any noise reduction benefit when speeds drop below 50km/h. The speeds on all roads within the area of the proposed scheme are below 50km/h and hence using low noise surfacing materials is not likely to result any noise reducing benefits at any of the residential properties in the vicinity of the scheme.

6. Summary

6.1 AECOM was commissioned to undertake a noise and vibration assessment for the proposed junction improvements to the existing traffic-light controlled junction at the Broadway/Pogmoor Road crossroads, to the east of the M1, junction 37. The results of the assessment, with proposals for mitigating adverse noise impacts of the junction improvement were set out in a report submitted to Barnsley Metropolitan Borough Council on 14th September 2018. The report identified a number of significant adverse effects which were likely to occur as a result of the junction improvement, primarily along Dodworth Road and Grosvenor Walk.

6.2 Following the submission of the September 2018 assessment report, further discussions have been held between BMBC and AECOM to identify alternative options to reduce, or where possible, remove all significant adverse effects identified in the report.

6.3 A comparison of the alternative options has been undertaken and the results set out in this report. In comparing the current situation (taken as Base Year 2014) with those expected in 2019, the 'no scheme' option results in the least noise impact, when compared to the alternative options, which is due to negligible traffic changes on the road network between these two years.

6.4 None of the alternative options remove all significant adverse effects from the scheme, primarily due to no feasible noise mitigation options being identified to avoid significant adverse effects at 5 properties along Dodworth Road and Broadway in the vicinity of Pogmoor Road junction.

6.5 Of the three alternative options considered, Option A results in the least number of significant adverse noise effects. However, this option would result in a significant loss of parkland due to the need to install a 3m high berm, with a footprint of approximately 7700m^2. However, all alternative options considered in this report result in fewer significant adverse noise effects than those reported in the September 2018 assessment report.

6.6 A comparison of the noise levels resulting from absorptive and reflective noise barriers has concluded that the changes are small, with a maximum reduction of absorptive barriers of 0.3dB(A) compared to reflective barrier observed. These small changes in noise level resulting from the absorptive barriers have not resulted in a change in the impacts or significant adverse effects identified for reflective barriers. The speeds on all roads within the area of the proposed scheme are below 50km/h and hence using low noise surfacing materials is not likely to result any noise reducing benefits at any of the residential properties in the vicinity of the scheme.

Appendix A Figures

Figure 1: Current (September 2018) mitigation proposals

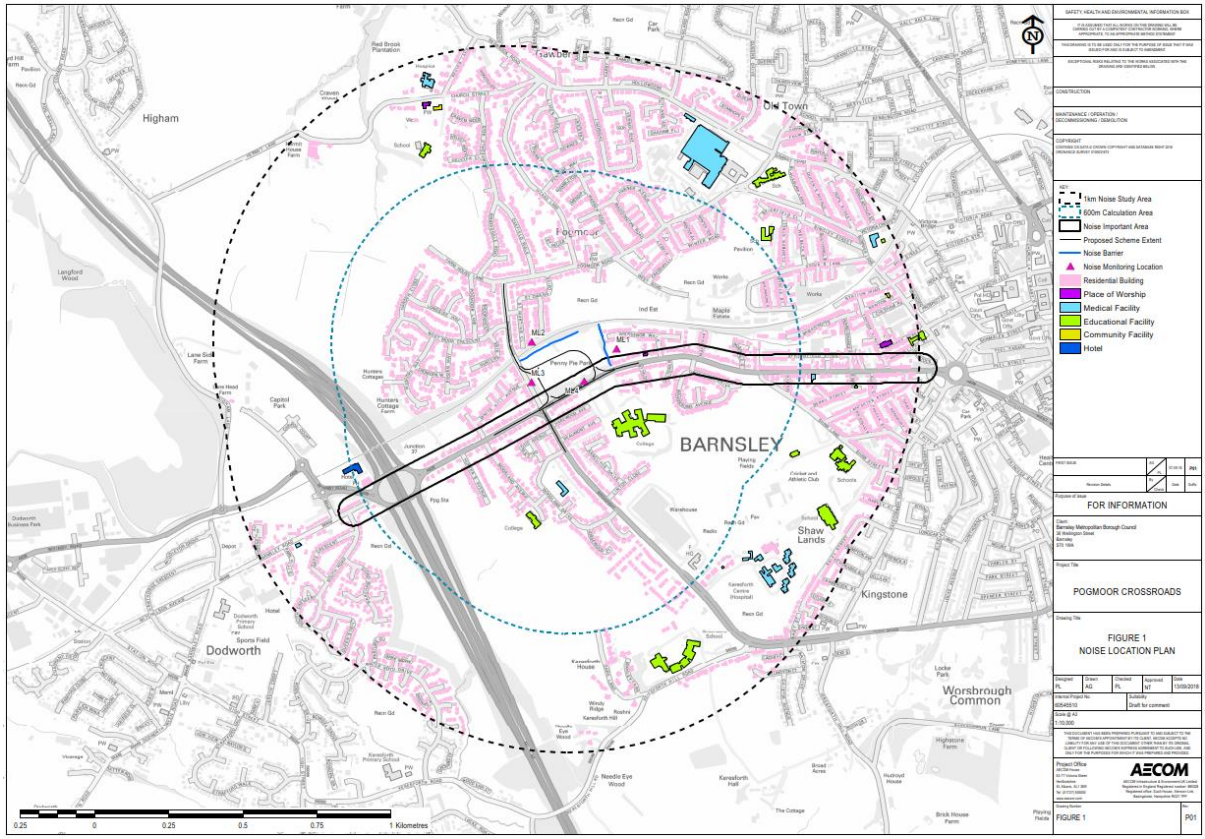

Figure 2: Option A alternative mitigation proposal – Layout

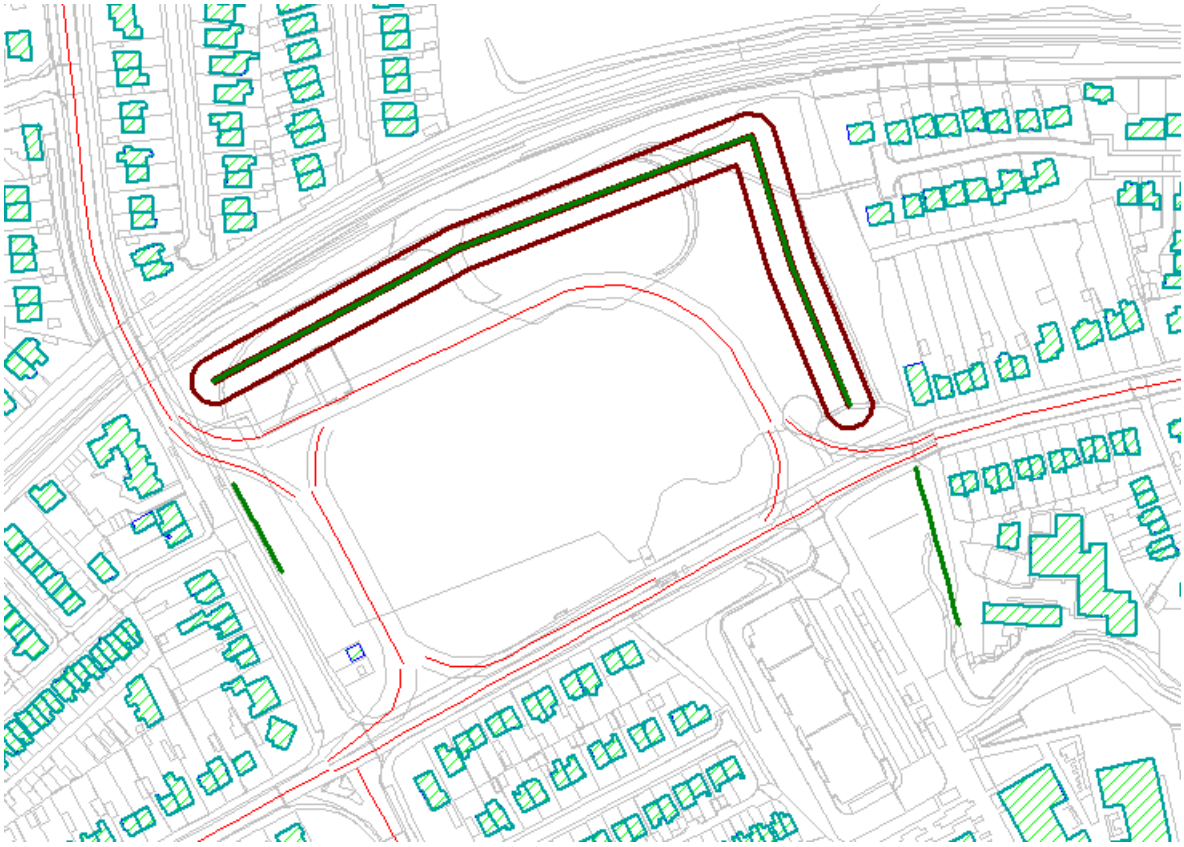

Figure 3: Option B alternative mitigation proposal – Layout

Figure 4: Option C alternative mitigation proposal – Layout

Figure 5: Option A alternative mitigation proposal – Significant adverse effects (3dB(A) increase)

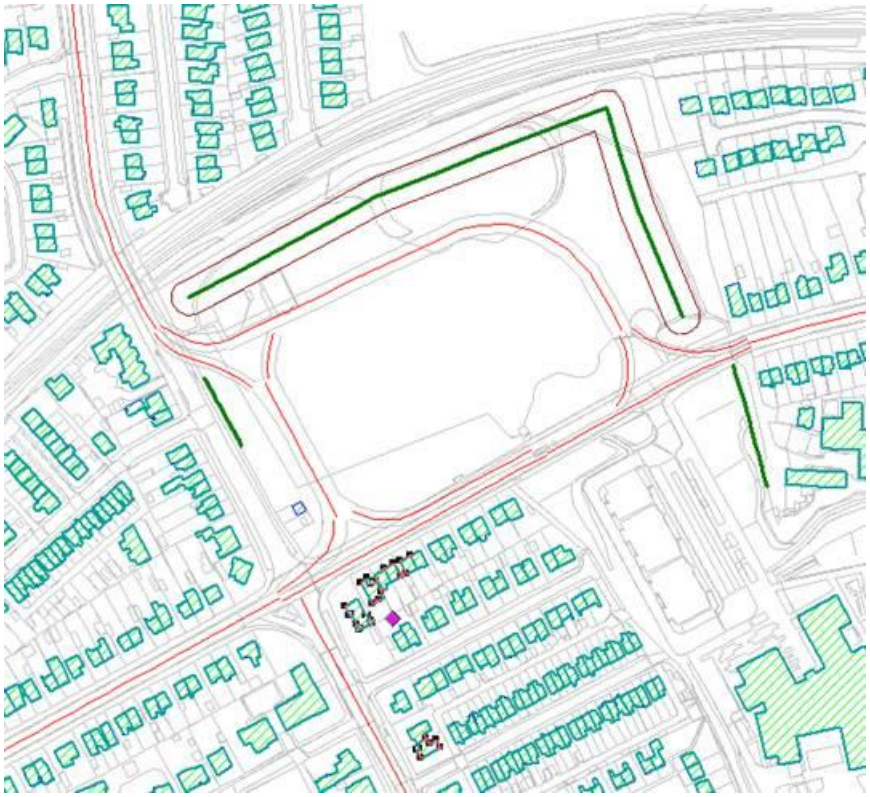

Figure 6: Option B alternative mitigation proposal – Significant adverse effects (3dB(A) increase)

Figure 7: Option C alternative mitigation proposal – Significant adverse effects (3dB(A) increase)

Figure 8: Option A alternative mitigation proposal - Significant adverse effects (SOAEL plus at least 1dB(A) increase due to scheme)

Figure 9: Option B alternative mitigation proposal - Significant adverse effects (SOAEL plus at least 1dB(A) increase due to scheme)

Figure 10: Option C alternative mitigation proposal - Significant adverse effects (SOAEL plus at least 1dB(A) increase due to scheme)

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