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ENVIRONMENT

Avant Homes

Land off Moorthorpe Way

Mosborough, Sheffield

Noise Impact Assessment

LDP2266

ENVIRONMENT

Avant Homes

Land off Moorthorpe Way

Mosborough, Sheffield

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Notice

EXECUTIVE SUMMARY

This noise assessment has been produced for Avant Homes to support a detailed planning application for a proposed residential development at Land off Moorthorpe Way, Mosborough, Sheffield, S20 6PD.

A baseline noise survey was undertaken at the Site in February 2019. The existing noise environment across the Site is dominated by road traffic from nearby roads. Proposed dwellings closest to the existing access road will also experience some occasional noise from vehicles visiting the Owlthorpe Surgery and Weldricks Pharmacy and car park in the daytime.

The results of the survey show that Sheffield City Council's daytime internal noise design criteria should be achieved in all habitable rooms with windows partially open. However, there could be minor exceedances of SCC's night-time noise levels in some habitable rooms with windows partially open in dwellings closest to existing nearby roads. It is therefore considered that mitigation is required for some units in the form of standard thermal double glazing and ventilation via constant MEV and hit-and-miss trickle ventilators in window heads.

Daytime road traffic noise levels were consistently below 50 dB $L_{Aeq,16hr}$, and the Councils upper daytime limit of 55 dB $L_{Aeq,16hr}$ in external amenity areas should be achieved without any additional noise mitigation measures.

Noise from the proposed LEAP and MUGA is likely to be at an acceptable level for existing and proposed noise sensitive receptors and no further noise mitigation is required, however best practice has been suggested for any perimeter fencing to be installed.

Based on the results of the assessment, it has been demonstrated that the Site is suitable for residential development, and therefore noise need not be a determining factor in the granting of planning approval for the Proposed Development.

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1. INTRODUCTION

Appointment & Background

1.1 BWB Consulting Ltd was appointed by Avant Homes to undertake an environmental noise assessment for a proposed residential development at Land off Moorthorpe Way, Mosborough, Sheffield, S20 6PD, which falls within the administrative boundary of Sheffield City Council (SCC).

1.2 This assessment has been undertaken based on the results of a baseline noise survey on the Site. The results of the survey have been assessed in accordance with current standards and guidance to establish the requirement for any noise mitigation measures that may be required to secure an appropriate level of amenity for future incoming residents of the Proposed Development.

1.3 This report is necessarily technical in nature, so to assist the reader, a glossary of acoustic terminology can be found in Appendix A.

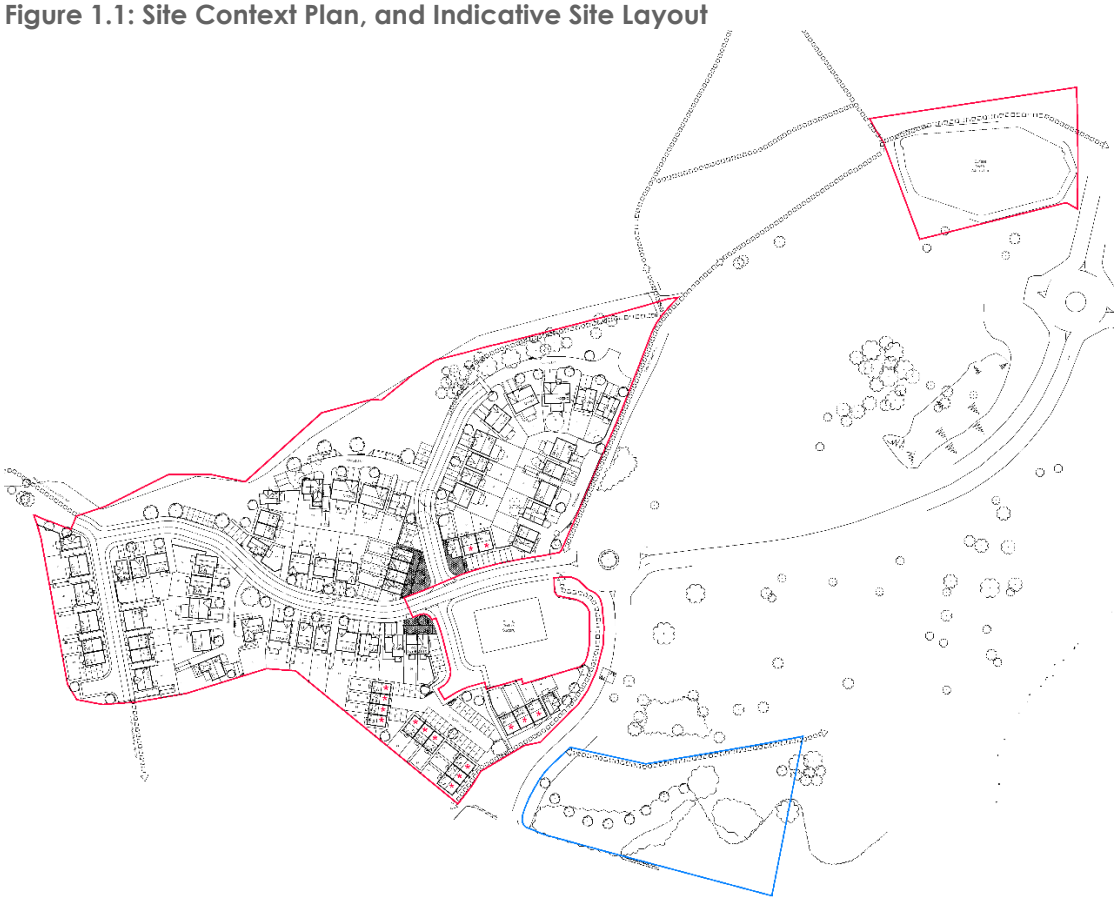
Site Setting

1.4 The Site location is shown in **Figure 1.1**. The site wraps around Owlthorpe Surgery, Weldricks Pharmacy, car park and access on the eastern boundary. The Surgery is open only in the daytime on weekdays (typically 08:00-18:00hrs, but from 07:00hrs on Wednesday and is closed at weekends). The Pharmacy's typical opening hours are 08:30-18:30 on weekdays and is also closed at weekends. A small condensing unit is installed on the western-facing elevation of the Pharmacy.

1.5 To the east of the Site are Moorthorpe Gate and Moorthorpe Rise that provide access to the Surgery Site via a small roundabout. Further to the east and also to the west and north is open land. Well away to the north is Donetsk Way and the Malin Bridge to Halfway route of the Sheffield Supertram (officially the Stagecoach Supertram), although day and night-time noise from these transportation sources is low to the acoustic screening provided by intervening land and dwellings that are at a higher elevation.

1.6 Moorthorpe Rise provides access to a residential area to the south of the site only resulting in relatively low traffic flows on Both Moorthorpe Gate and Moorthorpe Rise.

Figure 1.1: Site Context Plan, and Indicative Site Layout



Proposed Development

1.7 The indicative layout provided by client at the time of writing this report is shown **Figure 1.1**. The current layout is comprised of approximately 75 residential dwellings and associated infrastructure.

1.8 The layout is well designed and shows that the majority of rear gardens will be well away from nearby roads. A small number of gardens are shown to have a line of sight to the Surgery Site and car park.As part of the wider site, a Surface Water Attenuation Area is proposed on land to the north east of the proposed development site, and a Local Equipped Area for Play (LEAP) and Multi-Use Games Area (MUGA) is proposed on land to the south east, shown in blue on **Figure 1.1.**

2. STANDARDS AND GUIDANCE

National Planning Policy Framework (NPPF)

2.1 Updated in February 2019, this document sets out the Government's planning policies for England and supersedes the previous NPPF published in 2012. It makes the following reference to noise in the section entitled *Conserving and enhancing the natural environment*:

"*170. Planning policies and decisions should contribute to and enhance the natural and local environment by:*

[…]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."

2.2 It also makes the following references to noise in the Section entitled *Ground conditions and pollution*:

"*180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life[60];

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

[60] See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)."

BS 8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings

2.3 This standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

2.4 The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings for steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the following criteria set out in **Table 2.1** below:

Table 2.1: Summary of Internal Ambient Noise Levels to be achieved in Habitable Rooms when Assessed in Accordance with BS 8233

Activity	Location	Period	
		07:00 to 23:00 Hours, i.e. Daytime	23:00 to 07:00 Hours, i.e. Night-time
Resting	Living Room	35 dB $L_{Aeq, 16\ Hour}$	-
Dining	Dining Room/area	40 dB $L_{Aeq, 16\ Hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16\ Hour}$	30 dB $L_{Aeq, 8\ Hour}$

2.5 Whilst BS 8233:2014 recognises that a guideline value may be set in terms of SEL or L_{AFmax} for the assessment of regular individual noise events that can cause sleep disturbance during the night-time, a specific criterion is not stipulated. Accordingly, reference has been made in this assessment to the World Health Organisation (WHO) 1999: *Guidelines for Community Noise* below.

2.6 With respect to external amenity space such as gardens and patios it is stated that it is desirable that the noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances such as within city centres urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

World Health Organisation (WHO) 1999: Guidelines for Community Noise

2.7 As with the 'good' and 'reasonable' criteria in BS8233, the L_{AFmax} criterion in BS8233 is largely concordant with the World Health Organisation (WHO) guidance: 1999: *Guidelines for community noise*. This document draws upon guidance from Vallet and Vernay, which states:

> "*For good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night", and "noise events exceeding 45d dB L_{AFmax} should be limited if possible*".

2.8 The WHO guidelines state that at night, sound pressure levels at the outside facades of living spaces should not regularly exceed 45 dB L_{Aeq} and 60 dB L_{AFmax} so that people may sleep with bedroom windows open, assuming a reduction of noise ingress through a partially open window of 15dB.

Sport England Design Guidance Note – Artificial Grass Pitch (AGP) Acoustics – Planning Implications, 2015

2.9 There is currently no standard or guidance document that relates specifically to the impact of noise generated by LEAP and MUGA developments onto existing or proposed residential receptors. SCC have requested that the potential impact is considered in the context of the Sport England AGP document, given that noise from activities on an AGP can include noise from raised voices and impact noise from balls.

2.10 The above guidance document expands on the general technical advice already available from Sport England. It provides details of acoustic implications associated with such facilities and follows on from an acoustic research programme involving detailed analysis of relevant noise guidance documents and site testing in a range of locations.

2.11 It proposes appropriate noise criteria and assessment methods and outlines practical measures that can be applied to reduce noise in particularly sensitive areas.

2.12 It refers to the World Health Organisation (WHO) document Guidelines for Community Noise (1999) which provides guidance for outdoor living areas that states that to avoid 'moderate annoyance' during the daytime and evening the noise level should not exceed 50 dB $L_{Aeq,T}$. WHO guidelines for residential development are typically calculated over a 16-hour daytime period. For an artificial grass pitch, a 16-hour assessment period may not truly reflect the noise impact as it takes into account times of use and non-use. It is suggested an appropriate assessment time period is for one hour, $L_{Aeq,1h}$ as this is typically the time period for a community sports session on an AGP.

2.13 The document identifies that, from measurement data, a typical free-field noise level of 58 dB $L_{Aeq,1h}$ at a distance of 10 metres (m) from the side line halfway marking has been determined as representative for noise from an AGP. The document goes on to state that, when a site is in an open location, noise levels of 50 dB $L_{Aeq,1h}$ can be achieved at a distance of 40 m at 1.5 m above local ground height.

Sheffield City Council Guidance

2.14 Following previous consultation with Sheffield City Council (SCC) on similar residential developments, we understand that SCC could apply the following noise related condition and criteria where appropriate.

> ***Pre-Occupation: Transportation Noise***
>
> *The residential accommodation hereby permitted shall not be occupied unless a scheme of sound insulation works has been installed and thereafter retained. Such scheme of works shall:*
>
> > *Be based on the findings of (Option - EITHER: an approved noise survey of the application site, including an approved method statement for the noise survey OR approved noise survey (variable)).*
> >
> > *Be capable of achieving the following noise levels:*
> > *Bedrooms: $L_{Aeq(8\ hour)}$ – 30 dB (2300 to 0700 hours);*
> > *Living Rooms & Bedrooms: $L_{Aeq(16\ hour)}$ – 35 dB (0700 to 2300 hours);*
> > *Other Habitable Rooms: $L_{Aeq(16\ hour)}$ – 40 dB (0700 to 2300 hours);*
> > *Bedrooms: L_{AFmax} – 45 dB (2300 to 0700 hours).*
>
> *Where the above noise criteria cannot be achieved with windows partially open, include a system of alternative acoustically treated ventilation to all habitable rooms. Before the scheme of sound insulation works is installed full details thereof shall first have been submitted to and approved in writing by the Local Planning Authority.*

Adopted Noise Design Criteria

2.15 The dominant noise across the site is road traffic from nearby roads and achieving SCC's preoccupation noise criteria would secure a reasonable degree of amenity for future incoming residents, and the site be suitable for residential development.

3. BASELINE NOISE MONITORING

3.1 A baseline noise survey has been undertaken to determine the exiting daytime and night-time noise levels on the site that are most exposed to road traffic noise and any noise from the Surgery, Pharmacy and car park.

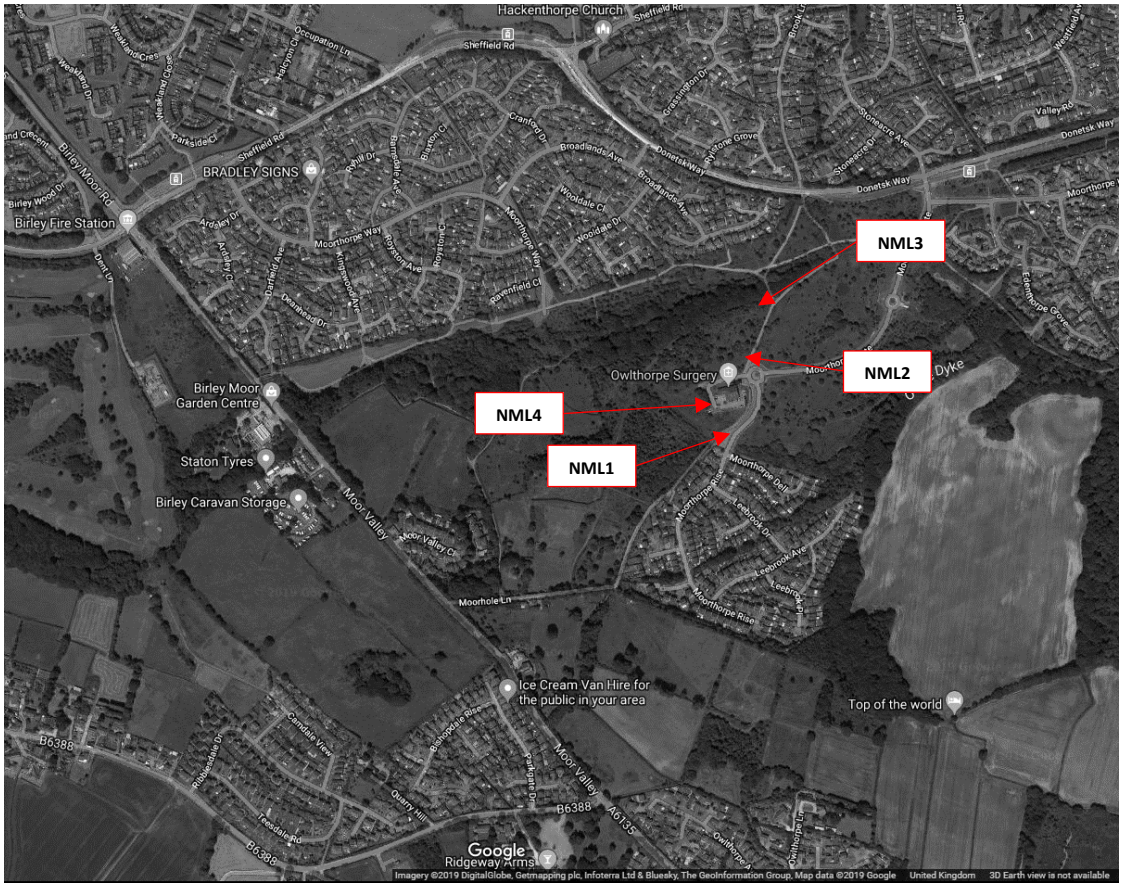
Noise Monitoring Locations

3.2 Attended noise monitoring was undertaken on Friday 22nd February 2019 during the following periods;

- Night-time: 04:00hrs – 07:00hrs
- Daytime: 07:45hrs – 13:54hrs

3.3 During the survey, monitoring was undertaken at three Noise Monitoring Locations (NMLs). The NMLs are shown in **Figure 1.1** and were chosen so as to be representative of proposed dwelling and external amenity spaces (i.e. private rear gardens) most exposed noise from nearby roads and the Surgery site.

Figure 3.2: Noise Monitoring Locations



3.4 All noise monitoring was carried out at height of 1.5m above ground level and in free-field conditions.

Equipment

3.5 Noise measurements were carried out using NTi XL2-TA Class 1, precision integrating sound level meters (inc. pre-amplifier and microphone) calibrated within the preceding 2 years. Prior to and following the noise measurements acoustic field calibration of the sound level meters and microphones used for the measurements was carried out using a 1kHz tone at 114dB, using an acoustic calibrator that itself had been calibrated within the preceding 12 months. No significant drift (i.e. >0.1dB) in the field-calibrated noise level was observed. All noise measurements were carried out with a suitable windshield fitted to the measurement microphone. Details of the equipment used are provided in **Table 3.1**.

3.6 Spectral and broadband noise levels were generally logged in 15-minute intervals. Broadband noise levels were also logged in 1s intervals, and further analysis carried out where useful.

Table 3.1: Equipment Summary

Equipment	Make & Model	Serial Number	Calibration due Date
Sound Level Meter	NTi XL2-TA	A2A-11111-E0	05/09/2019
Pre-Amplifier	NTi MA220	6908	
Microphone	NTi MC230	A14423	
Acoustic Calibrator	Larson Davis CAL 200	14154	06/09/2019

Meteorological and Local Conditions

3.7 The prevailing meteorological conditions were measured using a hand-held anemometer. At the start of the survey, the air temperature was 3 Deg. C and still. The ambient temperature increased to 14 Deg. C. at 13:00hrs, when a slight breezed from the SE (<2m/s) was noted to have developed since the morning.

3.8 Road traffic on all nearby roads was free flowing and without abnormal restriction.

3.9 The weather and local transport conditions were therefore judged to be acceptable for the purposes of the survey and subsequent assessment.

Observations

NML1

3.10 At NML1, the night-time noise climate is characterised by distant road traffic and birdsong, with an increasing contribution from passing vehicles on Moorthorpe Rise after 05:00hrs. Towards the end of the night some faint noise was also noted from the distant Supertram but did not affect the measured noise levels. The majority of noise maxima at night were due to birdsong, and analysis of the measurement data shows that peaks in noise from passing traffic were obfuscated by birdsong but below 60 dB L_{AFmax}.

3.11 In the daytime the noise climate is characterised by distant road traffic and occasional road traffic on Moorthorpe Rise, typically one car every few minutes.

NML2

3.12 At NML2, the night-time noise climate is again characterised by distant road traffic and birdsong, with an increasing contribution from passing vehicles on Moorthorpe Rise/Gate after 05:00hrs. The majority of noise maxima at night were due to birdsong, and analysis of the measurement data shows that peaks in noise from passing traffic were below 60 dB L_{AFmax}.

3.13 The daytime noise climate is characterised by distant road traffic and occasional road traffic on Moorthorpe Rise/Way, and the access road to the Surgery site.

3.14 The external condenser at the Pharmacy was noted as operating at various times throughout the noise survey but was not audible on any part of the Site at any time and is not therefore consider a significant source of noise affecting the Proposed Development.

NML3

3.15 The day and night time noise climate at NML3 Is characterised by distant road traffic noise with some infrequent contribution from pedestrians on nearby public footpaths. The highest measured noise level attributable to road traffic on nearby roads at night was 51 dB L_{AFmax}.

NML4

3.16 At NML4, the night-time noise climate is characterised by distance road traffic noise. The Surgery and Pharmacy operate in the daytime only and should not generate a significant amount of road traffic at night, with the exception of Wednesdays when Surgery Staff and Visitors are expected to arrive just before 07:00hrs.

3.17 The daytime noise climate is characterised by distant road traffic and occasional staff, patient and customer vehicles arriving and departing the Surgery Site car park.

Survey Results

3.18 The survey results, and representative noise levels are summarised in **Table 3.2.**

Table 3.2: Summary of measured daytime and night-time sound pressure levels

Noise Monitoring Location	Daytime (07:00hrs – 23:00hrs)			Night Time (23:00hrs – 07:00hrs)		
	dB $L_{Aeq,T}$	dB $L_{A10,T}$	dB L_{AFmax}	dB $L_{Aeq,T}$	dB $L_{A10,T}$	dB L_{AFmax}
NML1	43-45	46-49	58-67	34-49	37-53	51-61
NML2	43-48	47-49	59-70	36-47	40-49	46-59

Noise Monitoring Location	Daytime (07:00hrs – 23:00hrs)			Night Time (23:00hrs – 07:00hrs)		
	dB $L_{Aeq,T}$	dB $L_{A10,T}$	dB L_{AFmax}	dB $L_{Aeq,T}$	dB $L_{A10,T}$	dB L_{AFmax}
NML3	41-46	43-47	55-69	38-48	41-50	51-55
NML4	45-51	48-54	61-69	-	-	-

4. ASSESSMENT

4.1 The results of the noise survey have been used as a basis for the noise assessment of the Site's suitability for residential development.

NML1-3

4.2 The results of the daytime road traffic noise monitoring at NML1-3 have been used to establish daytime road traffic noise exposure levels ($L_{Aeq,16hr}$) at proposed dwelling facades and private rear gardens closest and most exposed to road traffic noise from nearby roads in general accordance with the '*shortened measurement method*' as described in the Department of Transport document '*Calculation of Road Traffic Noise*' (CRTN, 1988).

4.3 For the daytime, the CRTN shortened measurement method involves measuring L_{A10} noise levels within any three consecutive hours between 10:00hrs and 17:00hrs using a representative measurement sample period (i.e. 15-minutes in each 1hr period). The $L_{A10,18hr}$ value has been calculated using the linear average of the measured $L_{A10,15min}$ values with a correction of -1dB. The equivalent $L_{Aeq,16hr}$ daytime road traffic noise levels have then been calculated by applying a correction of -2dB to the $L_{A10,18hr}$ noise levels.

4.4 For the night-time, there are no well-established methods for predicting road traffic noise exposure levels using short-term noise measurements (i.e. less than 8hrs between 23:00hrs and 07:00hrs). Therefore, the night-time road traffic noise exposure value at each location has been calculated from the logarithmic average of the measured dB $L_{Aeq,15min}$ values measured between 04:00hrs and 07:00hrs. This approach slightly overestimates the actual dB $L_{Aeq,8hr}$ exposure level to provide a reasonably robust assessment.

4.5 The calculated day and night-time road traffic noise exposure values are summarised in **Table 4.1** The highest measured noise level attributable to road traffic at NML2-3 are also shown for the night-time period.

NML4

4.6 At night NML4 existing road traffic noise is low given the distance from nearby roads, and therefore not expected to be higher than at NML2 that is closer to existing roads.

4.7 Daytime road traffic to/from the Surgery site does not follow the diurnal pattern expected of normal roads and establishing daytime road traffic noise exposure levels using the shortened measurement methodology of CRTN is not appropriate. Instead, the daytime road traffic noise exposure level (**Table 4.1**) has been calculated from the logarithmic average of the measured $L_{Aeq,15min}$ noise levels, which would be slightly higher than the actual dB $L_{Aeq,16hr}$ noise levels and considered to provide a reasonably robust assessment.

Table 4.1: Summary of calculated day and night-time road traffic noise exposure values

Noise Monitoring Location	Daytime (07:00hrs – 23:00hrs)	Night Time (23:00hrs – 07:00hrs)	
	dB $L_{Aeq,16hr}$	dB $L_{Aeq,8hr}$	dB L_{AFmax}
NML1	45	46	<60
NML2	45	44	54
NML3	42	44	51
NML4	48	<44	<54-

4.8 Representative noise exposure values in terms of octave bands have been adopted using an adapted spectrum calculated from the log-average of the measured $L_{Aeq,15min}$ levels, and are summarised in **Table 4.2** and **Table 4.3**.

Table 4.2 Representative daytime octave band road traffic noise exposure values

NML	Octave Band Sound Pressure Levels (Hz)								dB(A)
	63Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz	
NML1	57	49	44	39	40	36	38	31	45
NML2	55	51	43	40	42	36	30	22	45
NML3	53	45	38	38	37	33	31	25	42
NML4	58	50	45	43	44	39	38	34	48

Table 4.3: Representative night-time octave band road traffic noise exposure values

NML	Octave Band Sound Pressure Levels (Hz)								dB(A)
	63Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz	
NML1	52	44	39	38	40	39	42	35	46
NML2	53	44	36	40	41	37	30	19	44
NML3	52	45	38	41	41	36	32	25	44

External Daytime Noise Levels

4.9 The daytime noise levels in all external amenity spaces (private rear gardens) will be below the 'desirable' guideline value of 50dB $L_{Aeq,16hr}$ in line with BS8233 and WHO guidance and below SCCs upper limit of 55dB $L_{Aeq,16hr}$. Therefore, no any additional mitigation measures for external amenity spaces are warranted for the proposed layout.

Internal Noise Levels

4.10 The results of the **daytime** survey indicate road traffic noise levels outside dwelling façades closest to Moorthorpe Rise/Way and the Surgery will be between 42-48 dB $L_{Aeq,16hr}$. Assuming a 15dB loss through a partially opened window, resulting internal daytime noise levels would be up to 33 dB $L_{Aeq,16h}$ and SCCs daytime criteria should be achieved without any specific mitigation measures.

4.11 For the **night**, the survey indicates that $L_{Aeq,8hr}$ road traffic noise levels would be 44-46 dB, but were above 45 dB $L_{Aeq,15min}$ at all NMLs between 06:00-07:00hrs. At night the highest measured night-time L_{AFmax} attributable to road traffic was around 58 dB L_{AFmax}. With a partially open window, internal L_{AFmax} levels would be below 45 dB, however the night-time noise level could marginally exceed 30 dB $L_{Aeq,8hr}$.

4.12 Calculations have been undertaken in accordance with BS 8233:2014 methods to establish the required sound reduction performance for critical façade elements in these areas. The following assumptions have been made:

- Habitable rooms have a reverberation time (T_{60}) not exceeding 0.5 seconds;
- Standard habitable room dimensions are 5m x 4m x 3m;
- External walls provide a sound reduction performance at least 5dB better than the specified glazing performance;
- Windows are closed and trickle ventilators are operational i.e. open to provide Part F background ventilation rates; and
- Purge ventilation (fumes/odours/overheating) is acceptable via openable windows.

4.13 In order to reduce noise levels in the habitable rooms closes to Moorthorpe Rise/Way and the surgery, standard thermal double glazing with a minimum sound reduction performance of $R_w + C_{tr}$ 24 dB should be installed with trickle ventilators in window heads providing a minimum sound reduction performance of $R_w + C_{tr}$ 30 dB. These performances should be achievable with a 4/12/4mm glazed panel and hit-and-miss trickle ventilators with a direct air path. Manufacturers should demonstrate compliance with these performance standards by means of a laboratory acoustic test report.

4.14 The extent of the area requiring mitigation as described above is indicated on **Figure 4.1** below.

Figure 4.1: Bedrooms requiring alternative system of ventilation

4.15 It is therefore concluded that as SCCs planning noise criteria are capable of being achieved and the site is considered suitable for the proposed residential development.

LEAP and MUGA Assessment

Existing Dwellings to the South of the LEAP and MUGA

4.16 The nearest existing dwellings are located to the south of the LEAP and MUGA on Moorthorpe Dell. The closest existing dwelling is approximately 40m from the centre of the MUGA and 42m from the centre of the LEAP. Drawing on the Sport England document, it is likely that noise from the use of these facilities would give rise to noise levels of around 50 dB $L_{Aeq,1h}$. This would not exceed the WHO guideline value for the hours they are being used for.

Proposed Dwellings to the West of the LEAP and MUGA

4.17 The nearest proposed dwellings are located to the west of the LEAP and MUGA, as indicated in the proposed layout drawings. The closest proposed dwelling is approximately 42m from the centre of the LEAP and 80m from the centre of the MUGA.

Drawing on the Sport England document, it is likely that noise from the use of these facilities would give rise to noise levels at or below 50 dB $L_{Aeq,1h}$. This would not exceed the WHO guideline value for the hours they are being used for.

Summary

4.18 The assessment has shown that predicted noise levels from the proposed LEAP and MUGA are unlikely to generate noise above the threshold for moderate annoyance based on the information provided in the Sport England document. It is also important to note that the noise levels may be lower during periods of less intensive use.

4.19 Notwithstanding the above, the Sport England document observes that the impact noise of balls hitting strike boards, goal boards and fencing has the potential to generate higher noise levels than from users. In addition, there can be a difference in the character of that noise. Such impact noises can be found to be significantly reduced by the careful design and selection of perimeter fencing. Therefore, it is recommended that, if any fencing is required around the perimeter of the areas, weldmesh fencing is used to enclose them, securely clamped with resilient fixings to avoid vibrations.

4.20 In summary, noise from the proposed LEAP and MUGA is likely to be at an acceptable level for existing and proposed noise sensitive receptors and no further noise mitigation is required, however best practice has been suggested for any perimeter fencing to be installed.

5. CONCLUSION AND RECOMMENDATIONS

5.1 BWB Consulting Ltd has been appointed by Avant Homes to undertake an environmental noise assessment for a proposed residential development at land off Moorthorpe Way, Mosborough, Sheffield, S20 6PD.

5.2 This assessment has been undertaken based on the results of a baseline noise survey on the Site. The results of the survey have been assessed in accordance with current standards and guidance and show that the Councils internal planning noise criteria can be achieved for the majority of dwellings with windows partially open for ventilation. SCCs planning guidance dictates however that for some bedrooms, an alternative method of ventilation would be needed to ensure that the night-time noise criteria are achieved across the Proposed Development.

5.3 The noise assessment shows that with appropriate consideration to noise mitigation measures, SCCs standard planning noise criteria can be achieved, and a commensurate level of amenity secured for the future incoming residents of the proposed residential development.

5.4 Noise from the proposed LEAP and MUGA is likely to be at an acceptable level for existing and proposed noise sensitive receptors and no further noise mitigation is required, however best practice has been suggested for any perimeter fencing to be installed.

5.5 It is concluded therefore that the Site is suitable for residential development, and that noise need not be a determining factor in the granting of planning approval for the Proposed Development.

APPENDICES

Appendix A: Glossary of Terms

Noise

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

Acoustic Terminology

dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.

Appendix B: Baseline Survey Data

Table B1: Octave-band Measurement Data - NML1

Start Time	Period (T)	dB $L_{Aeq,T}$	dB L_{AFmax}	dB L_{AF90}	Sound Pressure Levels (dB $L_{eq,T}$) per octave band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8 kHz
Night-time												
04:00	0:15:00	34.4	50.7	29.0	45	40	34	30	30	25	22	15
05:05	0:15:00	43.5	58.1	36.1	49	39	35	35	37	33	39	32
06:05	0:15:00	49.1	60.5	43.4	54	46	41	40	42	42	44	38
Daytime												
11:00	0:15:00	45.0	59.0	37.8	56	48	42	37	38	35	40	34
12:00	0:15:00	44.6	67.0	36.7	56	49	44	39	40	36	35	28
13:02	0:15:00	42.9	57.9	37.2	57	48	44	37	38	34	33	25

Table B3: Octave-band Measurement Data – NML3

Start Time	Period (T)	dB $L_{Aeq,T}$	dB L_{AFmax}	dB L_{AF90}	Sound Pressure Levels (dB $L_{eq,T}$) per octave band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8 kHz
Night-time												
04:22	0:15:00	36.3	46.1	31.7	46	40	33	33	33	27	20	12
05:24	0:15:00	44.3	53.1	40.2	52	44	36	38	41	39	30	18
06:27	0:15:00	46.9	58.9	44.5	55	47	39	43	44	39	33	22
Daytime												
11:20	0:15:00	44.7	60.5	36.8	57	49	42	37	40	39	33	23
12:23	0:15:00	43.2	59.3	38.3	55	48	39	37	39	37	30	24
13:20	0:15:00	48.3	70.2	37.3	54	55	47	44	46	36	28	20

Table B3: Octave-band Measurement Data – NML3

Start Time	Period (T)	dB $L_{Aeq,T}$	dB L_{AFmax}	dB L_{AF90}	Sound Pressure Levels (dB $L_{eq,T}$) per octave band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8 kHz
Night-time												
04:45	0:15:00	38.2	51.0	33.8	39	34	35	34	31	24	13	39
05:41	0:15:00	42.2	51.4	40.2	43	35	38	39	34	31	21	43
06:44	0:15:00	47.7	55.4	45.7	48	40	44	44	40	35	29	48
Daytime												
11:40	0:15:00	42.1	62.0	39.1	47	38	37	38	33	32	25	47
12:41	0:15:00	46.2	68.7	39.5	47	42	44	42	37	35	29	47
13:39	0:15:00	41.0	55.1	38.7	47	39	35	37	32	31	27	47

Table B4: Octave-band Measurement Data – NML4

Start Time	Period (T)	dB $L_{Aeq,T}$	dB L_{AFmax}	dB L_{AF90}	Sound Pressure Levels (dB $L_{eq,T}$) per octave band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8 kHz
Daytime												
07:45	0:15:00	46.7	64.3	42.8	58	49	43	42	43	39	33	26
08:00	0:15:00	46.4	69.1	43.0	57	49	42	40	43	38	34	30
08:15	0:14:12	46.4	66.9	42.1	57	48	43	41	43	38	36	29

08:30	0:12:46	46.3	60.8	41.8	57	49	45	42	42	38	34	26
08:45	0:15:00	51.4	69.3	41.9	59	55	51	50	47	40	36	29
09:00	0:15:00	47.7	61.6	41.8	59	50	44	41	43	40	38	33
09:15	0:15:00	49.0	67.0	40.5	57	49	44	41	42	39	44	40
09:30	0:15:00	46.3	65.8	39.3	58	51	45	40	41	38	37	34
09:45	0:15:00	44.8	61.6	37.2	55	46	41	37	39	36	38	35
10:00	0:08:55	49.3	65.9	37.8	60	49	45	42	46	42	37	33

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