
RHODRI & REBECCA DAVIES

NOISE IMPACT ASSESSMENT

**TROUT PONDS FARM, TWYXCROSS ROAD, SHEEPY
MAGNA, ATHERSTONE, LEICESTERSHIRE CV9 3RT**

Client: Rhodri & Rebecca Davies

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1 INTRODUCTION

1.1 Overview

- 1.1.1 By instruction from Rhodri & Rebecca Davies ('the client'), NoiseAir was commissioned to undertake a Noise Impact Assessment (NIA) to support a planning application for the change of use of agricultural barns to storage and distribution (use class B8) at the location: Trout Ponds Farm, Twycross Road, Sheepy Magna, Atherstone, Leicestershire CV9 3RT, herein referred to as the 'development site'.
- 1.1.2 The proposed development is for the change of use of 455 m² of floorspace of the existing agricultural barns to Class B8 storage units. The internal layout has been designed to make use of the existing apertures within the structure of the buildings and no new openings are proposed.
- 1.1.3 It has been advised that the proposal is to fall within a storage and distribution planning use, however the operations on the site will predominantly relate to storage.
- 1.1.4 General limitations with respect to this NIA are outlined in **Appendix A**.

1.2 General Information

- 1.2.1 At the time of writing, the site is currently an operational farm located on the outskirts of the village of Sheepy Magna within a larger rural and agricultural area.
- 1.2.2 The development site is bound to the south by community playing fields and to the south-east by Sheepy Magna Church of England Primary School and residential properties which face onto Rodney Gardens, Twycross Road (B4116) and Highfield Close.
- 1.2.3 Rodney Gardens and Highfield Close are single carriageway access roads trafficked by vehicles travelling up to 30 miles per hour (mph). Twycross Road (B4116) is a single carriageway road trafficked by vehicles limited to up to 30 mph through the village and up to 20 mph at certain times past the school.
- 1.2.4 All remaining sides of the development site are bound by agricultural greenfield land.
- 1.2.5 The application area is located to the southwest of the development site.
- 1.2.6 **Figure 1** shows a site location plan of the development site with respect to the local area and its context.



Figure 1: Development site aerial photograph.

1.3 Identified Noise Sensitive Receptors

- 1.3.1 The nearest identified noise sensitive receptor (NSR) is the residential property south-easterly adjacent to the application site (NSR A). However, it is understood that this will be the residence of the applicant and it is considered unlikely that complaints will arise from this property regarding noise from site activity; therefore has not been included in this assessment.
- 1.3.2 In light of this, the following surrounding NSRs have been considered within the assessment:
- 7 - 9 Highfield Close c. 220 south-east of the activity site (NSR B) and
 - 1-12 and 14 Rodney Gardens c. 204 east of the activity site (NSR C).
- 1.3.3 **Figure 2** below shows the NSR locations.

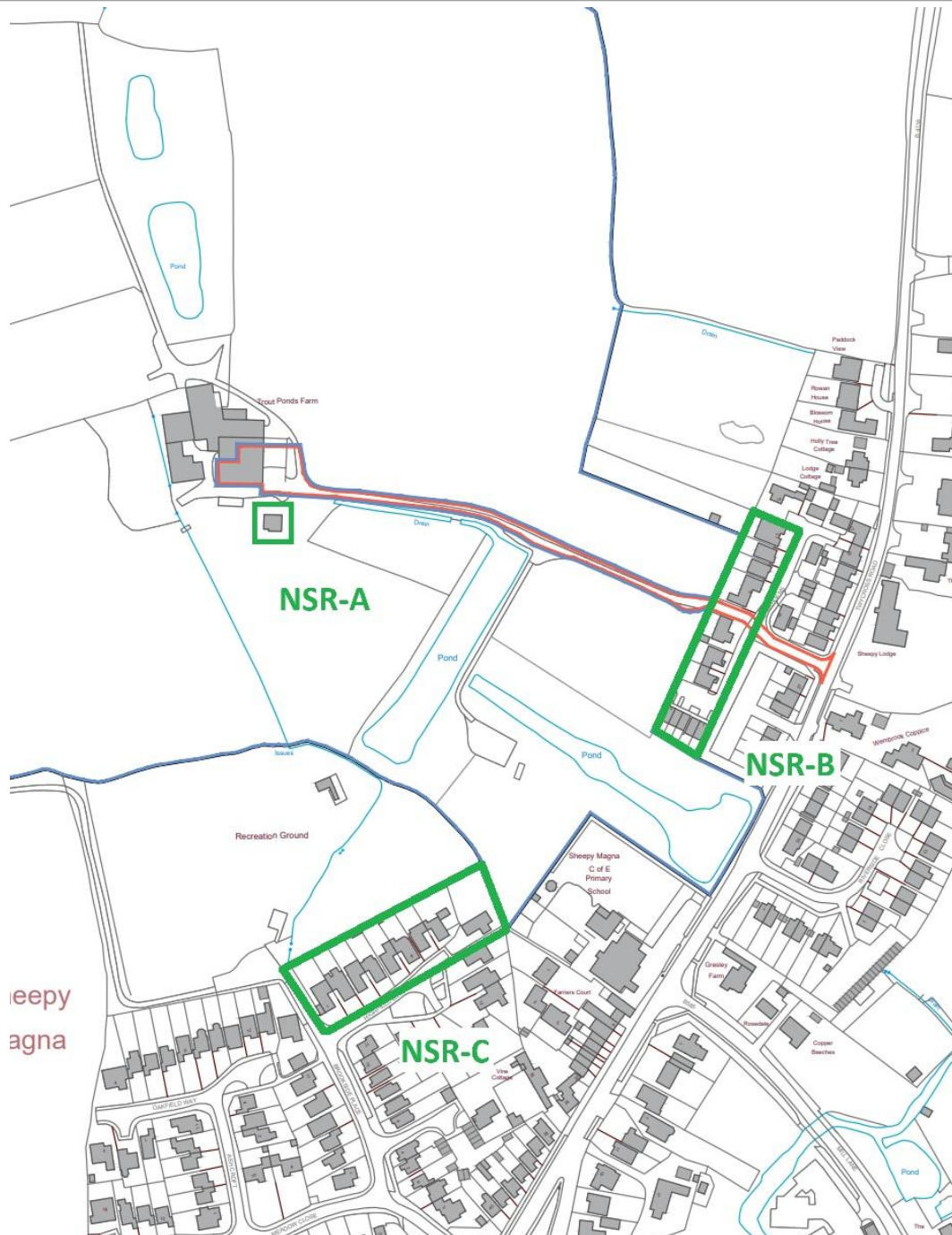


Figure 2: NSR locations.

1.4 Development Proposals

- 1.4.1 Development proposals outline the partial change of use of the existing agricultural barns to storage and distribution (Class B8) use class in conjunction with the client's arboriculture business. No external changes are proposed.
- 1.4.2 **Figure 3** below shows the NSR locations.



Figure 3: Development site proposed layout.

1.4.3 The proposals shown in **Figure 3** therefore relate to the change of use of part of the existing barn to form the shown Use 1 (455 m2).

1.4.4 It has been advised that items to be stored on site are likely to include the following:

- Chippers;
- Chainsaws;
- Hedge cutters;
- Strimmers;
- Blowers;
- General gardening equipment e.g. shovels, forks, spades, rakes;
- Chain oil;
- Oil cans;
- Cabinets to store spare parts;
- Helmets;
- Robot mowers;
- PPE – clothing; and,
- Drills general tools.

1.4.5 The above items are all associated with the applicants horticultural business which will be the operator of the aforementioned.

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- 1.4.6 The applicant has advised that given that the development site is to be used for the storage of the items associated with their business, HGV deliveries are to be restricted to one vehicle in the morning and one vehicle in the afternoon. The site will not be subject to repeated HGV movements throughout any given day.
- 1.4.7 Operational hours are not clearly defined at this stage however for the purposes of this assessment operations of the development site are considered to be daytime only (between the hours of 07:00 to 19:00).

2 ASSESSMENT METHODOLOGY AND SCOPE OF WORKS

2.1 Scope of Works and Assessment Criteria

- 2.1.1 The scope of the assessment includes consideration of the potential impact of noise breakout from the proposed development upon sensitive areas of existing residential properties surrounding the proposed development site.
- 2.1.2 Given the nature of the proposed operations at the development site, it is considered that an assessment should be undertaken primarily in accordance with the following British Standard and guidance documentation:
- BS 4142:2014+A1:2019 (BS 4142:2014) – Methods for rating and assessing industrial and commercial sound.
- 2.1.3 A summary of the above documentation is provided below for reference.

2.2 British Standard 4142:2014 (BS 4142:2014)

- 2.2.1 British Standard 4142:2014 – Methods for rating and assessing industrial and commercial sound, sets the methodology for rating and assessing sound of an industrial and commercial nature, which includes sound from fixed installations such as mechanical and electrical plant and equipment.
- 2.2.2 In BS 4142:2014, a noise rating is determined and compared with the existing local background sound level based on several more cumulative acoustic feature corrections to apply where appropriate. For example, if the noise includes a distinguishable tone, impulse, intermittency or other readily distinguishable sound characteristic, then additional cumulative penalties individually ranging from 0 to 9 dB may be applied depending on the type of noise.
- 2.2.3 BS 4142:2014 seeks to determine a “representative” background sound level, stating that “...the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods”.
- 2.2.4 The assessment of the impact depends upon the margin by which the rating level of the specific sound source exceeds the background sound level but also promotes a consideration of the context in which the sound occurs when making an assessment. BS 4142:2014 states that an initial estimate of the impact of the specific sound is made by subtracting the measured background sound level from the rating level, while considering the following points:

-
- Typically, the greater this difference, the greater the magnitude of the impact;
 - A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
 - A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and,
 - The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

2.2.5 Therefore, a BS 4142:2014 assessment may deduce a low impact where the specific sound level is below the background sound level.

3.1.3 The noise measurements were made using a Class 1, integrating sound level meter (SLM).

3.1.4 The acoustic equipment was calibrated to comply with Section 4.2 of BS 7445-1:2003¹, before and after the noise monitoring periods.

3.1.5 Details of the SLM and its associated field calibration can be found in **Table 1** below.

Table 1: Summary of SLM Used for Survey and Associated Field Calibration.						
SLM (Serial No.)	Preamp (Serial No.)	Microphone (Serial No.)	Calibrator (Serial No.)	Calibration		
				Start	End	Drift
NOR140 (1403342)	NOR1209 (12943)	NOR1225 (96162)	B&K 4231 (2482550)	-26.6	-26.5	0.1 dB

3.1.6 The weather conditions were noted to be favourable throughout the entire noise survey.

3.2 Measured Sound Levels

3.2.1 **Figure 5** details a level vs time graph of the recorded L_{Aeq} and L_{A90} sound levels over 15-minute time periods for the entire monitoring duration at ML1.

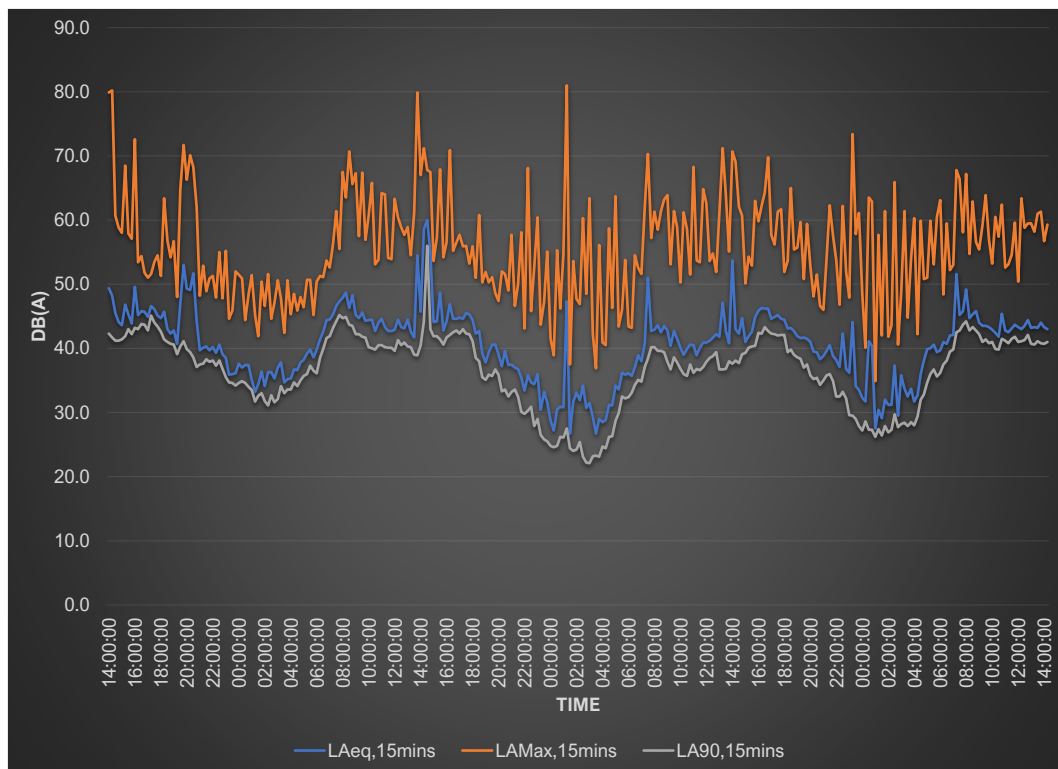


Figure 5: Level vs. time graph showing L_{Amax} , L_{Aeq} and L_{A90} sound levels – ML1.

¹ BS7445-2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures.

3.3 Background Sound Levels

3.3.1 Histograms showing the distribution of measured $L_{A90,T}$ sound levels for ML1 during the daytime are presented in **Figure 6**.

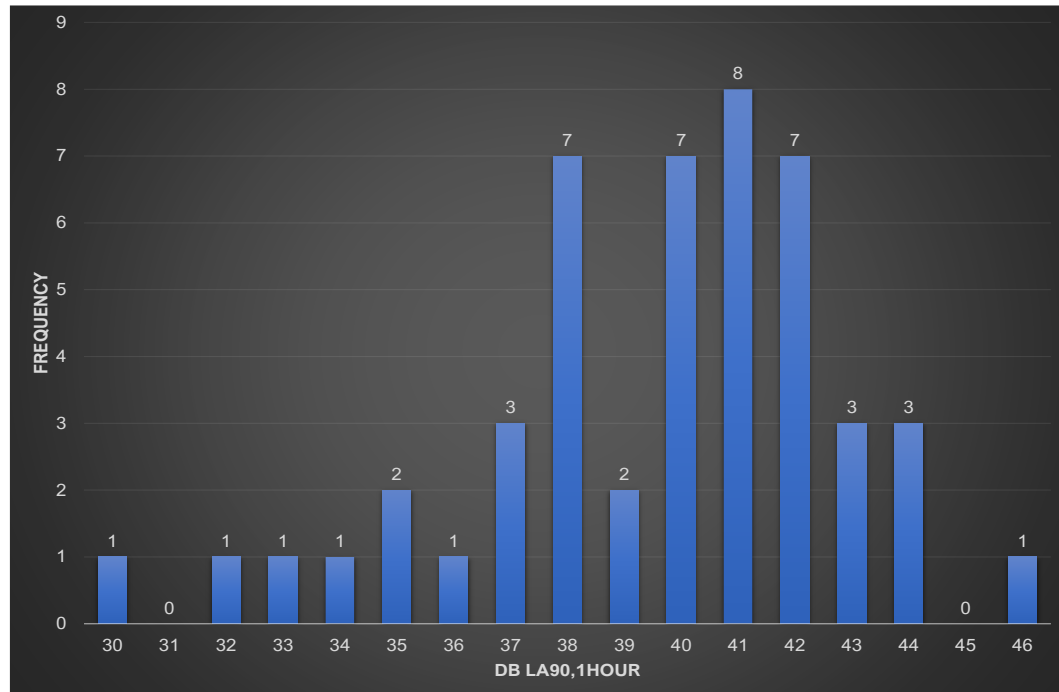


Figure 6: Frequency distribution of $LA_{90,1hour}$ noise readings at ML1 – Daytime.

3.3.2 A conservative background sound level of 38 dB(A) has been selected for the daytime.

4 3D SOUND MODEL

4.1 Overview

- 4.1.1 In order to accurately undertake an NIA with respect to the development proposals, it is considered that a 3D sound model should be utilised to calculate the noise levels at identified receptor locations.

4.2 Adopted Noise Data for the 3D Sound Model

- 4.2.1 At the time of writing, the development is still in the preliminary planning stage and therefore there are no noise levels on site that can be measured for the assessment. NoiseAir has therefore adopted appropriate surrogate noise data from previous acoustic surveys to represent the activities considered typical at the development site as described by the client.

Access Road Traffic Noise

- 4.2.2 Access road traffic noise was adopted from NoiseAir's sound data library for a typical heavy goods vehicle (HGV), the frequency spectrum of which is presented in **Table 2** below. This is considered a conservative approach given that not all vehicles accessing and egressing the site will be HGVs.

Table 2: Octave Band Frequency for Surrogate HGV Road Traffic Noise Data									
Frequency (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)
HGV	72.4	63.1	63	63.3	57.8	56.6	53.2	48.7	64.6

- 4.2.3 The HGV noise level (reference spectrum) presented above has been assumed for one minute of every hour which is considered conservative as a HGV passing is likely to last for 5-10 seconds on average.

Commercial Unit Noise

- 4.2.4 The proposed commercial units have been constructed in SoundPLAN™ and assumed with a sound pressure level within all units of 67 dB(A) as an average noise level over a given hour. The noise source spectrum has been selected from the SoundPLAN™ library for that of a steel pipe factory.
- 4.2.5 Each unit has been set with a double door opening for access which has been set as 'open' allowing noise emissions to occur freely, which is considered a worst case approach.

4.3 3D Sound Model

- 4.3.1 A 3D sound model has been constructed in SoundPLAN™ to calculate the predicted sound pressure levels at selected potential receptor locations. The model uses the calculation method from ISO 9613-2:1996² to account for the distance between the source and receiver and any screening or reflections provided by the surrounding buildings. The model is based on the proposals forwarded to NoiseAir at the time of writing.
- 4.3.2 A noise contour plot illustrating the propagation of the sound from source to receptor during the daytime ($L_{Aeq,1hour}$) condition is given in **Figure 7**.

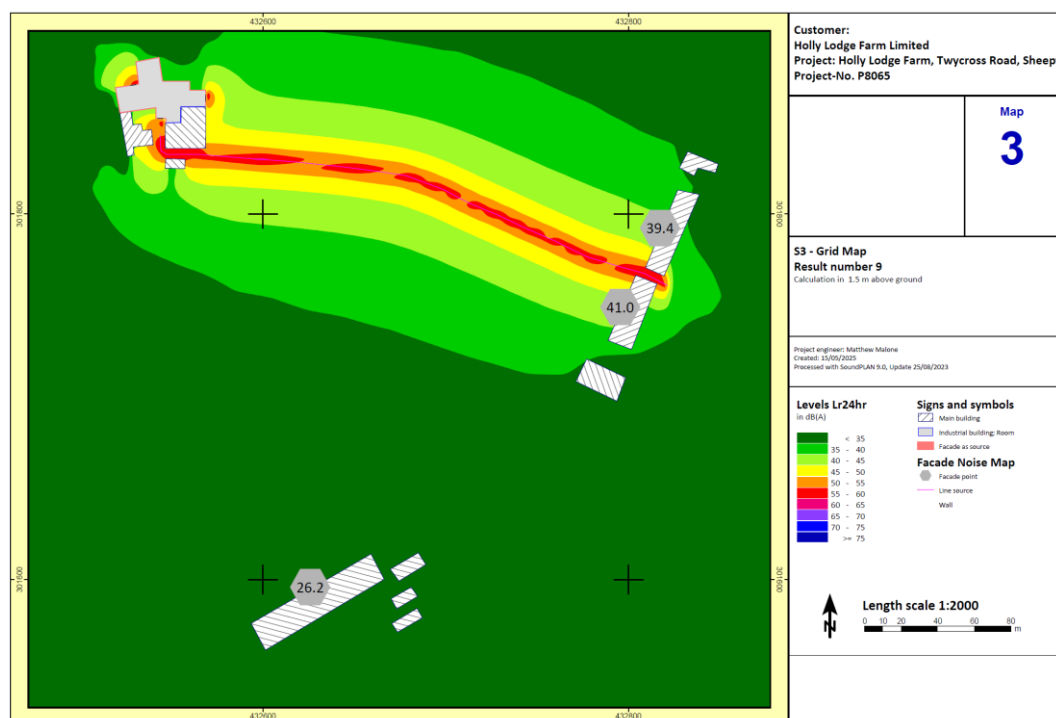


Figure 7: Noise propagation of sound during the daytime, Scenario 1 – $L_{Aeq,1hour}$.

4.4 Calculated Noise Levels

- 4.4.1 **Table 3** below details the predicted worst case façade noise level.

Table 3: Predicted Receptor Noise Levels - Worst Case Facade	
	dB $L_{Aeq,1hour}$ Daytime
	41.0

² ISO9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation"

5 NOISE IMPACT ASSESSMENT

5.1 BS 4142:2014+A1:2019 Assessment

- 5.1.1 A BS 4142:2014 assessment has been undertaken considering operational activity noise breakout from the development site with respect to the closest identified NSRs.

5.2 Specific Sound Level

- 5.2.1 The worst-case daytime specific sound level has been selected as the following:
- 41.0 dB(A).

5.3 Background Sound Level

- 5.3.1 The measured background sound levels are presented within Section 3 of this report.
- 5.3.2 A daytime background sound level of 38 dB(A) has been adopted for this assessment.

5.4 Character Corrections

- 5.4.1 NoiseAir have experience of assessing noise breakout from commercial units and have used historical knowledge of such developments to determine the application of the following appropriate character corrections:
- **Tonality** – Noise emissions from the proposed commercial activity, including proposed HGV movements, have the potential to contain tonal components, however it is considered that such tonal characteristics are only present for a short period of time and will therefore will not form a perceptible noise characteristic for specific noise source. Therefore, no correction has been applied.
 - **Impulsivity** – Given the nature of the noise assessed, no correction for impulsivity has been applied; and,
 - **Intermittency** – Noise emissions from the commercial activity, including proposed limited HGV movements, has the potential to exhibit intermittent characteristics, therefore a +3dB character correction has been applied for intermittency.

5.5 Initial Assessment

- 5.5.1 The initial assessment for the calculated noise breakout levels for all noise sources is presented in **Table 4**.

Table 4: BS 4142:2014 Assessment to Determine the Likelihood of Adverse Impacts on the Worst Affected NSR

Quantity	Sound Level dB(A)
	Daytime
Specific Sound Level	41
Acoustic Feature Corrections	+3
Rating Level	44
Typical Background Sound Level, dB L _{A90}	38
Excess of Rating Level over Background Sound Level	+6
Initial indication of potential impact	Adverse (Context Depending)

5.6 BS 4142:2014 Assessment and Context

- 5.6.1 The BS 4142:2014 initial assessment indicates that the excess of rating level over the existing background sound level is calculated to be +6 dB(A) during the daytime. The initial assessment therefore indicates that an adverse impact is likely during the daytime period at the worst affected NSR.
- 5.6.2 BS 4142 advises that a rated sound level which is at or below the measured background sound level is likely to present as a low impact and a rated level which exceeds the measured background by 5 dB(A) or more is likely to present as an adverse impact, this outcome rises to a significant adverse impact as the rated level exceeds the measured background by 10 dB(A) or more. It is important however to assess the context of the specific sound source.
- 5.6.3 It should be noted therefore that the excess of the rated sound level over the background sound level marginally exceeds the threshold of adverse impact.
- 5.6.4 The number of HGV events for the access road is considered to be extremely low based on the information provided and the assessment is considered to present a worst case scenario.
- 5.6.5 It is also considered that some level of acoustic masking effects is likely to be attributed at the NSRs given that the residual sound levels are primarily of vehicle/ transport noise type.
- 5.6.6 The specific sound levels should also be considered in terms of the absolute levels against accepted British Standard criteria. The external façade levels has been calculated to be 41 dB(A). Allowing 15 dB(A) attenuation across a partially open window reduces the likely

internal noise levels attributed to the specific sound source to be below the 35 dB(A) threshold for habitable rooms in the daytime.

- 5.6.7 Based on the contextual considerations outlined and inclusion of proposed additional mitigation; it is reasoned that the operational activities at the proposed development site are likely to have a lesser impact than that initially presented by the BS 4142 assessment, and with good noise management a **low impact** at the nearest NSRs is considered probable.

5.7 Uncertainty

- 5.7.1 Uncertainty of measurements can have a significant effect on the outcome and findings of an assessment and therefore such constraints are documented and discussed below.
- 5.7.2 The SLM used was a Norsonic Class 1 SLM's, it is generally recognised that Class 1 SLM's offer an uncertainty of ± 1.0 dB. The instrumentation used for the survey has been calibrated by UKAS approved laboratories.
- 5.7.3 The sound levels measured (which include busier and quieter periods) are considered typical for a rural area.
- 5.7.4 Wind speeds during the survey visits were typically less than 5 ms^{-1} and the effect of wind generated noise is not considered to have a significant impact on this assessment.
- 5.7.5 The specific noise level and therefore rated noise level have been calculated using a 3D sound model, however, a conservative assessment of breakout noise levels has been undertaken.
- 5.7.6 It is therefore considered that, in this instance, the uncertainty of the calculations is likely to have minimal influence on the outcome of the assessment.

6 CONCLUSIONS

6.1 Overview

- 6.1.1 By instruction from Rhodri & Rebecca Davies, NoiseAir was commissioned to undertake a Noise Impact Assessment to support a planning application for the change of use of agricultural barns to storage and distribution (use class B8) at the location: Trout Ponds Farm, Twycross Road, Sheepy Magna, Atherstone, Leicestershire CV9 3RT.
- 6.1.2 The proposed development is for the change of use of 455 m² of floorspace of the existing agricultural barns to Class B8 storage units. The internal layout has been designed to make use of the existing apertures within the structure of the buildings and no new openings are proposed.
- 6.1.3 Background sound levels have been established through an on-site acoustic survey and the likely noise levels incident on the nearest noise sensitive receptors has been determined through the use of a 3D sound model based on typical information from similar sites to that proposed.
- 6.1.4 A BS 4142:2014 assessment has been undertaken considering operational noise breakout from the development site.
- 6.1.5 The assessment indicates that a low impact is probably during the daytime at the worst affected external facades.

APPENDIX A - REPORT LIMITATIONS

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APPENDIX B - GLOSSARY

A-weighted sound pressure, p_A	Value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network. <i>NOTE: The A-weighting network modifies the electrical response of a sound level meter with frequency in approximately the same way as the sensitivity of the human hearing system.</i>
A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure in decibels (dBA).
Acoustic environment	Sound from all sound sources as modified by the environment [BS ISO 12913-1:2013].
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. <i>NOTE: The ambient sound comprises the residual sound and the specific sound when present.</i>
Ambient sound level, $L_a = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T <i>NOTE: The ambient sound level is a measure of the residual sound and the specific sound when present.</i>
Background sound	Underlying level of sound over a period, T, which might in part be an indication of relative quietness at a given location.
Background sound level, $L_{A90,T}$ (BS 4142:2014)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Break-in	Noise transmission into a structure from outside.
Break-out	Noise transmission from inside a structure to the outside.
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time.
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ (BS 4142:2014)	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time.
Equivalent sound absorption area of a room, A	Hypothetical area of a totally absorbing surface without diffraction effects, expressed in square metres (m ²), which, if it were the only absorbing element in the room, would give the same reverberation time as the room under consideration
Facade level	Sound pressure level 1 m in front of the façade. <i>NOTE: Facade level measurements of L_{pA} are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the facade.</i>
Free-field level	Sound pressure level away from reflecting surfaces. <i>NOTE: Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source). Estimates of noise from aircraft overhead usually include a correction of 2 dB to allow for reflections from the ground.</i>
Measurement time interval, T_m (BS 4142:2014)	Total time over which measurements are taken. <i>NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.</i>
Noise criteria	Numerical indices used to define design goals in a given space.

Octave band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.
Reference interval, T_r (BS 4142:2014)	Specified interval over which the specific sound level is determined. <i>NOTE: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h.</i>
Residual sound (BS 4142:2014)	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, $L_r = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T .
Rating level, L_{Ar,T_r}	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise. <i>NOTE: This is used in BS 7445 and BS 4142 for rating industrial noise, where the noise is the specific noise from the source under investigation.</i>
Sound pressure, p	Root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound.
Sound pressure level, L_p	Quantity of sound pressure, in decibels (dB).
Sound reduction index, R	Laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.
Specific sound level, $L_s = L_{Aeq,T_r}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .
Specific sound source (BS 4142:2014)	Sound source being assessed.
Third octave band	Band of frequencies in which the upper limit of the band is 2% times the frequency of the lower limit.
Weighted level difference, D_w	Single-number quantity that characterizes airborne sound insulation between rooms, but which is not adjusted to reference conditions. <i>NOTE Weighted level difference is used to characterize the insulation between rooms in a building as they are. Values cannot normally be compared with measurements made under other conditions (see BS EN ISO 717-1).</i>

Symbols

D_w	Weighted level difference (dB)
D_{nT}	Standardized level difference (dB)
$D_{nT,w}$	Weighted standardized level difference (dB)
L_{Amax}	Maximum noise level (dB)
L_{Ar,T_r}	Rating level (dB)
L_n	Normalised impact sound pressure level (dB)
L_{nT}	Standardised impact sound pressure level (dB)
$L_{nT,w}$	Weighted standardised impact sound pressure level (dB)
$L_{n,w}$	Weighted normalised impact sound pressure level (dB)
L_p	Sound pressure level (dB)
L_{pA}	A-weighted sound pressure level (dB)
$L_{AN,T}$	Percentile level (dB)
L_{AE}	Sound exposure level (dB)
$LA_{eq,T}$	Equivalent continuous A-weighted sound pressure level (dB)
p	Sound pressure (Pa)
p_A	A-weighted sound pressure (dB)
$p_{A(t)}$	Instantaneous A-weighted sound pressure (Pa)

R	Sound reduction index (dB)
R_w	Weighted sound reduction index (dB)
T	Time interval (also used for reverberation time) (s)
t_0	Reference time interval (s)

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