hepworth acoustics

THE WHITE HART, BRASTED

EXTERNAL COLD STORE NOISE IMPACT ASSESSMENT

On behalf of:

Mitchells & Butlers

Report No P24-023-R01
February 2024

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On behalf of:
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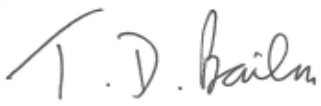

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1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by Mitchells & Butlers to carry out a noise impact assessment of the proposed external cold store to be installed at The White Hart public house, High Street, Brasted, Kent TN16 1JE. The location is shown in Figure 1.

1.2 The client seeks permission from the Local Authority, Sevenoaks District Council, to install a new cold store at the rear of the existing building. The Planning Officer has recommended the following pre-commencement condition relevant to noise:

Condition 1

Prior to the installation of the cold store and associated plant/equipment being used, a noise impact assessment will be submitted and approved in writing by the local planning authority. The assessment will detail how noise and vibration from new plant and equipment when operating at its maximum speed and output shall be limited to 10 dB(A) below the background noise level which is expressed as a LA90,15minutes at the boundary of the nearest residential property. The rated noise levels from plant and equipment shall include any penalties for noise characteristics such as tone, intermittency, that are liable to cause the noise to be a nuisance etc. Background noise levels shall be established for the following periods:

- Daytime 0700 to 1900

- Evening 1900 to 2300

- Night 2300 to 0700

In order to establish background noise level a representative survey shall be undertaken in accordance with BS 4142:2014+A1:2019 and/or the most suitable method to fully represent any noise source and impact at the boundary of the nearest residential properties so that noise will not cause a statutory nuisance. This shall be undertaken by a suitably competent person.

1.3 The aim of this report is to assess whether the proposed new cold store will meet the noise requirements of Condition 1, and to make recommendations for noise mitigation where required.

1.4 The site is bounded by High Street (A25) to the north. To the east is the pub's car park, with residences beyond. To the south are private gardens and open fields, with residences beyond. To the east is The Green, with residences beyond. There is a continuous 2.5 metre high solid brick wall along the eastern boundary.

1.5 The proposal is for the new cold store to be installed in place of the existing storage shed to the rear of the pub. The location is shown in Figure 1. The only noise source associated with the cold store is the condenser specified by the manufacturer. The condenser will be positioned on the ground next to the cold store, next to the north elevation of the cold store.

1.6 The nearest habitable room window to the condenser is on the western elevation of the residence on the opposite side of The Green, marked on Figure 1; this window is around 18 metres away based on our survey on site. Direct line-of-sight to the cold store condenser is concealed from view from the nearest residence by the eastern boundary wall. Other noise-sensitive receptors are further away and will therefore be impacted less.

1.7 This assessment is based on the following drawings from JMDA Ltd:

- JMDA_1677_PL_003 Revision A
- JMDA_1677_PL_004 Revision B
- JMDA_1677_PL_005

1.8 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 ACOUSTIC DESIGN CRITERIA

2.1 Condition 1 refers to "BS 4142:2014+A1:2019". In full, this is British Standard 4142: 2014 + A1: 2019 '*Methods for rating and assessing industrial and commercial sound*'. This provides methods for rating and assessing sound of an industrial and/or commercial nature. This will be referred to as BS 4142 hereafter for brevity.

2.2 BS 4142 requires the 'rating' noise level for the operation to be compared with the L_{A90} background noise level in the absence of the operational noise.

2.3 The 'rating' level is derived based on the 'specific' L_{Aeq} noise level attributable to the operation with an 'acoustic feature' penalty added for any noise sources that give rise to tonal, impulsive, intermittent, or other characteristics readily distinctive against the residual acoustic environment.

2.4 For Condition 1, the Local Authority requires the rating level to be 10 dB below the background sound level at the nearest noise-sensitive receptor, assessed during the daytime, evening, and night-time periods.

2.5 For assessment purposes, we have taken the nearest noise-sensitive receptor as the nearest habitable room window on the western elevation of the residence on the opposite side of The Green, as indicated on Figure 1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Environmental noise measurements were carried out at the site at Location 1 marked on Figure 1. This location was selected as being representative of the noise environment at the nearest residence.

3.2 We understand that the condenser for the cold store will potentially operate 24 hours a day. As stipulated in Condition 1, we have considered the following periods:

- Daytime 07:00 to 19:00
- Evening 19:00 to 23:00
- Night 23:00 to 07:00

3.3 Noise measurements were taken for 24 hours starting at 18:00 on Monday 29th January 2024. This time was selected to represent a typical weekday. The pub was closed for the duration of the noise survey.

3.4 The weather conditions throughout the noise survey were cool, dry, and overcast, with wind speeds below 5 m/s. Wind was from the south-west. These were considered suitable conditions for the survey.

3.5 The noise measurements were taken in 'free-field' conditions with the microphone at approximately 1.5 metres above ground level. Measurements were taken in 15-minute samples for the duration of the survey.

3.6 The results of the noise survey are detailed in Appendix II. The background noise levels for the day, evening and night periods are summarised in Table 1 below.

Table 1: Background noise levels summary (dBA)

Time	$L_{A90,15mins}$	
	Mode	Mean
Day (07:00 to 19:00)	50	49
Evening (19:00 to 23:00)	41	40
Night (23:00 to 07:00)	41	46

3.7 The dominant noise source was road traffic on High Street.

3.8 The noise monitoring was carried out using a NTi XL2 Class 1 Sound Analyser (serial no. A2A-20294-E0) fitted with a windshield. The calibration level of the meter was checked before and after the survey with a Brüel & Kjær Type 4231 sound calibrator (serial no. 2412667). No significant calibration deviation occurred.

4.0 ASSESSMENT AND RECOMMENDED MITIGATION MEASURES

4.1 The sound power level of the cold store condenser is shown in Table 2.

Table 2: Proposed external cold store condenser noise level

Equipment	Type	Sound Power Level, dBA	Comment
Condenser	Storer's System	61	Manufacturer's data

4.2 Based on our experience of this type of equipment and the manufacturer's noise data, we do not expect it to feature tonal or impulsive characteristics readily distinctive against the residual acoustic environment, but we expect the condenser to operate intermittently so a penalty of +3 dB is considered applicable to obtain the rating level.

4.3 The boundary wall will block line-of-sight of the condenser to the neighbouring residence. The screening effect is predicted to reduce the equipment noise rating levels by at least 14 dB(A) outside the nearest habitable room window, using the calculation method described in BS 5228-1:2009+A1:2014. The calculation is shown in Appendix III.

4.4 The assessment takes into account the distance attenuation to the nearest residential window, which is measured to be 18 metres away from the proposed new condenser. Ground attenuation has been taken as zero for a cautious approach. We have assumed that the condenser is operating at full speed, to consider a worst-case scenario.

4.5 The predicted rating level and corresponding background noise level for the cold store condenser outside the nearest habitable room window is presented in Table 3. The mean value for the evening background noise level has been used to favour a more conservative approach, as this is the lowest of the background noise levels shown in Table 1.

Table 3: Summary of the Initial Assessment for the cold store condenser

Description	dB(A)
Condenser sound power level during operation, L_w	61
Distance attenuation with hemi-spherical propagation @ 18 metres from source	-33
Barrier attenuation	-14
Specific sound level during operation (dB $L_{Aeq,15mins}$)	14
Acoustic feature correction	+3
Sound rating level (dB $L_{Ar,15mins}$)	17
Evening mean background noise level (dB L_{A90})	40
Comparison ($L_{Ar,15mins} – L_{A90}$)	-23

4.6 As can be seen from Table 3, the rating level is calculated to be 23 dB(A) below the background sound level at the nearest noise-sensitive premises. As the predicted level is better than 10 dB below the background noise level, this is therefore compliant with the noise requirements of Condition 1.

4.7 Based on the manufacturer's data and our experience of this equipment, vibration associated with the condenser is negligible.

4.8 Based on this, no specific noise and vibration mitigation measures are necessary.

5.0 SUMMARY AND CONCLUSION

5.1 Mitchells & Butlers appointed Hepworth Acoustics to assess the impact of noise on the neighbouring residential properties from the proposed new external cold store to be installed at The White Hart, Brasted.

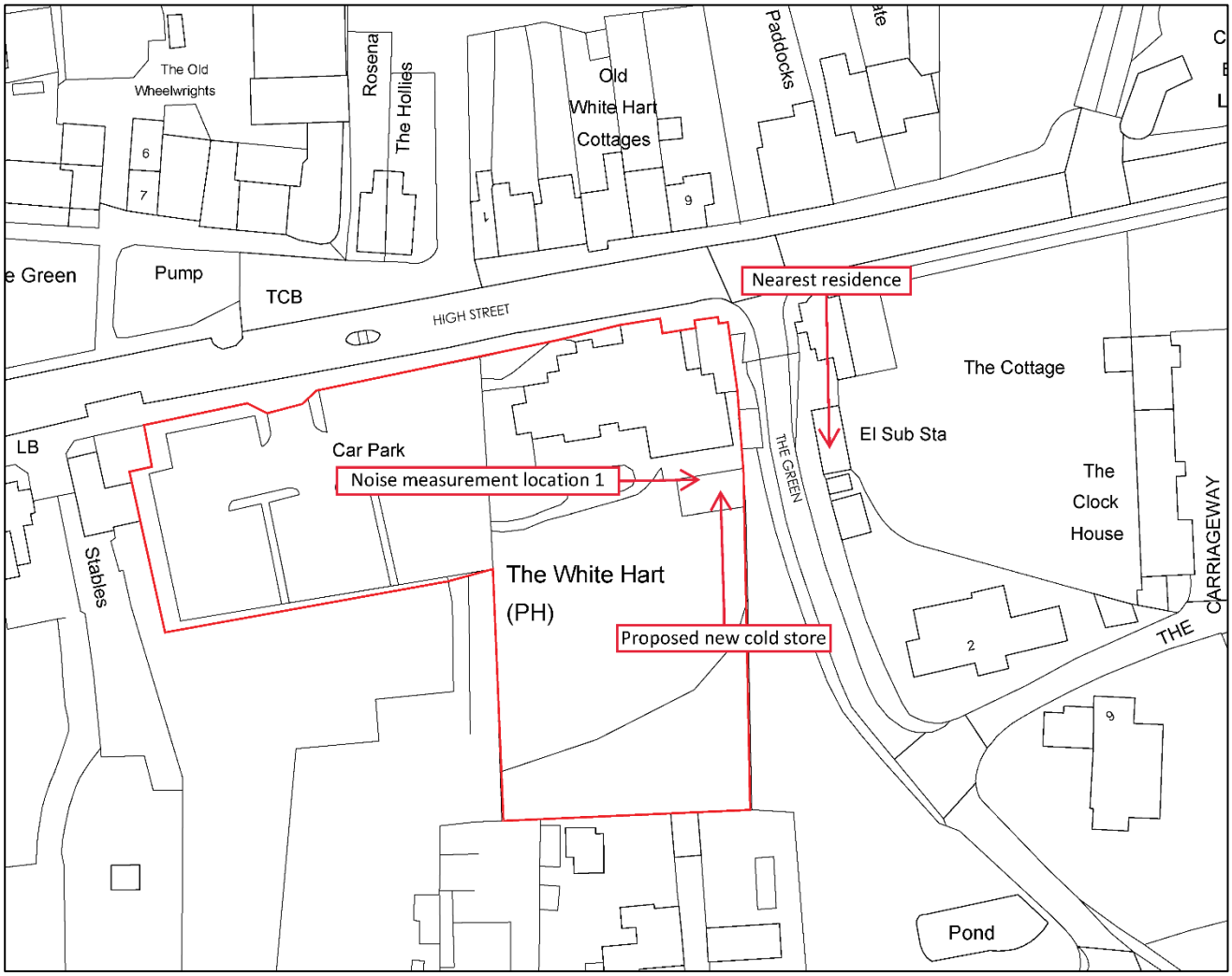
5.2 A noise survey has been undertaken at the site and the background noise levels have been determined in accordance with the guidance in BS 4142: 2014 + A1: 2019, as recommended by the Local Authority.

5.3 Using the noise data for the proposed equipment, the rating level for the noise emission at the nearest noise-sensitive premises has been predicted. The rating level of noise emitted from the proposed new cold store is calculated to be 23 dB(A) below the background levels determined outside the nearest noise-sensitive receptor. This is compliant with the noise requirements of the Local Authority.

5.4 Vibration associated with the new condenser is negligible.

5.5 On the basis of the above, we conclude that no specific noise and vibration mitigation measures are necessary.

Figure 1 – Site Layout



Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

$L_{Aeq,T}$ This is the A–weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period, T. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A–weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

L_W This is the sound power level of a sound source, in decibels, which is 10 times the logarithm to the base 10 of the ratio of sound power radiated by the source to a reference power. The reference power is 1 picowatt (1×10^{-12} watt). The sound power level is the fundamental measure of the total sound energy radiated by a source per unit time.

$L_{A90,T}$ This is the A–weighted noise level exceeded for 90% of the time period, T. L_{A90} is used as a measure of background noise.

$L_{Amax,f}$ This is the maximum A–weighted noise level that was recorded during a sample duration, with the sound level meter on the ‘fast’ setting.

Appendix II: Noise Survey Results

Location 1

Equipment: NTi XL2 Class 1 Sound Analyser (serial no. A2A-20294-E0) with tripod and windshield.

Weather: Dry, wind speed below 5 m/s

All levels in dB(A)

Date	Time	$L_{Amax,f}$	$L_{Aeq,15mins}$	$L_{A90,15mins}$
29/01/2024	18:00:00	56	48	42
29/01/2024	18:15:00	74	49	41
29/01/2024	18:30:00	62	48	41
29/01/2024	18:45:00	61	48	42
29/01/2024	19:00:00	59	47	41
29/01/2024	19:15:00	61	46	40
29/01/2024	19:30:00	55	46	41
29/01/2024	19:45:00	56	46	42
29/01/2024	20:00:00	76	50	42
29/01/2024	20:15:00	63	47	41
29/01/2024	20:30:00	64	48	41
29/01/2024	20:45:00	63	48	41
29/01/2024	21:00:00	80	48	41
29/01/2024	21:15:00	63	45	40
29/01/2024	21:30:00	62	45	40
29/01/2024	21:45:00	58	45	40
29/01/2024	22:00:00	59	45	40
29/01/2024	22:15:00	55	44	39
29/01/2024	22:30:00	61	43	37
29/01/2024	22:45:00	52	42	37
29/01/2024	23:00:00	55	41	37
29/01/2024	23:15:00	51	40	37
29/01/2024	23:30:00	51	41	38
29/01/2024	23:45:00	55	41	38
30/01/2024	00:00:00	57	42	39
30/01/2024	00:15:00	59	44	40
30/01/2024	00:30:00	55	44	41
30/01/2024	00:45:00	58	44	40
30/01/2024	01:00:00	56	45	41
30/01/2024	01:15:00	53	45	42
30/01/2024	01:30:00	71	46	42
30/01/2024	01:45:00	57	47	42
30/01/2024	02:00:00	59	45	41

30/01/2024	02:15:00	54	44	40
30/01/2024	02:30:00	48	41	38
30/01/2024	02:45:00	53	42	39
30/01/2024	03:00:00	54	42	40
30/01/2024	03:15:00	57	43	40
30/01/2024	03:30:00	55	44	41
30/01/2024	03:45:00	56	43	40
30/01/2024	04:00:00	53	45	42
30/01/2024	04:15:00	59	47	44
30/01/2024	04:30:00	57	47	44
30/01/2024	04:45:00	61	49	46
30/01/2024	05:00:00	59	49	46
30/01/2024	05:15:00	59	50	48
30/01/2024	05:30:00	62	53	50
30/01/2024	05:45:00	62	53	50
30/01/2024	06:00:00	63	53	51
30/01/2024	06:15:00	71	53	49
30/01/2024	06:30:00	65	52	48
30/01/2024	06:45:00	65	53	50
30/01/2024	07:00:00	70	52	48
30/01/2024	07:15:00	84	55	51
30/01/2024	07:30:00	63	52	49
30/01/2024	07:45:00	76	54	50
30/01/2024	08:00:00	69	55	52
30/01/2024	08:15:00	73	54	51
30/01/2024	08:30:00	76	56	52
30/01/2024	08:45:00	79	58	53
30/01/2024	09:00:00	81	60	53
30/01/2024	09:15:00	67	59	53
30/01/2024	09:30:00	72	58	52
30/01/2024	09:45:00	67	54	52
30/01/2024	10:00:00	71	54	51
30/01/2024	10:15:00	74	56	53
30/01/2024	10:30:00	69	56	52
30/01/2024	10:45:00	79	57	52
30/01/2024	11:00:00	80	55	52
30/01/2024	11:15:00	81	58	52
30/01/2024	11:30:00	80	59	53
30/01/2024	11:45:00	73	55	52
30/01/2024	12:00:00	72	53	51
30/01/2024	12:15:00	78	56	51
30/01/2024	12:30:00	77	55	52
30/01/2024	12:45:00	73	55	52
30/01/2024	13:00:00	72	55	52

30/01/2024	13:15:00	92	62	52
30/01/2024	13:30:00	84	57	51
30/01/2024	13:45:00	76	56	52
30/01/2024	14:00:00	75	55	52
30/01/2024	14:15:00	71	56	50
30/01/2024	14:30:00	72	53	50
30/01/2024	14:45:00	75	55	50
30/01/2024	15:00:00	68	53	50
30/01/2024	15:15:00	67	52	50
30/01/2024	15:30:00	81	58	49
30/01/2024	15:45:00	72	57	48
30/01/2024	16:00:00	67	55	48
30/01/2024	16:15:00	71	55	47
30/01/2024	16:30:00	74	54	47
30/01/2024	16:45:00	69	53	46
30/01/2024	17:00:00	79	51	45
30/01/2024	17:15:00	80	51	44
30/01/2024	17:30:00	73	50	44
30/01/2024	17:45:00	72	49	43

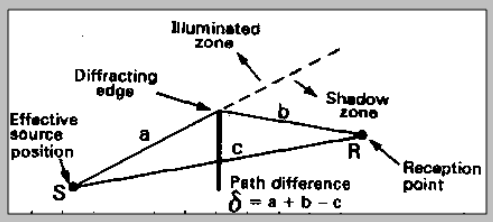
Appendix III: Noise Barrier Calculation

Barrier Attenuation	h (Source)	h(Receiver)	h(Barrier)	d(S-B)	d(B-R)	d(S-B-R)	d(SBR)	d(SR)
	0.6	4.5	2.5	2.0	16.0	18.0	18.88	18.42

a	b	c	Path Diff	Log
2.76	16.12	18.42	0.465484	-3.32E-01

Frequency (Hz)	500	h(S)-H(R)	h(S)-H(R)/SBR	Theta	h(min shadow)	Zone
Speed (c)	344	3.9	0.216666667	0.213369	1.033333333	Shadow

		Freq Hz	Barrier Correction dB	
	At Frequency (Hz)			
Fresnel				-14.8
Octave Band		63		-8.1
		125		-9.9
		250		-12.2
		500	BS5228	-14.8
		1000		-17.6
		2000		-20.5
		4000		-23.4
		8000		-26.4



Minimum mass kg/m^2	10.0

	BS5228								
	63	125	250	500	1k	2k	4k	8k	A
Fresnel/BS5228	-8	-10	-12	-15	-18	-20	-23	-26	**-14**