



BRAIDEN ACOUSTICS LTD

Innovation Forum | 51 Frederick Road | Salford | Manchester | M6 6FP

INDUSTRIAL NOISE IMPACT ASSESSMENT

Prepared For : Beech Building and Construction Ltd

Date : 16 May 2024

Site : 5 Smalley Street, Rochdale, OL11 3DX

Report No. : 11278

1 INTRODUCTION

Braiden Acoustics Ltd has been commissioned by Beech Building and Construction Ltd to undertake an acoustic survey at the site of 5 Smalley Street, Rochdale, OL11 3DX in order to support planning application 24/00158/FUL which proposes external alterations including the installation of 4no. external condensers.

1.1 AIM

This report shall determine the noise sources and receivers and assess any potential noise emissions from the industrial noise sources, according to relevant standards and guidance.

2 DESCRIPTION OF SITE

The site is a storage and commercial unit for Spartan Motor Factors which is part of a larger site designated for B8 storage and distribution.

The building is single storey and outlined in red in Figure 1.



Location Plan 1:1250

Figure 1
Site Edge Red

2.1 SITE LOCATION AND SURROUNDING USES

Smalley Street is primarily comprised of smaller scale terrace residential properties with some commercial and community use buildings.

To the east of the site is the larger distribution and storage site.

To the north is Royal Bath Road and directly to the south is an area of hardstanding which has some car park spaces for the staff at Spartan Motor Factors.

2.1.1 Nearest sensitive receivers

There are residential dwellings on the other side of the hardstanding, as can be seen in Figure 2.



Figure 2
Site location in relation to nearby sensitive receivers

The nearest property is over 15m to the south east.



Figure 3
Proposed site showing condenser units and nearest resident

2.2 PROPOSED USE

The main building is used for storage, offices and a small retail shop.

There are 4no. condenser units on the side wall for air conditioning, as shown in Figure 3.

2.2.1 Opening hours

The main building is in operation during office hours of 08:00 – 17:00.

The condenser units will only operate during office hours.

2.2.2 Building services

Four external condenser units have been fitted.





Figure 4
Installed condenser units

The external units are as follows:

1no.	Mitsubishi	SUZ-M71VA	51 dB Lp@1m (Heating)
3no.	Mitsubishi	MUZ-AP20VGK	48 dB Lp@1m (Heating)

3 ACOUSTIC CRITERIA AND METHODOLOGY

3.1 BS 4142

BS 4142:1999 “Method for rating industrial noise affecting mixed residential and industrial areas” [1] assesses industrial noise with regards to nearby residential dwellings. The guidance is commonly used to compare the equivalent noise from an industrial source only (*specific noise level*), L_{Aeq} , to the background noise level, L_{A90} , at the nearest sensitive receptor (NSR).

This Standard has been recently updated, BS 4142:2014 “Methods for rating and assessing industrial and commercial sound” [2]. Whereas the old standard added 5dB ‘penalty’ to the Specific Noise Level (SNL) if the noise source has a ‘character’ that can draw attention that may be described as tonal, intermittent or impulsive, the new standard gives clearer guidance on noise ‘character’. Furthermore, the previous Standard gave only one 5 dB penalty whereas the new Standard may not. When added to the specific noise level it forms the *rating level*. The new Standard gives the guidance for the following types of noise character:

Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed.

Correct the specific sound level if a tone, impulse or other characteristic occurs, or is expected to be present, for new or modified sound sources.

NOTE 1 The prominence of tonal or impulsive sound from a source can be masked by residual sound. In many cases the amount of masking varies as the residual sound changes in level and possibly character. The source’s tonal and/or impulsive characteristics could also vary with time.

Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention.

Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.

Impulsivity



A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

NOTE 2 Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Once a penalty for noise character is added to the Specific Noise Level then this is termed the Rating Level.

The background level is then compared to the rating level. It is usual that the rating level due to the source should be below the background noise level at the nearest sensitive receptor; indeed BS 4142 states:

Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level.

a) Typically, the greater this difference, the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) 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.

3.2 BS 8233: 2014

The British Standard BS 8233:2014 “Guidance on sound insulation and noise reduction for buildings” gives guidance on recommended indoor ambient noise levels for residential dwellings.



Room	Criterion	$L_{Aeq,T}$	
		night	day
Bedroom	Sleeping	30	35
Dining Room/Area	Dining	--	40
Living Room	Resting	--	35

Table 1

Recommending indoor ambient noise level thresholds from anonymous noise (taken from Table 4, BS 8233:2014)

Internal levels are simply predicted by the subtraction of the estimated sound reduction index (SRI) of the building façade from the external free field noise measurements. When considering the SRI of a particular façade it is usual to only consider the glazing as this is the weakest element acoustically.

3.3 COUNCIL CRITERIA

3.3.1 Industrial noise

Section 11 d) of BS 4142:2014 says

“Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact”

Therefore, the Rating Level should not exceed the Background Level to ensure any potential noise has a low or no impact.

4 MEASUREMENT DETAILS

A site visit measured external background noise levels as well as noise from various external plant on site.

4.1 BACKGROUND NOISE MONITORING

In order to assess the noise levels, background noise levels have been taken at a location near to the residential properties to the south east of the site.

Background noise measurements were made in line with Section 8 – Background sound level, of BS4142:2014.

4.1.1 Measurement Time Interval, T_m

The Measurement Time Interval, T_m is given (in BS4142:2014 Section 3.6) as:

total time over which measurements are taken

For measuring background noise levels, Section 8.1.3 of BS 4142:2014 states:

“Ensure that the measurement time interval is sufficient to obtain a representative value of the background sound level for the period of interest. This should comprise continuous measurements of normally not less than 15 min intervals, which can be contiguous or disaggregated.”

A site visit measured external background noise levels.

4.1.2 Monitoring details

Personnel: John Braiden, BSc & MSc Acoustics, MIOA.

Weather: 16 - 21- ° C; <5ms⁻¹ wind; ~40 - 60% cloud; no precipitation.



Equipment: NTi XL2 integrated real time analyser & B&K 4231 calibrator.

Date: Thursday 2nd May 2024.

The sound level meter was calibrated before after the measurements with no drift reported.

Monitoring was manned.

4.1.3 Monitoring location

The location of the monitoring was at 1.2m from local ground at the location shown in Figure 5.



Figure 5
Background Noise monitoring location

The monitoring location was representative of the nearest sensitive receptor.

4.1.4 Monitoring times

Monitoring took place late on a mid-week afternoon when the condensers would be operational.

4.1.5 Monitoring results

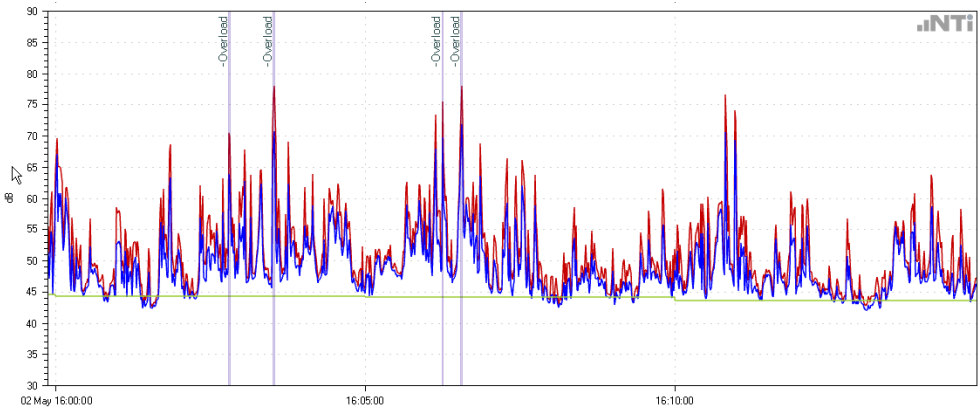


Figure 6
Measured noise levels

The background noise level measured was 43 dB L_{A90+} .

4.2 EXTERNAL PLANT

Spot measurements were made of the various external plant:

Dexcription	Duration	Distance	Noise level in dB
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			L_{A90}	L_{Aeq}	L_{Amax}
Condensers OFF	5 min	2m	48.3	60.6	80.2
Large Condenser ON	5 min	2m	48.5	55.9	71.0
ALL Condensers ON	5 min	2m	49.5	57.9	79.2

Table 2
External plant measured noise levels

Noise from the condenser units, even when all four were operating, were barely audible at the monitoring location, approximately 2m from the units. The noise climate consisted of distant road traffic noise, some infrequent passing vehicles on Smalley Street and distant passing trains. Whilst the wind speed was within limits, there was some mildly blustery winds on occasions.

5 ACOUSTIC ASSESSMENT

The L_{Aeq} values shown in Table 2 above does not reveal any distinct increase in noise level due to the condensers. In fact the measured noise levels showed that the overall noise level was slightly higher when all the units were off; therefore, the units were not contributing to the overall noise level at the monitoring location, even when all four units were operating. Furthermore, there was no significant change in the Background Noise Level between all the units on and all the units off (a difference of only 1.2 dB – this is below the Just Noticeable Difference¹ of the average adult human).

Therefore, to conduct a meaningful BS4142 assessment, noise data has been taken from the datasheets of the units.

1no.	Mitsubishi	SUZ-M71VA	51 dB LpA@1m (Heating)
3no.	Mitsubishi	MUZ-AP20VGK	48 dB LpA@1m (Heating)

The logarithmic sum of the four units, operating simultaneously, at a distance of 1m, in a hemi-spherical free field (hard floor) is:

55 dB

5.1 BS4142 ASSESSMENTS

For all units operating simultaneously there will be a BS4142 assessment.

The following will be taken into account:

- Number of reflecting surfaces
- Shielding
- Distance attenuation
- Acoustic characteristics such as, intermittency, tonality and impulsivity.

¹ Just Noticeable Difference (JND) is the amount of increase / decrease in noise level when there is a perceived change in noise level. The typical JND is 3 dB.



BS 4142 Noise Assessment (ALL Condensers)	Value	dB
Specific Noise Level at 1m		55
No. of nearby surfaces	1	3
Barrier	none	0
Distance	15	-23
Total Specific Noise Level @ NSR		35
BS 4141		
Tonality	0/2/4/6	0
Impulsivity	0/3/6/9	0
Intermittency	0/3	3
Rating Noise Level		38
Background Noise Level (day)	L_{A90}	43
Rating minus Background		-5

Table 3
BS 4142 ALL condensers operating simultaneously

Table 5 shows that the Rating Level for all condensers is 38 dB. This is 5dB below the typical day time Background Noise Level of 43 dB L_{A90} .

6 CONCLUSION

An acoustic survey has taken place at 5 Smalley Street, Rochdale, OL11 3DX to determine noise levels from the installed external condenser units.

Noise measurements from the in-situ plant did not reveal any change to the ambient noise level with the units on and off.

Using the noise level data from the respective datasheets, a BS 4142 assessment was conducted. The results were that the combined Rating Level of all four units operating simultaneously was 5dB below the typical daytime Background Noise Level at the nearest residential dwelling, some 15m away.

Therefore, the noise level of all external plant is within acceptable noise limits and so no acoustic mitigation is required.

7 REFERENCES

- [1] BS 4142: 1997
Method for Rating industrial noise affecting mixed residential and industrial areas
British Standards Institute, 1997.
- [2] BS 4142: 2014
Methods for rating and assessing industrial and commercial sound
British Standards Institute, 2014.



Appendix



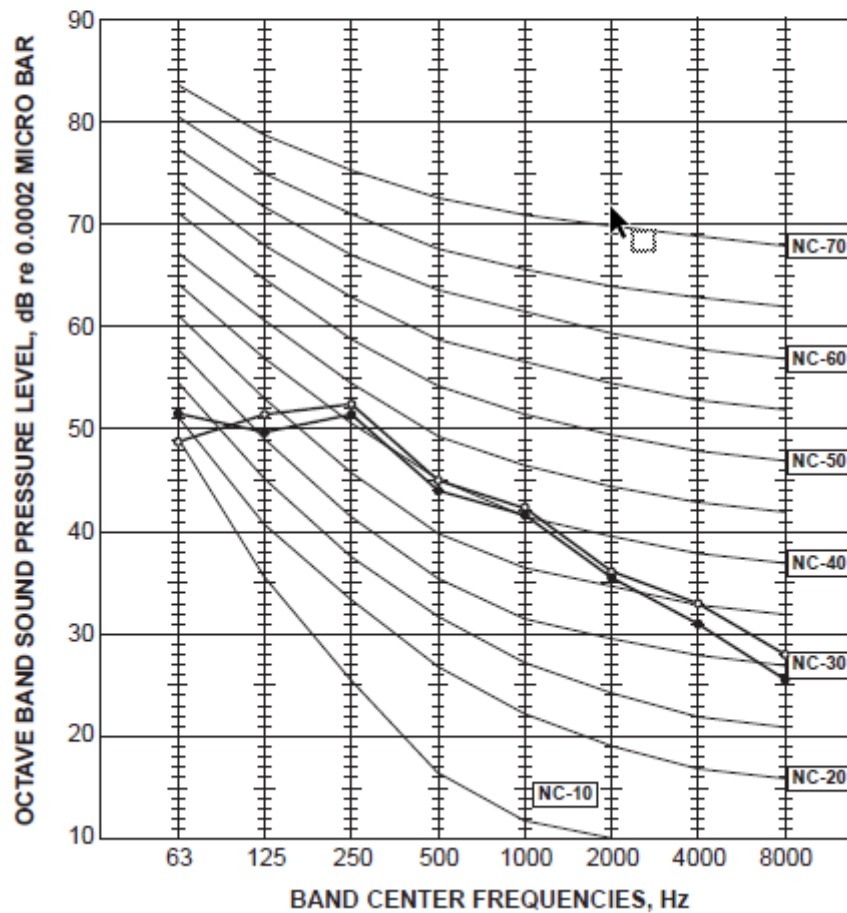
A1 CONDENSER NOISE SPECTRA

A1.1 MUZ-AP20VG

MUZ-AP20VG

OUTDOOR UNIT

FAN SPEED	FUNCTION	SPL(dB(A))	LINE
Super High	COOLING	47	●—●
	HEATING	48	○—○



SUZ-M60VA.TH
 SUZ-M60VAR1.TH
 SUZ-M60VAR2.TH
 SUZ-M60VA-ET.TH
 SUZ-M60VA-ETR2.TH

SUZ-M71VA.TH
 SUZ-M71VAR1.TH
 SUZ-M71VA-ET.TH
 SUZ-M71VA-ETR1.TH

