Former Wrexham Musical Theatre, 1 Salop Road, Wrexham LL13 7AF

Noise impact assesssment

for

Carbana Ltd

ACT Acoustics

Contents

Document information 4
Revision history 4
Executive Summary 5
1 Introduction 6
1.1 Site address 6
1.2 Proposed development 6
1.3 Hours of operation 7
1.4 Approach to the assessment 7
1.5 Scope and limitations 8
2 Standards 9
2.1 Noise — British Standard 4142:2014+A1 9
3 Baseline survey 13
3.1 Measurement methodology 13
3.2 Survey location and time 13
4 Summary of survey results for Location 1 15
4.1 Subjective impressions of noise 15
4.2 Time series results 15
4.3 Summary statistics 16
4.4 Representative values 16
5 Noise model 17
5.1 Noise modelling assumptions 17
5.2 Noise sources 17
5.3 Usage assumptions 18
5.4 Noise-sensitive receivers 19
5.5 Results 20
6 BS 4142:2014+A1 assessment 22
6.1 Acoustic feature corrections 22
6.2 Assessment 23
7 Appendix 24
7.1 Typical noise levels 24
7.2 Glossary 25
7.3 Sound measurement equipment 27

Disclaimer.....28

Figures

Figure 1: Location of the proposed site.... 6
Figure 2: Plan of the proposed site showing (1) air compressors and vacuum cleaners, (2) self-serve car wash bays and (3) new tyre fitting facility.... 7
Figure 3: Map showing the location of the unattended noise survey.... 13
Figure 4: Photograph of the equipment on location].... 14
Figure 5: Time-series results for the survey period.... 15
Figure 6: Noise sources being assessed.... 17
Figure 7: Noise-sensitive receivers.... 19
Figure 8: Noise contours showing the noise output from all elements.... 20
Figure 9: XL2 calibration certificate.... 27

Tables

Table 1: Sound power levels of point sources.... 18
Table 2: Internal sound levels within P1 Speedyfit Ltd.... 18
Table 3: Usage assumptions for all noise-making activity.... 18

Document information

Client	Carbana Ltd
Site address	Former Wrexham Musical Theatre, 1 Salop Road, Wrexham LL13 7AF
Project number	38334229
Author	Mike Wood PhD MIOA
Survey engineer	Mike Wood PhD MIOA
Phone	01392 248111
Email	m.wood@actacoustics.co.uk

Revision history

Version	Author	Checked by	Date	Comments
1.0	Mike Wood	Colin Gummer	18 September 2024	Draft for comment

Executive Summary

Carbana Ltd has commissioned ACT Acoustics to provide a noise impact assessment at Former Wrexham Musical Theatre, 1 Salop Road, Wrexham LL13 7AF.

This report has been produced to support the planning application for the scheme and details the results of the environmental noise survey undertaken at the site and a noise impact assessment.

We have made our assessment in accordance with BS 4142:2014+A1. To do this, we have:

- undertaken a survey of the background noise levels at the site;
- created a noise model to estimate the noise level from proposed equipment;
- used the results of the noise model to calculate the rating level at the nearest noise-sensitive location; and
- compared the rating level to the background sound level to determine the likelihood of adverse impact due to the introduction of new equipment.

Our assessment has shown that the difference between the cumulative rating level and the background sound level is expected to be +5 dB. In some circumstances this would indicate adverse impact; however, given that the site is within a busy town centre location with significant traffic noise, the sounds introduced are likely to be similar in character to those within the context of the existing site. We therefore expect the likelihood of adverse impact to be *low*, and thus see no reason to refuse planning permission on noise grounds, provided a good acoustic design process is followed.

1 Introduction

1.1 Site address

Former Wrexham Musical Theatre, 1 Salop Road, Wrexham LL13 7AF

1.2 Proposed development

The proposed development comprises a four-bay self-serve hand car wash facility. The proposed sound sources are two air compressors and two vacuum cleaners. A new tyre fitting facility is also proposed.

Plans showing the location and layout of the proposed development are show in the figures below:



Figure 1: Location of the proposed site

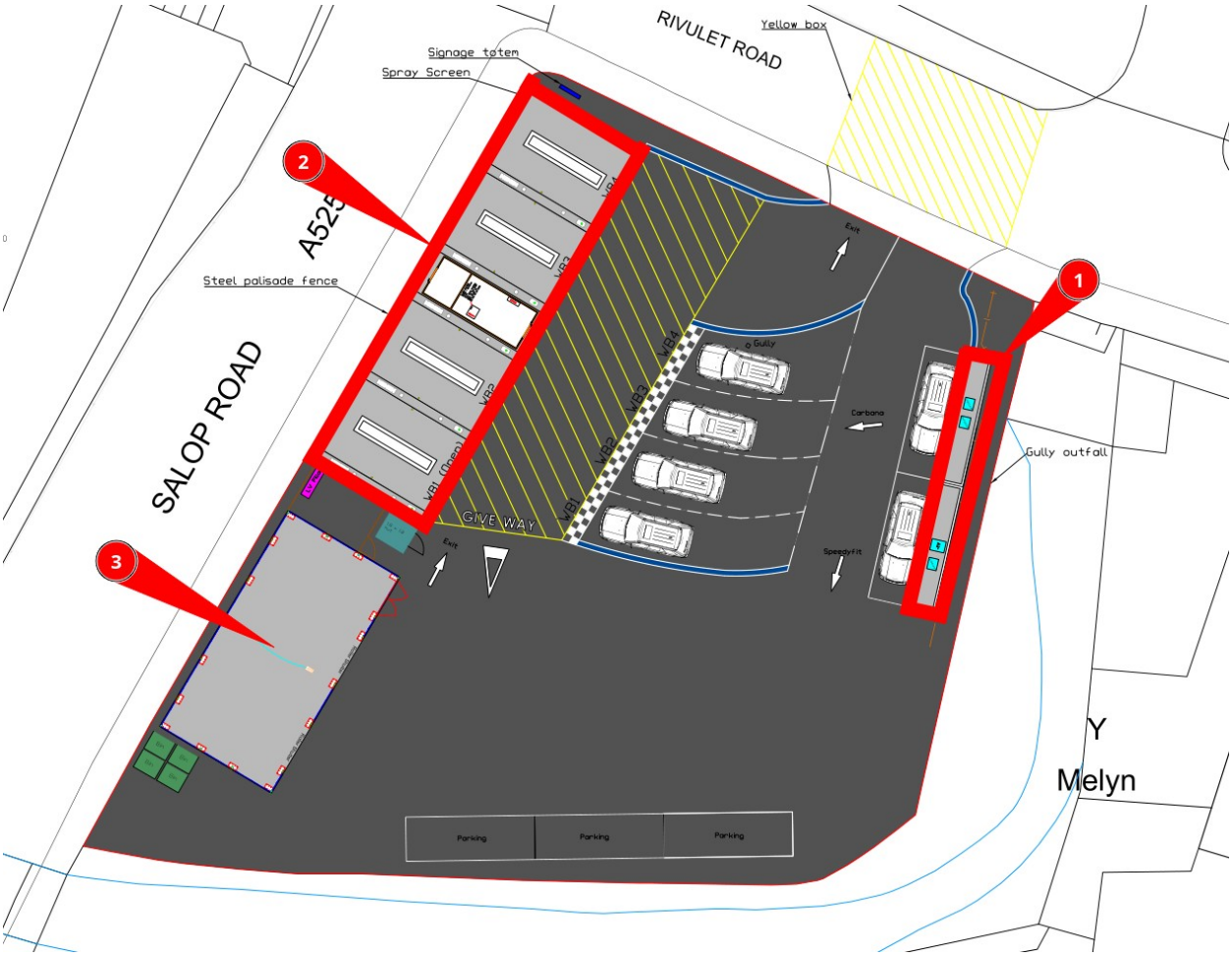


Figure 2: Plan of the proposed site showing (1) air compressors and vacuum cleaners, (2) self-serve car wash bays and (3) new tyre fitting facility.

1.3 Hours of operation

We understand that the proposed hours of operation of the car wash site (including vacuum and compressed air dispensers) are 0800 to 1900, Monday to Friday; 0900-1800 Saturday; and 1000-1700 Sunday. The hours of operation of the tyre fitting facility (P1 Speedyfit Ltd) are understood to be 0800 to 1900 Monday to Saturday and 1000 to 1600 on Sunday.

1.4 Approach to the assessment

To make our assessment we have:

- undertaken a baseline noise survey at the site to determine the prevailing background noise levels at the nearest noise-sensitive locations;

- made predictions of the noise egress using a noise model of the site; and
- assessed the impact in accordance BS 4142:2014+A1.

1.5 Scope and limitations

The scope of this report is limited to providing estimates of the noise egress from the site and a noise impact assessment suitable for planning purposes. Please ensure that you have read and understood the disclaimer at the end of this report.

2 Standards

This section provides a summary of the assessment methods and standards referred to in this report.

2.1 Noise — British Standard 4142:2014+A1

The impact of noise from from industrial and commercial activities is typically determined using British Standard 4142:2014+A1 (herein referred to as *BS 4142*). A summary of the requirements for assessment in accordance with BS 4142 is given below.

BS 4142 provides a method of assessment of industrial and commercial noise sources in mixed residential and industrial areas. The method assesses the noise by calculating the *noise rating level* (L_{ArTr}) and comparing this to the prevailing background sound level (L_{A90}).

The background sound level is the level which is exceeded for 90% of the time *in the absence of the noise being assessed*. The reason for measuring the background sound is that low background sound levels can make the noise being assessed more audible (and therefore increasing the impact), whereas high background sound levels can mask the sound. Since background sound levels typically vary throughout the day, they are usually measured by a noise survey lasting more than 24 hours.

The noise rating level is the noise level from the source in question plus any penalties (see below). The rating level is compared to the background sound level to determine its likely impact on noise-sensitive locations.

To calculate the rating level, the noise source (technically referred to as the *specific sound level*, L_s) is either measured in the field or calculated.

If the specific sound level is measured in the field, it will also include the residual sound (L_r) of the surrounding landscape. The total of the residual sound and the specific sound is the ambient sound level L_a.

In order to calculate the specific sound level, we must take measurements when the specific sound source is both *on* and *off*. The specific sound level is then calculated from:

$$L_s = 10 \times \log_{10}\left(10^{\frac{L_a}{10}} - 10^{\frac{L_r}{10}}\right)$$

The rating level is:

$$L_{\mathrm{ArTr}} = L_s + P$$

Where P is the sum of the noise penalties.

2.1.1 Acoustic feature corrections

In calculating the rating level (L_{ArTr}), BS 4142 requires that penalties are applied based on the character of the noise being assessed. Penalties are applied for any tonal, impulsive or intermittent sounds.

2.1.2 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.

2.1.3 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.

2.1.4 Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of a 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.

2.1.5 Uncertainty

BS 4142 states that the predictions of the rating level take account of uncertainty in both the calculations and the measurements undertaken. These uncertainties depend on a number of factors, including:

a) the complexity of the sound source and the level of variability in sound emission from the source;
b) the complexity and level of variability of the residual acoustic environment;
c) the level of residual sound in the presence of the specific sound at the measurement location;

d) the location(s) selected for taking the measurements;
e) the distance between the sources of sound and the measurement location, and intervening ground conditions;
f) the number of measurements taken;
g) the measurement time intervals;
h) the range of times when the measurements were taken;
i) the range of suitable weather conditions during which measurements were taken;
j) the measurement method and variability between different practitioners and the way the method is applied;
k) the level of rounding of each measurement recorded; and
l) the instrumentation used.

2.1.6 Assessment of the impacts

Once the rating level is calculated, the likely impact is assessed. BS 4142 section 11 gives the following guidance on assessing the impacts from noise:

> Typically, the greater this difference [between the rating level and the background sound level], the greater the magnitude of the impact.
> a) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
> b) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
> c) 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.

Typically, parity with the prevailing background sound is recommended, but for low background sound levels (such as during the night), BS 4142 provides the following additional guidance:

> For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low. Where the background sound levels and rating level are low, absolute levels might be as or more relevant than the margin by which the rating level exceeds the background sound level; this is especially true at night.

In situations where the background sound level is low, the *absolute* level from fixed plant may be more important than how much louder than the background level it is. In these cases, we can additionally assess the noise levels using the guidelines in British Standard 8233:2014, 'Guidance on sound insulation and noise reduction for buildings'.

The BS 8233 guidance recommends that, for a good night's sleep, the sound pressure level from all sources should not exceed 30 dB $L_{Aeq,8hr}$ in bedrooms at night and 35 dB $L_{Aeq,16hr}$ for daytime resting. Since the noise reduction through a partially open window has been shown to be between 10 dB and 15 dB*, the external sound levels in the vicinity of the receptors (assuming windows are partially open for ventilation) should not exceed 45 dB $L_{Aeq,8hr}$ during the night and 50 dB $L_{Aeq,16hr}$ during the day.

* As described in NANR116 Open / Closed Window Research published by Napier University in 2007

3 Baseline survey

3.1 Measurement methodology

British Standard 7445, 'Description and measurement of environmental noise: Guide to quantities and procedures', provides guidance on the quantification of environmental noise. It provides the framework within which environmental noise should be quantified.

It comprises three parts:

- Part 1 (2003): provides a guide to quantities and procedures;
- Part 2 (1991): provides a guide to the acquisition of data pertinent to land use;
- Part 3 (1991): provides a guide to the application of noise limits.

BS 7445 also refers to BS EN 61672, 'Electroacoustics: sound level meters', which details the required equipment necessary for proper measurement.

3.2 Survey location and time

The noise survey was undertaken at the site between 5 and 6 September 2024 at the location shown below:



Figure 3: Map showing the location of the unattended noise survey



Figure 4: Photograph of the equipment on location]

Details of the equipment used are given in the appendix.

4 Summary of survey results for Location 1

4.1 Subjective impressions of noise

During our visits to site, the soundscape at Location 1 was dominated by road traffic noise from nearby roads.

4.2 Time series results

The figure below shows a time series of the results during the survey period:

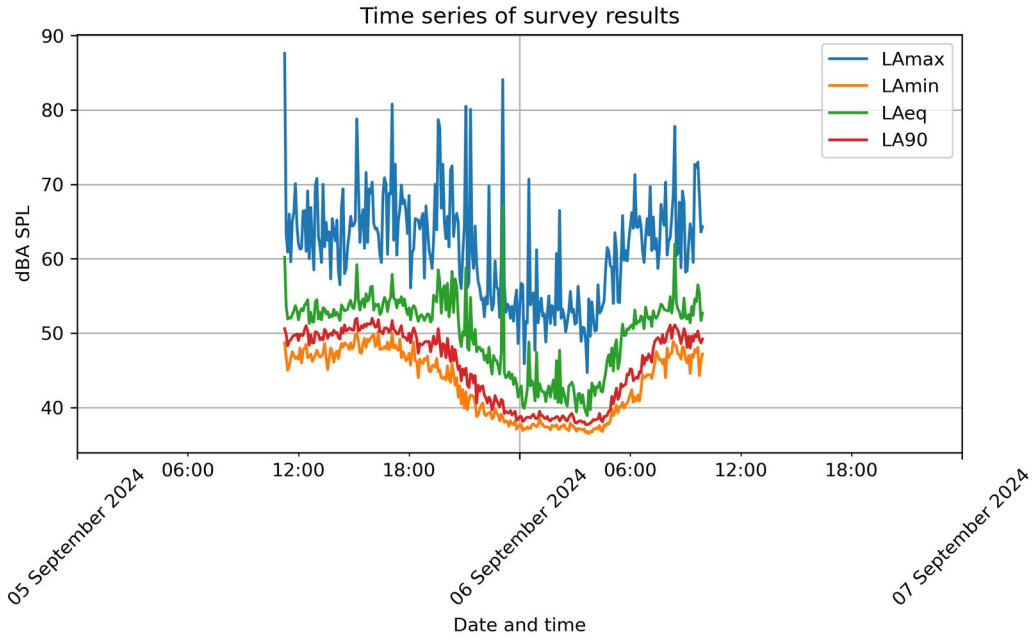


Figure 5: Time-series results for the survey period

4.3 Summary statistics

The typical values for L_{A90} for each period are:

Period	Median [$L_{A90,5min}$ dB]	Equivalent average [$L_{A90,5min}$ dB]	Average [$L_{A90,5min}$ dB]
0700 to 1900	50	50	50
1900 to 2300	45	46	45
2300 to 0700	39	41	40

4.4 Representative values

Based on the above, we take the following results to be representative of the noise levels at survey Location 1:

Period	Descriptor	Value	Unit
0700 to 1900	Median	50	dB L_{A90}
1900 to 2300	Median	45	dB L_{A90}
2300 to 0700	Median	39	dB L_{A90}

Since both the Carbana and P1 Speedyfit Ltd are only open during the daytime period, we take the background noise level to be 50 dB L_{A90} for the purposes of our assessment.

5 Noise model

5.1 Noise modelling assumptions

We created a noise model of the proposed development using iNoise 2024. The model was used to estimate the noise levels from the proposed equipment.

The settings used in the model were:

- Calculation methodology: ISO 9613-2
- Ground factor: 0 (hard ground, worst case assumption)
- D_{max} set in accordance with ISO 9613 (D_{max1} = 20.0, D_{max2} = 25)
- Temperature (Kelvin): 293.15
- Pressure (kPa): 101.33
- Air humidity (%): 60

5.2 Noise sources

The location of the noise sources being assessed are shown below:

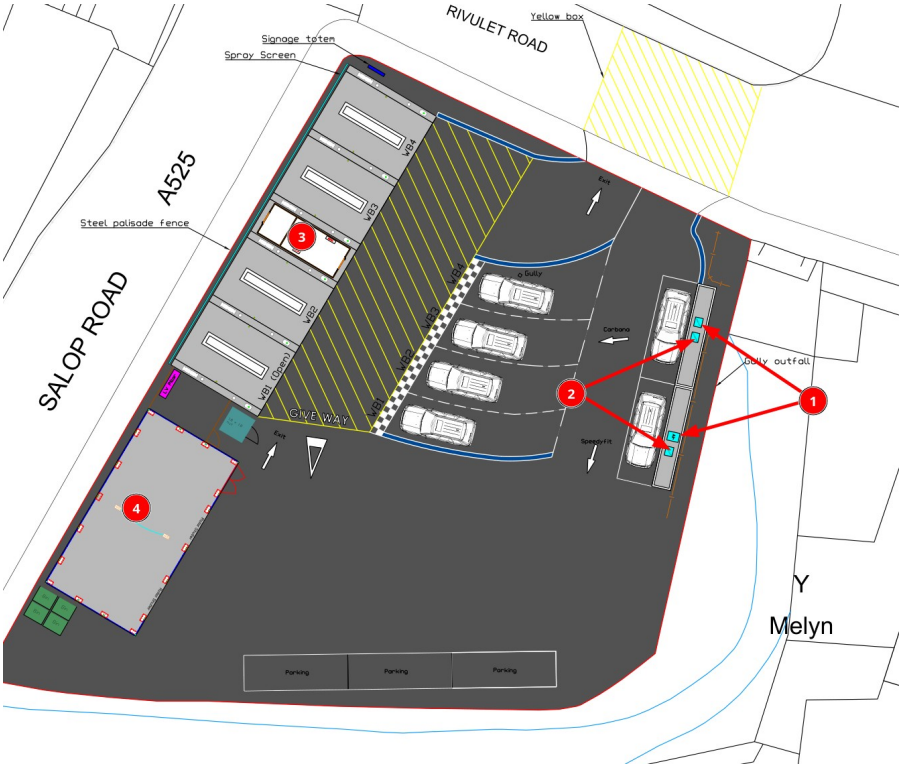


Figure 6: Noise sources being assessed

For each outdoor noise source (items 1-3), we have provided the sound power level. The table that follows shows the typical reported internal sound *pressure* level within the P1 Speedyfit facility.

Table 1: Sound power levels of point sources

Item no.	Plant	Sound power level (L_{WA} dB)	Quantity	Total uses per day (across all items)
1.	Air unit	73	2	35
2.	Vacuum cleaner (Karcher)	75	2	35
3.	Car wash bays	95	4	85

Table 2: Internal sound levels within P1 Speedyfit Ltd

Item no.	Type	Internal sound pressure level (L_{Aeq} dB)
4.	Tyre fitting facility	70

5.3 Usage assumptions

For each item, we have assumed that they are 'on' for the following periods of time:

Item	Type	Usage per day	Total no. of washes across all units	No of units	Duration of use (mins)	% operation time of each unit over the reference time period
1.	Car wash bays	85	7.7 per 60 mins	4	8	26%
2.	Compressor	35	3.2 per 60 mins	2	3	8%
3.	Vacuum	35	3.2 per 60 mins	2	3	8%
4.	Tyre fitting	—	—	1	60	100%

Table 3: Usage assumptions for all noise-making activity

5.4 Noise-sensitive receivers

The nearest noise-sensitive receivers are at the Tannery (show as 1 and 2 below) and Y Melyn (3 and 4):

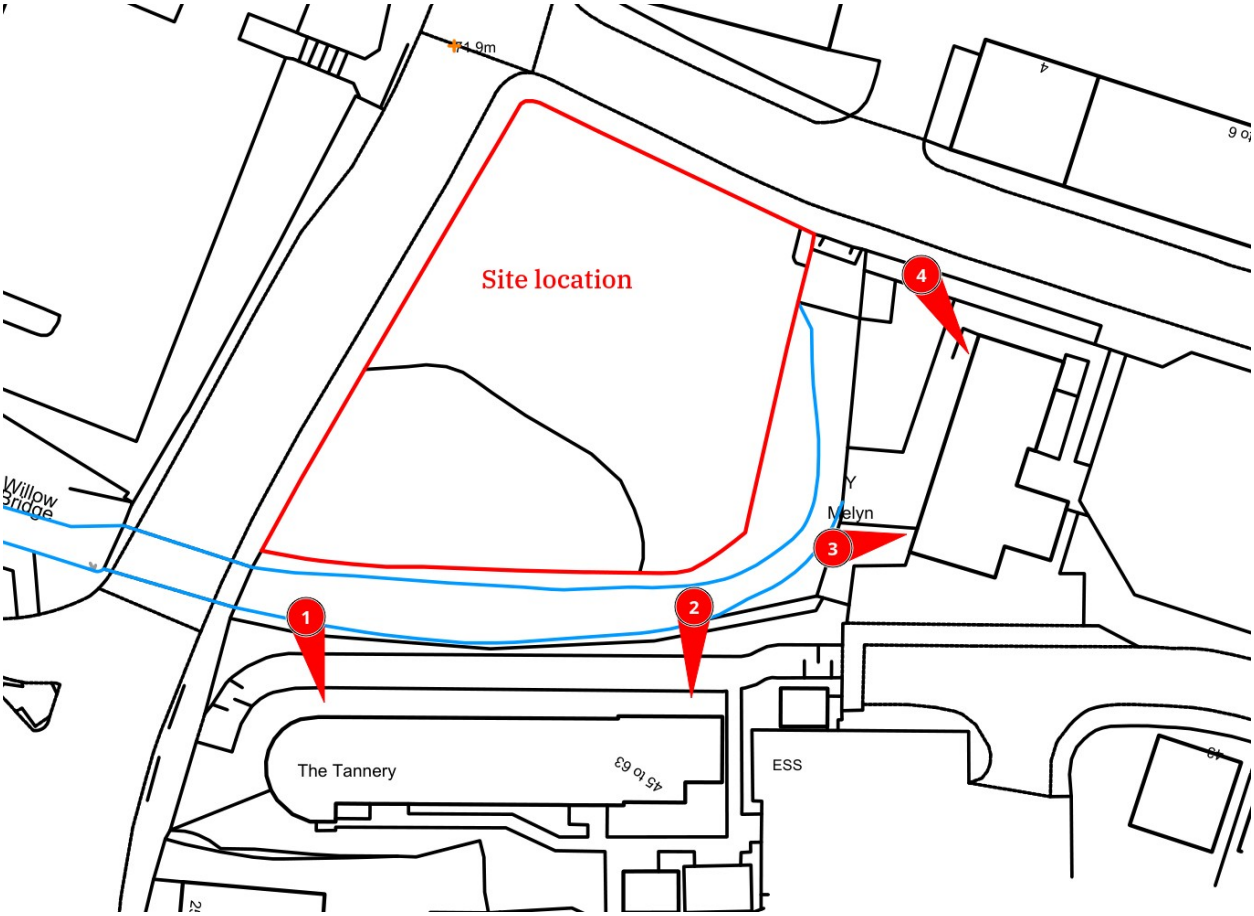


Figure 7: Noise-sensitive receivers

5.5 Results

The results of the noise model are summarised in the noise contours and table below:

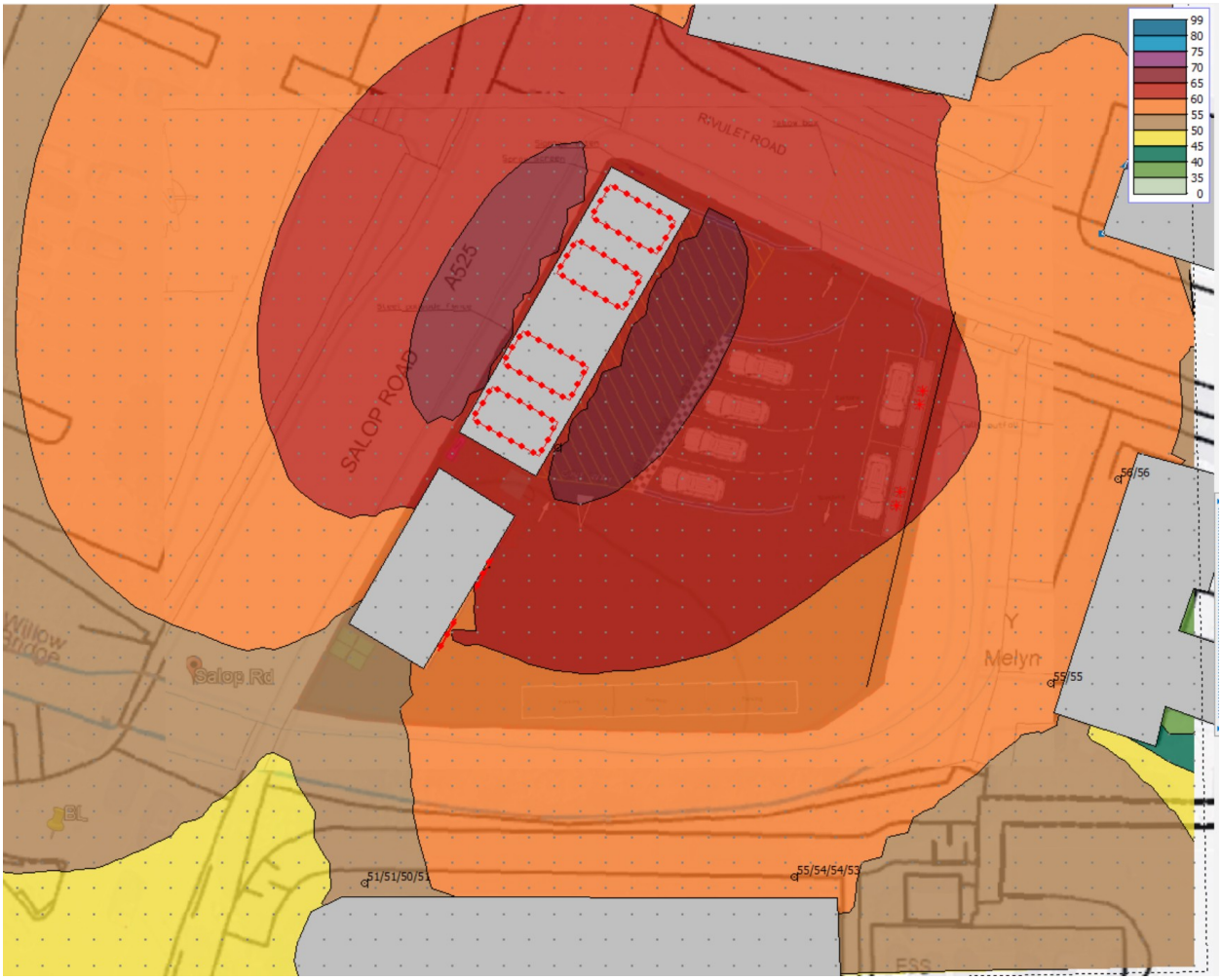


Figure 8: Noise contours showing the noise output from all elements

Table 4: Noise results table showing the most exposed location at Y Melyn (floors 2 and 3)

ID	Building	Floor level	Specific sound level (cumulative) L_s, dBA
1	Tannery	4	51
1	Tannery	3	52
1	Tannery	2	52
1	Tannery	1	52
2	Tannery	4	54
2	Tannery	3	54
2	Tannery	2	54
2	Tannery	1	54
3	Y Melyn	2	***55***
3	Y Melyn	1	***55***
4	Y Melyn	2	***55***
4	Y Melyn	1	***55***

6 BS 4142:2014+A1 assessment

6.1 Acoustic feature corrections

For the purposes of this assessment, we have applied the following acoustic feature corrections:

Table 5: Acoustic feature corrections applied

Feature correction type	Value (dB)	Reasoning
Tonality	0	We do not expect any tonal elements therefore no penalty is applied.
Impulsivity	0	We do not expect any impulsive elements therefore no penalty is applied.
Intermittency	0	We expect some audible intermittency but due to the high and varied level of road traffic noise in the area, we do not expect this to readily distinguishable against the prevailing ambient noise. We have therefore applied no penalty.
Total	**0**	

6.2 Assessment

We provide an assessment at each of the noise-sensitive locations (NSLs) below:

Table 6: BS 4142 initial assessment

Element	NSL 1	NSL 2	NSL 3	NSL 4	Comments
Specific sound level (L_s)	52 dB	54 dB	55 dB	55 dB	Noise level as calculated by the noise model, averaged over 1 hour and 15 minutes for the day and night periods respectively.
Acoustic feature corrections	0 dB	0 dB	0 dB	0 dB	The total acoustic feature corrections given in section 6.1.
Rating level (L_{ArTr})	52 dB	54 dB	55 dB	55 dB	The rating level in accordance with BS 4142:2014+A1
Background sound level (L_{A90})	50 dB	50 dB	50 dB	50 dB	The prevailing background sound level for the daytime period.
Difference	+2 dB	+4 dB	+5 dB	+5 dB	The difference between the rating level and the background sound level.

Based on the above, the difference between the rating level and the background sound level is expected to be +5 dB at most. In some circumstances, this would indicate an adverse impact; however, given that the site is within a busy town centre location with significant road traffic noise, the sounds introduced are likely to be similar in character to those within the context of the existing site. We therefore expect the likelihood of adverse impact to be *low, and thus* see no reason to refuse planning permission on noise grounds, provided a good acoustic design process is followed.

7 Appendix

7.1 Typical noise levels

The below table shows typical noise levels for reference:

Source	dBA SPL
Jet aircraft at a 50m distance	140
Threshold of pain	130
Threshold of discomfort	120
Chainsaw at a 1m distance	110
Disco, 1m from speaker	100
Diesel truck at a 10m distance	90
Kerbside of busy road at a 5m distance	80
Vacuum cleaner at a 1m distance	70
Conversational speech at a 1m distance	60
Average home	50
Quiet library	40
Quiet bedroom at night	30
Background in TV studio	20
Rustling leaves in the distance	10
Threshold of human hearing	0

7.2 Glossary

General acoustic terms

- **Sound**: The audible transmission of vibrations through air or water.
- **Noise**: Unwanted sound. Sound that causes disturbance.
- **Ground-borne Vibration**: Vibration transmitted through the ground. Has the potential cause disturbance, even damage at sufficient levels. Typically measured as Vibration Dose Values (VDVs).
- **Re-radiated Noise (or 'Ground-borne Noise')**: Ground-borne vibration can cause walls, floors and ceilings to radiate noise. This is often referred to as ground-borne noise. Mechanical plant may also generate noise by similar means.
- **Cross-talk**: Sound transmission between rooms via ventilation ducting.
- **Decibel (dB)**: The standard unit for defining sound pressure levels. The range of normal hearing is between 0 dB and 130 dB Where 130 dB is the upper threshold of pain. A change of 1dB in sound pressure levels is barely perceptible and 3dB is normally the minimum audible difference. A change of 5dB is clearly audible. A change of 10dB roughly corresponds to a halving or doubling of perceived loudness.
- **dBA (A-weighted decibel)**: A-weighted decibels use a frequency weighting to correspond to how the human ear hears sound.

Environmental noise terminology

- $\mathbf{L_{Aeq,T}}$ **(equivalent continuous noise level)**: The A-weighted equivalent average noise level (L_{Aeq}) is commonly used to describe the average noise level in a given environment over the measurement period.
- $\mathbf{L_{A10,T}}$: The A-weighted level of noise exceeded for 10% of the specified measurement period (T). It gives an indication of the upper limit of fluctuating noise and is commonly used in traffic noise measurements.
- $\mathbf{L_{A90,T}}$: The A-weighted level of noise exceeded for 90% of the specified period (T). It is commonly used to define background noise level; the underlying level in the absence of intermittent noise.
- $\mathbf{L_{Amax}}$ **(maximum noise level)**: The highest A-weighted noise level recorded during the measurement period. It is measured using the fast sound level meter response.
- **Hz (Hertz)**: Hz is the unit of frequency, equal to one pressure fluctuation cycle per second. Frequency is related to the pitch of a sound.
- **Free-field**: A sound measurement taking in the absence of any reflecting objects. Generally measured outside and away from buildings.
- **Façade-level**: A measurement taken in close proximity (e.g. 1 m) to a reflective surface other than ground, such as a building façade. This typically increases the measured level by around 3 dB.

- **NSL:** Noise-sensitive location. This is typically a dwelling, church, meditation space or other location likely to be significantly affected by noise.

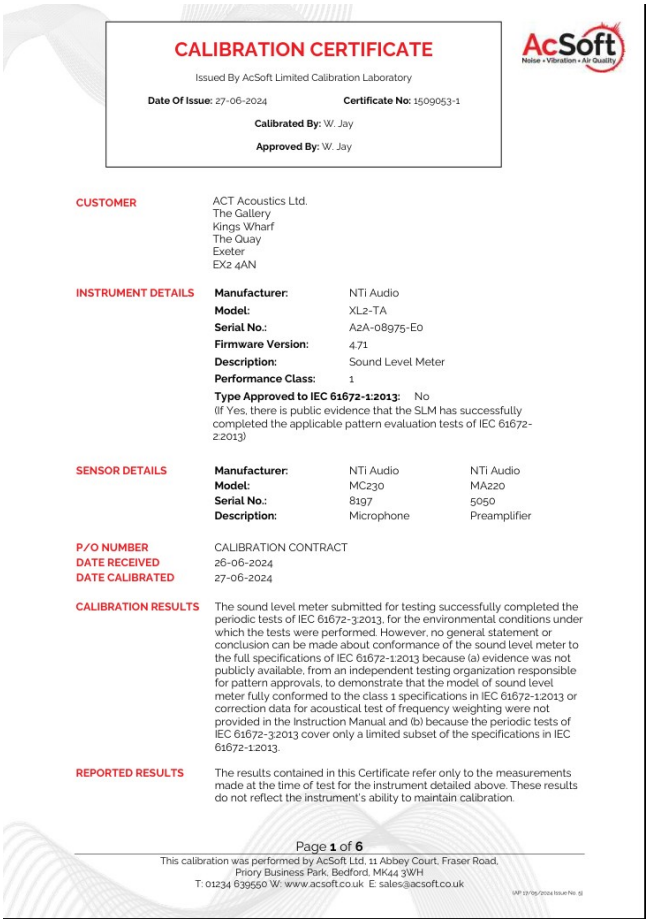
BS 4142 terminology

- **BS 4142:2014+A1:** A British Standard that provides guidance on assessing the effect of noise from industrial and commercial operations on residential dwellings.
- **Ambient sound level (L_a as used in BS 4142:2014+A1):** The sound that comprises the total sound for a specific situation and time (e.g. distant road traffic plus wildlife plus an air conditioning unit or other commercial noise source).
- **Specific sound level (L_s as used in BS 4142:2014+A1):** The sound arising from the source being assessed (e.g. an air conditioning unit or other commercial noise source).
- **Residual sound level (L_r as used in BS 4142:2014+A1):** The sound remaining when the specific sound is inaudible (e.g. distant road traffic plus wildlife)
- **Rating level (L_{ArTr} as used in BS 4142:2014+A1):** The specific sound level with penalties for characteristic features of the noise (i.e. tonality, intermittency or impulsivity)
- **Background sound level ($L_{A90,T}$ as used in BS 4142:2014+A1):** The sound level that is exceeded for 90% of the time.
- **Ambient sound level (L_a as used in BS4142:2014):** This is equivalent average noise level (dB L_{Aeq}) at a given location.

7.3 Sound measurement equipment

Details of the survey equipment are shown below:

Manufacturer	Name	Component Type	Serial Number	Calibration due
NTi Audio	XL2-TA	Sound level meter	A2A-08975-E0	27 June 2026
NTi Audio	MC230	Microphone	8197	27 June 2026
NTi Audio	MA220	Pre-amplifier	5050	27 June 2026
Bruel & Kjaer	B&K 4230	Calibrator	829693	17 March 2025



CALIBRATION CERTIFICATE

Issued By AcSoft Limited Calibration Laboratory

Date Of Issue: 27-06-2024 **Certificate No:** 1509053-1

Calibrated By: W. Jay

Approved By: W. Jay

CUSTOMER
ACT Acoustics Ltd.
The Gallery
Kings Wharf
The Quay
Exeter
EX2 4AN

INSTRUMENT DETAILS

Manufacturer:	NTi Audio
Model:	XL2-TA
Serial No.:	A2A-08975-E0
Firmware Version:	4.71
Description:	Sound Level Meter
Performance Class:	1

Type Approved to IEC 61672-1:2013: No
(If Yes, there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013)

SENSOR DETAILS

Manufacturer:	NTi Audio	NTi Audio
Model:	MC230	MA220
Serial No.:	8197	5050
Description:	Microphone	Preamplifier

P/O NUMBER CALIBRATION CONTRACT
DATE RECEIVED 26-06-2024
DATE CALIBRATED 27-06-2024

CALIBRATION RESULTS The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

REPORTED RESULTS The results contained in this Certificate refer only to the measurements made at the time of test for the instrument detailed above. These results do not reflect the instrument's ability to maintain calibration.

Page **1** of **6**

This calibration was performed by AcSoft Ltd, 11 Abbey Court, Fraser Road, Priory Business Park, Bedford, MK44 3WH
T: 01234 639550 W: www.acsoft.co.uk E: sales@acsoft.co.uk

Figure 9: XL2 calibration certificate

Disclaimer

ACT Acoustics Ltd has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and ACT Acoustics Ltd. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by ACT Acoustics Ltd for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. If additional information becomes available which may affect our comments, conclusions or recommendations, the author reserves the right to review the information, reassess any new potential concerns and modify our opinions accordingly.

All design advice given in this report should be checked with a suitably qualified structural engineer, fire safety engineer, chartered building surveyor, building services engineer and your local building control officer as required. Suitably qualified consultants can be found at the Institution of Structural Engineers, the Royal Institution of Chartered Surveyors and the Chartered Institution of Building Services Engineers. The manufacturer's guidance should be followed in full for all recommended products in this report.

This report is confidential to the client. ACT Acoustics Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by ACT Acoustics Ltd Any such party relies upon the advice given in this report at their own risk. No responsibility or liability is accepted by the author for the consequences if this document is used for a purposes beyond the stated scope. No part of this report may be copied or duplicated without the express permission of ACT Acoustics Ltd and the party for whom it was prepared.

ACT Acoustics Ltd is registered as a company in England and Wales. No. 10569267. Registered company address The Old Carriage Works, Moresk Road, Truro, Cornwall, United Kingdom, TR1 1DG. VAT No.: 267852854.