



**Independent Acoustic
Consultancy Practice**

Environmental Noise Assessment

**Apartments above 'Manettes' Retail Units
Merthyr Tydfil**

6348/ENA1

Environmental Noise Assessment

Project:	Apartments above 'Manettes' Retail Units
Site Address:	95-96 High Street Merthyr Tydfil CF47 8UD
HA Reference:	6348/ENA1
Date:	26/11/2021
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1. INTRODUCTION

We understand a residential development consisting of 7no studio apartments is proposed above 'Manettes' Retail Units, 95-96 High Street, Merthyr Tydfil, CF47 8UD.

The Local Planning Authority have requested a noise impact assessment is submitted to accompany the planning application.

This report has therefore been commissioned to assess existing ambient and background noise levels impinging the proposed residential units from both; external noise sources; and, from internal noise intrusion via next door 'Barcode' Bar (i.e. noise transfer from the ground floor bar through the separating wall/floors to apartments).

Survey results have been used for comparison with typical Local Authority Planning conditions and current planning guidance.

1.1 COVID-19

At the time of undertaking the noise survey detailed in this report, restrictions were still in place by Welsh Government to limit the spread of COVID-19 with regards to operation of bars and restaurants.

Our understanding was that the bar at ground floor in the adjacent unit was open to customers over the bank holiday weekend however a reduction on numbers was in place and only low level background music was allowed.

Audio recordings of street noise outside the building during the night-time periods over the bank holiday suggests it was busy with night-life and is therefore assumed typical of normal weekend trading (in terms of $L_{Amax,F}$ events of singing/shouting outside).

Separate breakout tests were conducted during the daytime hours when the bar was closed where the sound system could be run at typical operating levels to allow us to carry out our investigations.

2. CRITERIA

2.1 Planning Policy Wales

The Welsh Government's Planning Policy Wales (Edition 11) dated February 2021, states the following;

"6.7.20 Where sensitive developments need to be located close to existing transportation infrastructure for sustainable movement and access they should be designed, as far as practicable, to limit harmful substances and noise levels within and around those developments both now and in the future. This may include employing the principles of good acoustic design and the inclusion of active travel or travel management measures as part of development proposals. Such development, however, should preferably be located away from existing sources of significant noise, which may include aircraft noise or roads, particularly new roads or those with programmed route improvements."

The document states *"For more information on the principles of good acoustic design, readers are referred to Professional Planning Guidance (ProPG) Supplementary Document 2, produced by the Association of Noise Consultants, the Institute of Acoustics and the Chartered Institute of Environmental Health (<http://www.association-of-noise-consultants.co.uk/propg/>). ProPG has been written principally to assist with the planning process in England, but the design principles put forward in Supplementary Document 2 may also be adopted in Wales.*

On the subject of 'Noise from Existing Development', the document states;

"6.7.5 ...The agent of change principle says that a business or person responsible for introducing a change is responsible for managing that change. In practice, for example, this means a developer would have to ensure that solutions to address air quality or noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable."

"6.7.24 The potential impacts of noise pollution arising from existing development, be this commercial, industrial, transport-related or cultural venues (such as music venues, theatres or arts centres), must be fully considered to ensure the effects on new development can be adequately controlled to safeguard amenity and any necessary measures and controls should be incorporated as part of the proposed new development. This will help to prevent the risk of restrictions or possible closure of existing premises or adverse impacts on transport infrastructure due to noise and other complaints from occupiers of new developments. It will be important that the most appropriate level of information is provided and assessment undertaken.

The Welsh Government adds: *“Under the agent of change principle, if new developments or uses are to be introduced near a pre-existing business, such as a live music venue, it is the responsibility of the developer to ensure solutions to address and mitigate noise are put forward as part of proposals and are capable of being implemented.”*

2.2 ProPG Supplementary Document 2

Professional Practice Guidance on Planning & Noise, New Residential Development 'Supplementary Document 2 – Good Acoustic Design' produced by the ANC, IOA and CIEH discusses the general principles of Good Acoustic Design, including the following hierarchy of noise management measures in descending order of preference;

- i) *Maximising the spatial separation of noise source(s) and receptor(s).*
- ii) *Investigating the necessity and feasibility of reducing existing noise levels and relocating existing noise sources.*
- iii) *Using existing topography and existing structures (that are likely to last the expected life of the noise-sensitive scheme) to screen the proposed development site from significant sources of noise.*
- iv) *Incorporating noise barriers as part of the scheme to screen the proposed development site from significant sources of noise.*
- v) *Using the layout of the scheme to reduce noise propagation across the site.*
- vi) *Using the orientation of the buildings to reduce the noise exposure of noise-sensitive rooms.*
- vii) *Using the building envelope to mitigate noise to acceptable levels.*

“It should be remembered that good acoustic design is a process that begins as soon as land is under consideration for development. The timeline for good acoustic design stretches from the conceptual design stage, through quality control during construction, and beyond to post construction performance testing.

Both internal and external spaces should be considered in the acoustic design process. Care should be taken to ensure that acoustic mitigation measures do not result in an otherwise unsatisfactory development. Good acoustic design must be regarded as an integrated part of the overall design process”.

2.3 Technical Advice Note (Wales) 11

Noise bands defining categories A-D of TAN 11 are set in terms of $L_{Aeq,16hr}$ daytime and $L_{Aeq,8hr}$ night time levels for road traffic noise and mixed sources, free field 1.2-1.5m above ground level as follows;

Table 2.1 – TAN11 Noise Exposure Categories

Recommended noise exposure categories for new dwellings near existing noise sources (ref Table 2 of TAN 11 (Wales) October 1997)					
Noise Source	Time	Noise Exposure Categories			
		A	B	C	D
Road Traffic	07:00-23:00	<55	55-63	63-72	>72
	23:00-07:00	<45	45-57	57-66	>66
Rail Traffic	07:00-23:00	<55	55-66	66-74	>74
	23:00-07:00	<45	45-59	59-66	>66
Air Traffic	07:00-23:00	<57	57-66	66-72	>72
	23:00-07:00	<48	48-57	57-66	>66
Mixed Sources ⁽⁴⁾	07:00-23:00	<55	55-63	63-72	>72
	23:00-07:00	<45	45-57	57-66	>66

Note: In addition, sites where individual noise events regularly exceed 82dB(A) $L_{max}(slow)$, several times in any night time hour should be treated as being in NEC C, unless the $L_{eq}(8 \text{ hour})$ already puts the site in NEC D.

(4) Mixed sources: this refers to any combination of road, rail, air and industrial noise sources. The "mixed source" values are based on the lowest numerical values of the single source limits in the table. The "mixed source" NECs should only be used where no individual noise source is dominant.

With regards to noise from the ground floor bar, paragraph B18 of TAN11 states;

"Commercial developments such as fast food restaurants, discos, night clubs and public houses pose particular difficulties, not least because associated activities are often at their peak in the evening and late at night. Local planning authorities will wish to bear in mind not only the noise that is generated within the premises but also the attendant problems of noise that may be made by customers in the vicinity. Disturbance that can be caused by traffic and associated car parking should not be underestimated."

2.4 British Standard 8233:2014

British Standard 8233:2014 'Guidance on sound insulation and noise reduction for buildings' includes internal noise criteria of habitable rooms in residential dwellings, as shown below;

Table 2.2 – BS 8233:2014 Internal Ambient Noise Criteria for Habitable Rooms

Location	Desired		Reasonable *	
	07:00 to 23:00	23:00 to 07:00	07:00 to 23:00	23:00 to 07:00
Living room	35 dB $L_{Aeq,16hr}$	-	40 dB $L_{Aeq,16hr}$	-
Dining room/area	40 dB $L_{Aeq,16hr}$	-	45 dB $L_{Aeq,16hr}$	-
Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$	40 dB $L_{Aeq,16hr}$	35 dB $L_{Aeq,8hr}$

* NOTE 7 states “Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved.

In addition BS 8233:2014 states: “Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values.”

Reference is therefore made to World Health Organisation (WHO) ‘Guidelines for Community Noise, 1999’ which states “For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times per night (Vallet & Vernet 1991)”.

The above criteria in BS 8233:2014 apply for sources without specific character, previously termed “anonymous noise”. BS 8233:2014 7.7.1 advises:

“NOTE: Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate.”

2.5 British Standard 4142:2014

British Standard 4142:2014 “Methods for rating and assessing industrial and commercial sound”, provides current guidance for the assessment of industrial noise affecting residential receivers.

This standard describes a rating method comparing L_{Aeq} noise levels from the industrial source with pre-existing background L_{A90} levels at the residential receiver. It advises at a difference (industrial noise - background) of:

- +10dB or higher, likely to be an indication of a significant adverse impact, depending on the context.
- A difference of + 5dB, likely to be an indication of an adverse impact, depending on the context.
- 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.

A sliding scale of penalties can be applied to industrial/commercial sound levels which have acoustically distinguishing characteristics, including tonality, impulsivity and intermittency.

Tonality – A penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible.

Impulsivity – A penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it clearly perceptible, and 9dB 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 3dB can be applied

Intermittency – If intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.

BS 4142:2014 states under section 11;

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

- 1) *The absolute level of sound. 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 background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse."

2.6 Building Regulations ADE2003

Building Regulations ADE2003 separating floor sound insulation performance requirements for "Dwelling-houses and flats formed by material change of use" are quoted below. This criteria applies to separating floors between commercial and residential apartments/holiday lets above.

Table 2.3 - Building Regulations Part E Performance Requirements

Separating Construction	Airborne Sound Insulation Minimum Performance Requirement $D_{nT,w} + C_{tr}$ (dB)
Floor	43

The above quoted minimum airborne sound insulation performance values must be met to satisfy the requirements of ADE2003.

However, Building Regulations ADE2003 also states;

"The performance standards set out in [Table 2.3 above] are appropriate for walls, floors and stairs that separate spaces used for normal domestic purposes. A higher standard of sound insulation may be required between spaces used for normal domestic purposes and communal or non-domestic purposes. In these situations the appropriate level of sound insulation will depend on the noise generated in the

communal or non-domestic space. Specialist advice may be needed to establish if a higher standard of sound insulation is required and, if so, to determine the appropriate level."

We understand the units at ground floor level are likely to be used for retail/restaurant which may contain low level amplified music. A sound insulation performance standard of 50dB $D_{nT,w}+C_{tr}$ is therefore proposed to provide a good level of protection to flats above.

2.7 Music Break-In

The Noise Council's 'Code of Practice on Environmental Noise Control at Concerts' and the draft 'Code of Practice on Control of Noise from Pubs & Clubs' Nov '99 gives guidance and noise criteria for live music

However, this applies to music events and venues being established near to existing residential receivers, and is not considered appropriate for assessing new residential development near to existing well-established venues, in line with the Agent of Change principle.

The following music criteria are proposed to demonstrate good internal acoustic conditions:

2.7.1 Subjective-Objective Method

An objective limit has been calculated based on an EHO's subjective assessment of what would constitute a statutory noise nuisance at a similar site in Cardiff.

The limit equated to around an overall 25dB L_{Aeq} inside a bedroom (with the window partially open).

The 25dB L_{Aeq} internal limit is 5dB lower (tighter) than the 30dB $L_{Aeq,T}$ sleep disturbance guidance figure quoted by the World Health Organisation.

2.8 Council Pre-Application Response

Judith Jones of Merthyr Tydfil County Borough Council made the following comments in regards to noise;

“The property is located within an area that has a varied character and it is not considered that the change of use of the first and second floors to residential would be unduly harmful in this context. Notwithstanding this, the building is located in close proximity to a number of noisy uses which have the potential to cause noise disturbance to the future occupiers of the flats. As such, acoustic insulation may be required. It is also reiterated that the exact uses proposed for the ground floor of the application building is unknown. Due consideration will need to be given to the impact of the uses intended for the ground floor on future occupiers of the flats and those that may live within the vicinity of the building. “

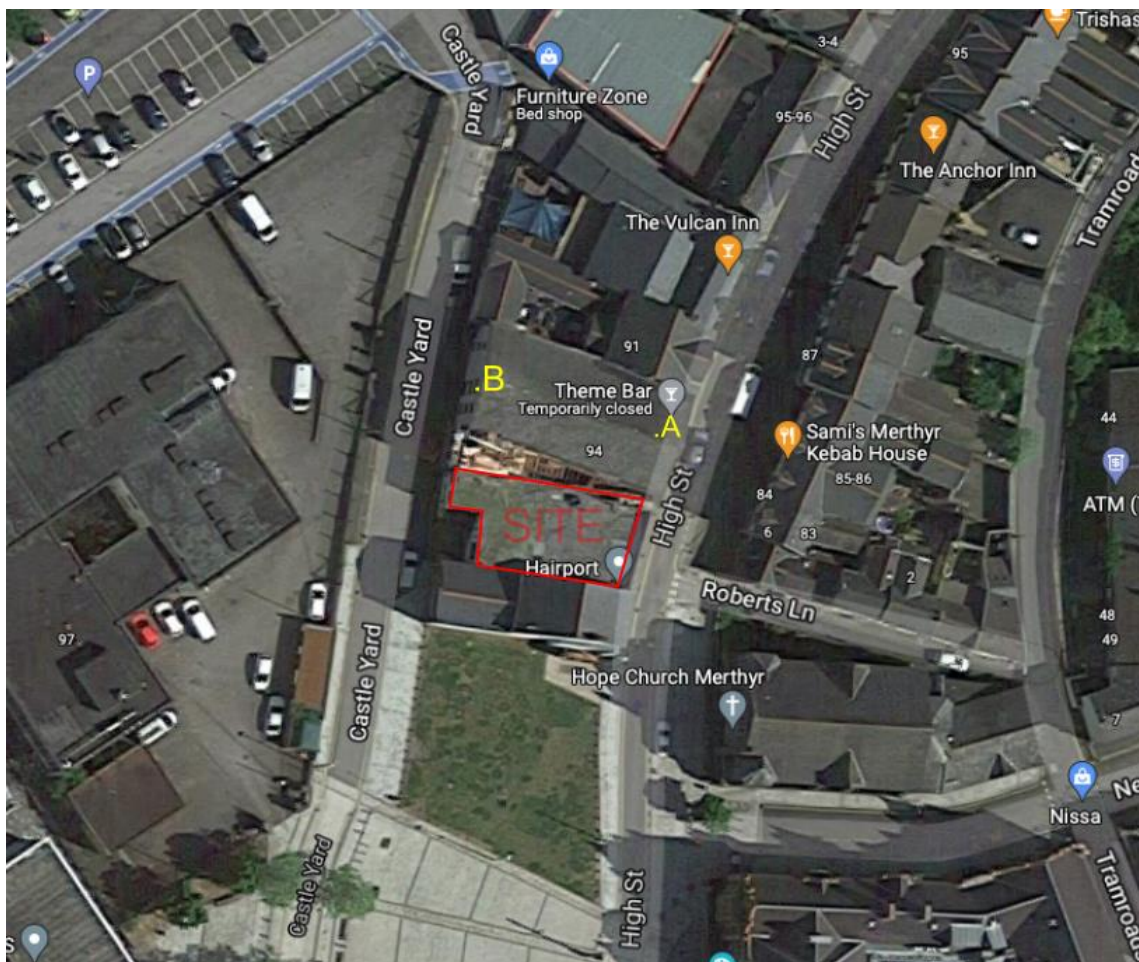
3. ENVIRONMENTAL NOISE SURVEY

3.1 Procedures

Continuous noise monitoring was carried out from 1100hrs on Friday, 28 May 2021 to 0040hrs on Tuesday, 01 June 2021 at positions A and B. (Note: this was a bank holiday weekend). This was carried out at the building immediately adjacent to the site and is considered representative of levels at the site.

Data including L_{Amax} , L_{Aeq} and background L_{A90} was logged at 1 minute intervals over the monitoring period, along with continuous audio and 100ms data to allow source identification and further detailed analysis of results if required.

Figure 3.1 – Site Plan Showing Monitoring Locations



Site plan in Figure 3.1 above shows the development site and continuous monitoring positions used, namely:

Table 3.1 – Continuous Monitoring Location Details

Position	Description
A	Outside 2 nd floor front façade window overlooking the High Street. Position approx. 7.5m above local ground height
B	Outside 1 st floor rear façade window overlooking Castle Yard. Position approx. 4.5m above local ground height

Note: Both monitoring positions were in proximity of the building façade. Therefore, a -3dB correction has been applied to the results in order to achieve 'free-field' noise levels, for comparison with planning guidance criteria.

3.2 Meteorological Conditions

Approximate weather conditions are shown in time history graph Figure B.1 of Appendix B.

To summarise, the weather conditions during the monitoring period were dry with an occasional breeze.

3.3 Measurement Equipment

The following measurement equipment was used during the surveys:

Table 3.2 – Noise Monitoring Equipment List

Make	Description	Model	Serial Number	Last Calibrated	Certificate No.
Norsonic AS	Calibrator (114.08dB @ 1kHz)	1251	31429	09 March 2021	UCRT21/1323
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-08723-E0	30 October 2019	FL-19-235
	Preamplifier	MA220	1820	30 October 2019	FL-19-235
	Microphone	Capsule	9381	30 October 2019	FL-19-235
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-10021-E0	20 August 2019	TCRT19/1651
	Preamplifier	MA220	5435	20 August 2019	TCRT19/1651
	Microphone	Capsule	8547	20 August 2019	TCRT19/1651

Measurement systems were calibrated before and after the surveys and no variation occurred.

Note: Copies of traceable calibration certificates for all equipment are available upon request.

3.4 Results

Time history graphs in Figure B.2 & Figure B.3 of Appendix B show L_{Amax} , L_{Aeq} and L_{A90} sound pressure levels measured at positions A and B. All measurement results are free-field sound pressure levels (a -3dB correction has been applied – see section 3.1).

The following $L_{Aeq,16hr}$ daytime (0700-2300hrs) and $L_{Aeq,8hr}$ night-time (2300-0700hrs) noise levels were measured;

Table 3.3 – Summary of Daytime $L_{Aeq,16hr}$ and Night-time $L_{Aeq,8hr}$ Results

Date / Time	Period	Position	
		A	B
Friday 11:00 28/05/2021 - Saturday 07:00 29/05/2021	Daytime $L_{Aeq,12hr}$ (dB)	63.0	59.7
	Night-time $L_{Aeq,8hr}$ (dB)	60.5	55.4
Saturday 07:00 29/05/2021 - Sunday 07:00 30/05/2021	Daytime $L_{Aeq,16hr}$ (dB)	61.0	52.6
	Night-time $L_{Aeq,8hr}$ (dB)	57.9	52.8
Sunday 07:00 30/05/2021 - Monday 07:00 31/05/2021 (05:05 @ Pos B)	Daytime $L_{Aeq,16hr}$ (dB)	61.9	51.7*
	Night-time $L_{Aeq,8hr}$ (dB)	68.5	53.7*
Monday 07:00 31/05/2021 - Tuesday 00:40 01/06/2021	Daytime $L_{Aeq,16hr}$ (dB)	58.2	N/A*
	Night-time $L_{Aeq,1.5hr}$ (dB)	56.3	N/A*

**Note: Pos B sound level meter lost power at 0505hrs on Monday 31/05/2021.*

There were a total 5no $L_{Amax,F}$ events over 82dB measured during the three night-time periods (2300-0700hrs) at Position B.

At Position A, night-time $L_{Amax, Fast}$ and $L_{Amax, Slow}$ events ≥ 82 dB, measured over the monitoring period (bank holiday weekend), are detailed as follows;

Table 3.4 – Position A 1-minute L_{Amax} Analysis

Period	Sound Level Meter Weighting	Total No of Night-time L_{Amax} Events > 82 dB =	Highest Measured L_{Amax} Level (dB) =
Friday Night	Fast	17	113
	Slow	5	105.4
Saturday Night	Fast	11	95
	Slow	0	90.8
Sunday Night	Fast	60	99.3
	Slow	29	95.2
Monday Night	Fast	1	99.4
	Slow	1	92.9

L_{Amax} events are indicated to be controlled by singing and shouting from pub-goers on High Street. The most frequent events occur between 2200-0000hrs, when people are vacating premises.

$L_{Amax, F}$ events at 80-110dB occurring regularly during the night-time period is considered significant.

Graphs in Appendix B show statistical analysis of background sound levels measured at positions A & B.

The following minimum consistent daytime and night-time background L_{A90} sound levels have been determined;

Table 3.5 – Minimum Consistent Daytime and Night-time Background L_{A90} Results

Period	Position	
	A	B
Daytime (0700-2300hrs) L_{A90} (dB)	44	49
Night-time (2300-0700hrs) L_{A90} (dB)	33	48

The ambient and background sound climate at Positions A & B was controlled by;

- Position A – Pub-goers / pedestrians on High Street, Road traffic on High Street.
- Position B – existing plant operating in the Castle Yard vicinity.

4. NOISE BREAKOUT TEST FROM ADJACENT BARCODE BAR

A noise breakout assessment was carried out on Friday 28th May 2021 to assess the noise break-out from the ground floor Barcode Bar to outside.

This was carried out when the bar was closed to the public to allow higher levels of noise to be generated during the test.

4.1 Personnel & Equipment

Personnel present: Rhodri Owen of Hunter Acoustics
Meirion Townsend of Hunter Acoustics

Test date: 28 May 2021

The following test equipment was used during our sound insulation tests;

Table 4.1 – Equipment List

Make	Description	Model	Serial Number	Last Calibrated	Certificate No.
Norsonic AS	Type 1 - Integrating - averaging Sound Level Meter	140	1403003	04 October 2019	U33025
	Preamplifier	1209	12403	04 October 2019	Included
	Microphone	1225	91797	04 October 2019	33024
Norsonic AS	Calibrator (114.08dB @ 1kHz)	1251	31429	09 March 2021	UCRT20/1323
Sennheiser	Bodypack Transmitter 606-648 MHz	SK100	1427385553	-	-
Sennheiser	Bodypack Receiver 606-648 MHz	EK100	1427312753	-	-
RCF	Amplifier & Loudspeaker	ART310A			
	Loudspeaker Tripod				
Electro-Voice	Active subwoofer	ELX200	-	-	-

Equipment calibration certificates are available upon request.

In addition to pink noise breakout tests carried out through our equipment, music was also played through the in-house system which consisted of a large sub-woofer in the dance floor area and one near the entrance doors on High Street, along with a number of smaller speakers hung at high level spaced around the entire ground floor bar.

4.2 Procedure

Broadband pink noise was generated in the front, rear and middle sections of the bar using a pink noise generator and a high performance amplifier/loudspeaker system with active sub-woofer.

Measurements were undertaken at 5m from the facades on both High Street out the front, and Castle Yard to the rear.

This part of the assessment was carried out in order to measure typical music noise levels in the bar during normal trading (pre-pandemic) and quiet (current COVID-19 regulations) periods.

4.3 Results

4.3.1 Airborne Sound Insulation Tests to Outside (Music Noise)

Graphs in Figure B.6 and Figure B.7 in Appendix B shows results of music noise breakout tests through the front and rear facades respectively to 5m distances.

Results are summarised below;

Table 4.2 – Music Noise Level (Set at Pre-pandemic Levels) to Above

	Location	Music Noise Level (MNL) L_{Aeq}
Source	Average in ground floor front bar area	86
Receiver 1	5m from Front Façade	59
Source	Average in ground floor rear bar area	86
Receiver 2	5m from Rear Façade	54

5. EXTERNAL BUILDING FABRIC ASSESSMENT

Note: The following assessment is based on the assumption that the music noise levels in the adjacent Bar Code bar are to be limited to background music levels going forward (levels discussed in Table 5.1 of our report 6084/ENA1_Rev1 dated 03/08/2021 for the proposed flats above Bar Code – repeated below).

Table 5.1 - Proposed Limits inside Bar

$L_{Aeq,5mins}$ (dB)	L_{eq} at Octave Band Centre Frequencies, Hz (dB)						
	63	125	250	500	1000	2000	4000
75	60	67	68	71	72	68	62

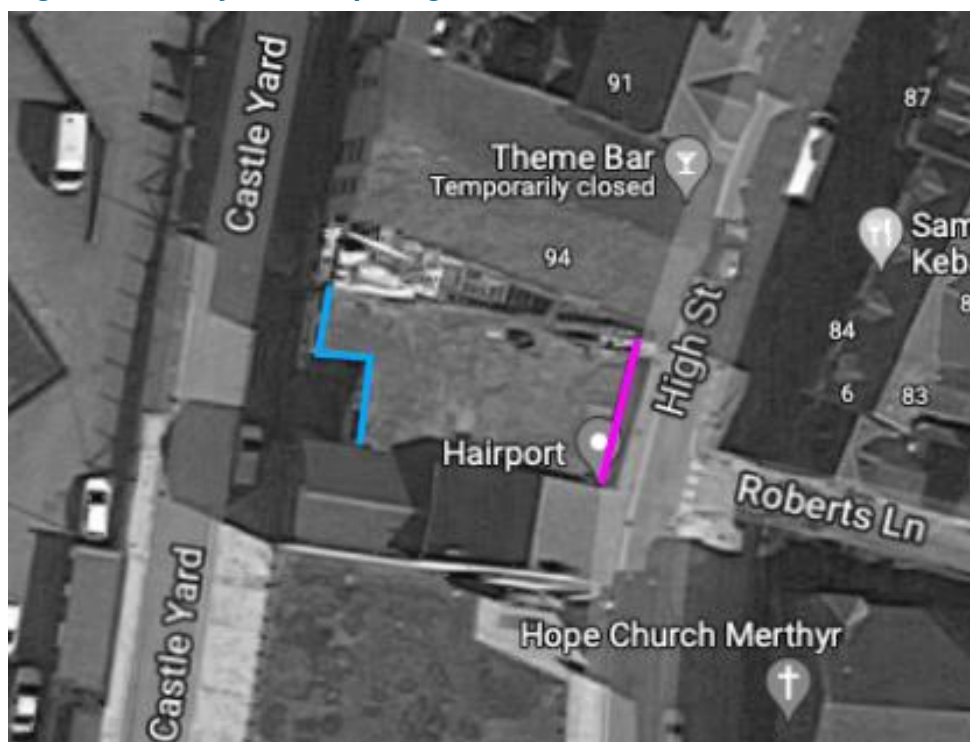
Residential studio flats are proposed at first & second floor levels. External building fabric shall control noise intrusion to habitable rooms to meet:

- 35dB $L_{Aeq,16hr}$ daytime
- 30dB $L_{Aeq,8hr}$ night-time / (25dB from 'Barcode' music noise intrusion)
- 45dB $L_{Amax,F}$ in bedrooms during the night

These are in line with the desirable internal ambient noise values quoted in BS 8233:2014 (see section 2.4 of this report).

Critical façades are shown on site plan in Figure 5.1 below, marked up with **MAGENTA** and **BLUE** lines.

Figure 5.1 – Façades Requiring Additional Sound Insulation Measures



Note: Habitable rooms include bedrooms, lounges, dining rooms and kitchen/diners but not kitchens or bathrooms.

All habitable rooms (at all floor levels) on façades highlighted above require up-rated acoustic glazing, roof and ventilation as specified below.

Survey results indicate $L_{Amax,F}$ events impinging the front façade of the building are the most critical aspect of controlling noise intrusion to meet 'desirable' internal conditions.

The minimum specifications outlined in this report, outlined for the walls, roof, glazing and ventilation, are shown to control $L_{Amax,F}$ events internally to not exceed 45dB more than 10-15 times during a worst-case bank-holiday night-time period.

5.1 External Walls

The following external wall constructions have been used in our analysis;

- Brick / 50mm cavity / Brick

The following SRI performance figures are taken from BS 8233:2014 for 'Brick and block external wall'.

A lightweight cladding on SFS system is proposed on the upper floor extension. Data from Knauf for a rain screen cladding with SFS, 200mm mineral wool insulation and 2no layers of 12.5mm fire rated plasterboard have been used.

The proposed constructions should be capable of achieving these figures as a minimum;

Table 5.1 – External Wall Sound Reduction Index Figures

Element	Description	Sound Reduction Index, R (SRI: BS EN ISO 140) at Octave Band Centre Frequency (Hz)				
		125	250	500	1k	2k
External Wall	Brick/Block Cavity Wall	40	44	45	51	56
External Wall (New Upper Floors)	Light-weight cladding on channel section, weatherboard, SFS with 200mm mineral wool, 2no layers of 12.5mm fire rated plasterboard	32	39	44	49	49

The successful tenderer must provide independent laboratory test data showing their wall systems meet the above performance requirements.

5.2 Roof

The following roof constructions have been used in our analysis;

- Insulated panel on timber trusses, with 2x 12.5mm plasterboard ceiling to below, 100mm mineral wool in cavity.

The following minimum SRI performance figures are indicated;

Table 5.2 – Roof Sound Reduction Index Figures

Element	Description	Sound Reduction Index, <i>R</i> (SRI: BS EN ISO 140) at Octave Band Centre Frequency (Hz)				
		125	250	500	1k	2k
Flat Roof	As detailed in bullet point above	18	30	39	43	42

The successful tenderer must provide independent laboratory test data showing their roof system meets the above performance requirements.

5.3 Glazing

The housing layout plan in Figure 5.1 shows façades where windows require up-rating. The following sound reduction index figures shall be met for glazing on these critical façades:

Table 5.3 - Glazing Sound Reduction Index Figures

Element	Description	Sound Reduction Index, <i>R</i> (SRI: BS EN ISO 140) at Octave Band Centre Frequency (Hz)				
		125	250	500	1k	2k
Front Façade Windows highlighted MAGENTA	For budgetary guidance: based on Selectaglaze 6mm / 150mm / 10mm Secondary (S40 SHC)	33	42	45	50	50
Rear Façade Windows highlighted BLUE	For budgetary guidance: based on Pilkington 10mm / 6 – 16mm / 6mm	24	24	32	37	37

A typical glazing system that should be capable of achieving the quoted SRI figures (based on Selectaglaze and Pilkington test data) is included in the table for initial budgetary guidance, however;

The successful glazing suppliers shall provide independent laboratory test data confirming their proposed systems (including frames/seals) meet the quoted octave band sound reduction performance figures above.

5.4 Ventilation

All habitable rooms on critical façades highlighted **MAGENTA** require a ventilation strategy that does not rely on opening windows or trickle ventilators in the façade to achieve 'whole building' and 'extract' ventilation rates as required by Building Regulations Part F;

System 4: *Continuous mechanical supply and extract with heat recovery. Guidance on minimum provisions for extract and whole building ventilation is set out in Table 1.2d of Building Regulations Part F..*

For façades at the rear of the building highlighted **BLUE**, if music source levels in the ground floor bar remain at 86dB L_{Aeq} or lower and the rear of the bar is not used as a smoking area, then it is possible to use acoustic trickle ventilators as part of a System 3 (MEV) as per specifications below;

Table 5.4 – Acoustic Trickle Ventilator Specifications

Element	Description	$D_{n,e}$ at Octave Band Centre Frequency (Hz)				
		125	250	500	1k	2k
Rear Façade Ventilators highlighted BLUE	For budgetary guidance: based on Greenwood EAR 42W	41	42	37	44	46

The calculation has allowed for a maximum of 2no acoustic trickle ventilators per room.

For budgetary guidance the above ventilator figures are based on Greenwood EAR 42W ventilators. The successful tenderer shall provide independent laboratory test data showing their vent meets the above performance requirements.

All ventilation systems shall meet the requirements of the Domestic Ventilation Compliance Guide 2010.

The final proposed ventilation strategy should be confirmed acceptable with planners/ EHO and Building Control.

5.5 Overheating

Our assessment recommends acoustic glazing and mechanical ventilation on critical facades, to control noise intrusion. This is based on windows normally being closed (excluding purge ventilation).

If there is a risk of overheating on any of the facades, requiring windows to be opened more frequently, a more detailed assessment would be required – please advise.

6. FIRST FLOOR SEPARATING FLOOR SOUND INSULATION

Following an initial site inspection, the current existing separating floor between ground floor retail units and flats above is not entirely intact; and, has a typical internal timber joist floor construction (existing floorboards on timber joist with lath & plaster ceiling below).

The separating floor therefore requires significant upgrades to meet party floor sound insulation performance standards.

6.1 1st Floor Separating Floor Upgrade

In order to improve the sound insulation performance of the separating floor between ground floor retail and residential above, the following ceiling upgrade options are deemed necessary.

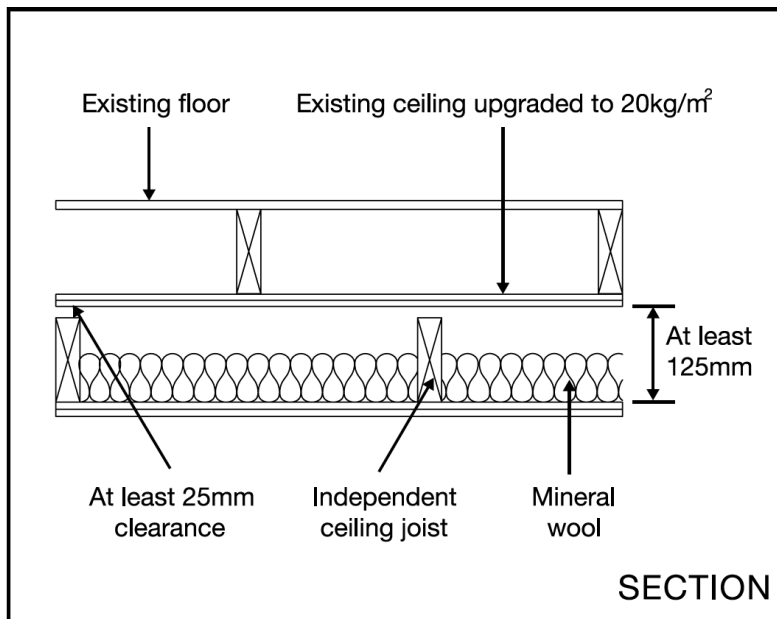
The following constructions include the existing timber joists with either a resilient bar ceiling or independent ceiling below;

6.1.1 Option 1 – Independent Ceiling

The following is taken from Building Regulations ADE2003.

Include two layers of 15mm acoustic or fire rated plasterboard (minimum combined mass per unit area 20kg/m²) ceiling on independent joists with minimum 100mm mineral wool insulation (min. density 10kg/m³).

Ensure a minimum void of 125mm between existing ceiling and top of new independent ceiling boards.

Figure 6.1 – Independent Ceiling Construction

Independent ceiling to be supported in one of two ways;

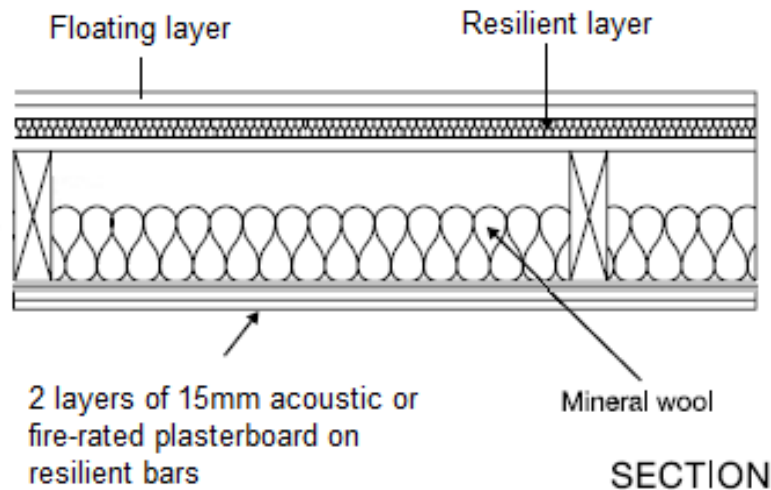
- Independent joists fixed only to surrounding walls with a minimum clearance of 25mm between top of independent ceiling joists and underside of existing floor construction; or
- Independent joists fixed to the surrounding walls with additional support provided by resilient hangers attached directly to the existing floor base (British Gypsum Gypframe Acoustic Hangers or similar).

Separating walls must break the independent ceiling joists and be built continuously up to the underside of the existing joists.

6.1.2 Option 2 - Resilient Bar Ceiling with Floating Floor

If there is insufficient head room to include an independent ceiling a resilient bar ceiling, with floating floor section would be required.

Figure 6.2 – Timber Floating Floor with Resilient Bar Ceiling



Floating Floor:

Floating floor to be installed, loose-laid above the existing floorboards. **Do not screw through the floating floor.**

A wide range of proprietary resilient overlay platform floor systems are available which would be suitable for this application. A list of possible suppliers and products are given below:

- | | | |
|-------------------------|----------------------------|-------------------|
| ○ Collecta | (Deckfon 26T or 30T) | Tel: 01634 296677 |
| ○ CMS Danskin | (SoundDeck Extra) | Tel: 02380 625568 |
| ○ JCW Acoustic Supplies | (Acoustic Deck 28 or 32) | Tel: 01204 548400 |
| ○ Hush Acoustics | (Panel 28 or 33) | Tel: 0151 9332026 |
| ○ Icopal | (Monarfloor Deck 18 or 22) | Tel: 0161 8654444 |

The above resilient overlay platform floors should be installed in accordance with the suppliers' instructions, including resilient edge strips provided which isolate the board from the perimeter walls and skirting boards.

These may still require a layer of 19mm plasterboard plank in conjunction with the proprietary product to achieve the required mass – please check.

Alternatively, a floating floor can be constructed comprising 2no layers of board with a total mass per unit area of 25kg/m^2 , each layer with a minimum of 8mm thickness, loose laid on a resilient layer of mineral wool (min 25mm thick, density of $60\text{-}100\text{kg/m}^3$).

The floating floor mass per unit area can usually be achieved with a layer of 22mm T&G floor board and 19mm plasterboard plank. The layers should be fixed together (e.g. spot bonded or glued/screwed) with joints staggered. Resilient layer mineral wool may be paper faced on the underside.

Ensure the resilient layer can carry the anticipated load and carry it up at all room edges to isolate the floating layer from the wall surface as shown in Figure 6.6.

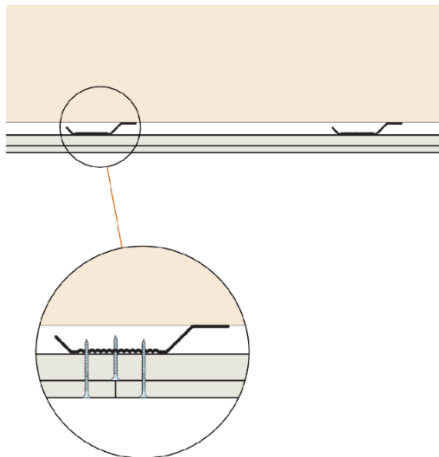
Resilient Bar Ceiling

2no layers of 15mm plasterboard (min. combined mass per unit area 22kg/m^2) on 16mm resilient bars at 400mm centres (min).

Ensure resilient bars are fixed at right angles. Bars must achieve a minimum laboratory performance of $\text{rd}\Delta R_w + C_{tr} = 17\text{dB}$ and $\text{rd}\Delta L_w = 16\text{dB}$.

Ceiling board fixings must not bridge resilient bars (i.e. do not screw through resilient bar into the joist). Refer to detail below;

Figure 6.3 – Resilient Bar Detail



Ensure the correct length screws are used. For two layers of 15mm plasterboard, 25mm screws should be used for the first layer and 42mm screws for the second layer.

Care should be taken to ensure screws do not bridge through the resilient bar and into the timber joists. As a precaution, a robust approach would be to avoid fixing boards to resilient bars on the joist zone.

The maximum load on resilient bars should not exceed that specified in the manufacturer's instructions.

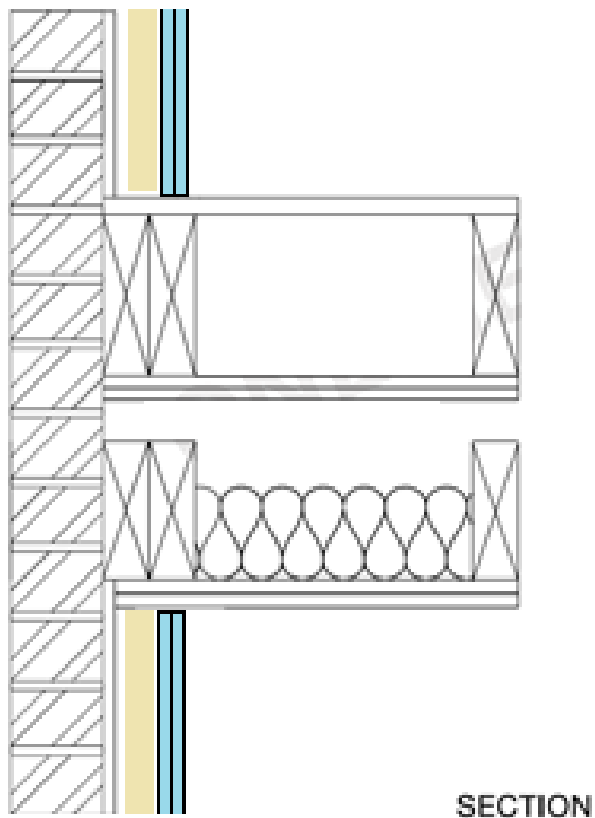
6.1.3 Junction Details

In order to minimise flanking via the external walls, we would advise including an independent timber or metal frame lining system consisting of 2no layers of 15mm acoustic plasterboard (min. 12kg/m² per layer) with 50mm mineral wool (10-33kg/m³) both sides of the separating floor.

This also has the added benefit of improving the separating wall performance between Manettes and the adjacent Bar Code.

- **Separating Floor / External Wall Junction (Option 1 Ceiling)**

Figure 6.4 – Separating Floor / External Wall Junction (Ceiling 1)

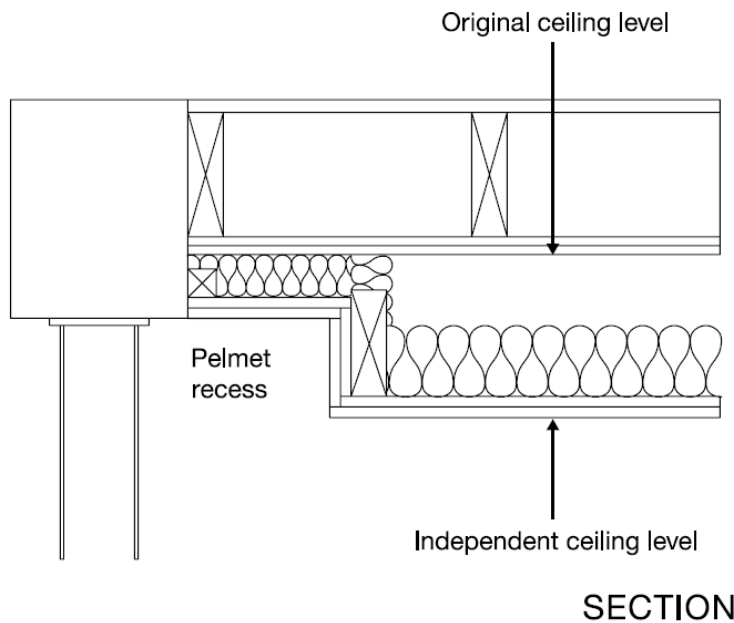


The separating floor (including independent ceiling) must break linings installed on the existing external/party walls.

- **Separating Floor / Pelmet Recess (Option 1 Ceiling)**

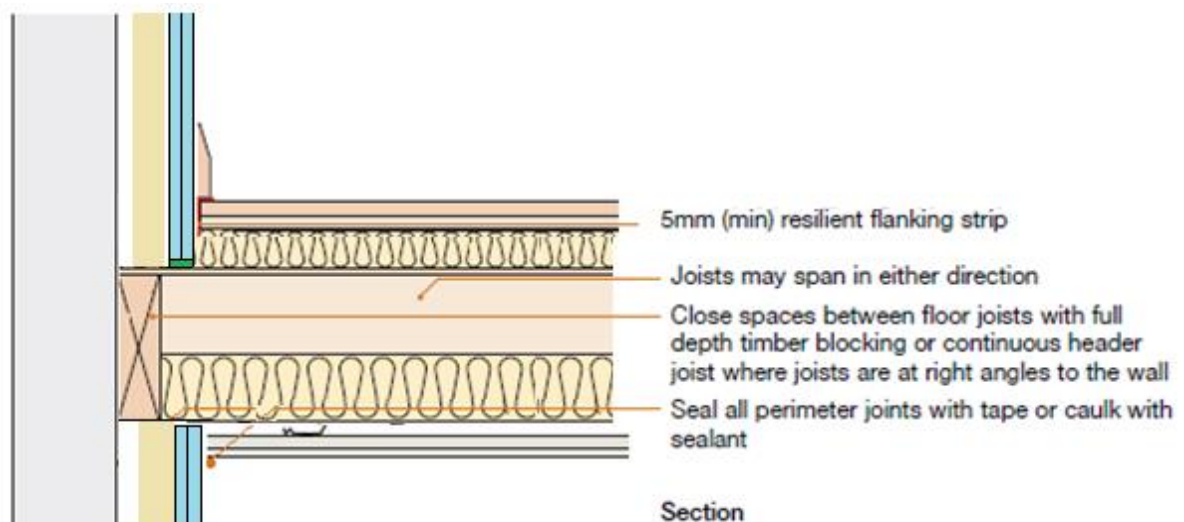
ADE2003 provides the following detail regarding the ceiling pelmet recess;

Figure 6.5 – Ceiling Pelmet Recess Detail



- **Separating Floor / External Wall Junction (Option 2 Ceiling)**

Figure 6.6 – Separating Floor / External Wall Junction (Ceiling 2)



Include resilient edge strips to isolate floating floor from perimeter wall linings and skirting.

- ***Penetration Details***

Pipes (excluding flues) through the separating floor should be boxed in with 2no layers of gypsum-based board, each layer nominal 8kg/m^2 and lagged with 25mm (min) mineral wool quilt (min 10kg/m^3) both sides of the separating floor.

Lights should be surface mounted.

7. CONCLUSION

An environmental noise assessment and noise breakout assessment has been carried out for the proposed Apartments above 'Manettes' Retail Units, 95-96 High Street, Merthyr Tydfil, CF47 8UD.

Significant night-time $L_{Amax,F}$ events from people shouting/singing out on the street have been measured.

An external building fabric assessment has been carried out. Critical facades requiring additional sound insulation measures have been highlighted and specifications for external wall, roof, ventilation and glazing are included.

Noise intrusion from night-life on the street outside is indicated to be significant and high performance secondary glazing and mechanical ventilation is required to control night-time $L_{Amax,F}$ events.

The internal sound insulation performance of the existing party floor (between ground floor retail units and flats above) requires significant upgrades in order to meet proposed level of 50dB $D_{nT,w}+C_{tr}$ (higher than Building Regulations minimum requirements).

This assessment assumes that music noise levels in the adjacent Bar Code bar are to be limited to background music levels going forward (levels discussed in Table 5.1 of our report 6084/ENA1_Rev1 dated 03/08/2021 for the proposed flats above Bar Code).

Specifications for upgraded floor and ceiling options are discussed.

APPENDIX A - ACOUSTIC TERMINOLOGY

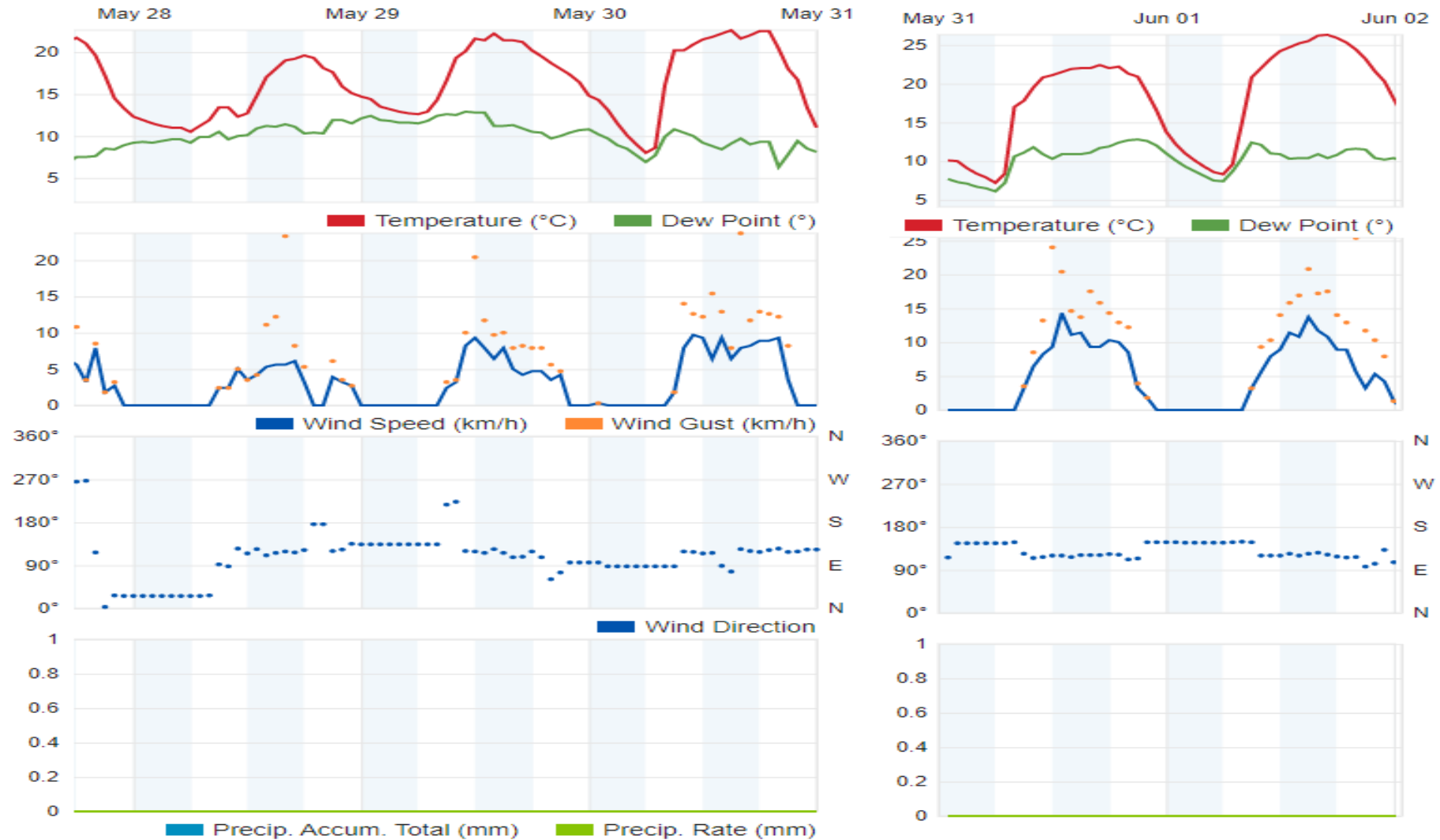
Human response to noise depends on a number of factors including loudness, frequency content and variations in level with time. Various frequency weightings and statistical indices have been developed in order to objectively quantify 'annoyance'.

The following units have been used in this report:

dB(A)	The sound pressure level A-weighted to correspond with the frequency response of the human ear and therefore a persons' subjective response to frequency content.
L_{eq}	The equivalent continuous sound level is a notional steady state level which over a quoted time period would have the same acoustic energy content as the actual fluctuating noise measured over that period.
L_{max}	The highest instantaneous sound level recorded during the measurement period.
L_{10}	The sound level which is exceeded for 10% of the measurement period. i.e. The level exceeded for 6 minutes of a 1 hour measurement - used as a measure of background noise.
L_{90}	The sound level which is exceeded for 90% of the measurement period. i.e. The level exceeded for 54 minutes of a 1 hour measurement - used as a measure of background noise.
MNL	'Music Noise Level', the L_{Aeq} of the music measured at a particular location.
Pink Noise	A random signal of every frequency in which each higher octave drops off 3 dB. The lower octaves have more power, and the higher octaves have less power. Pink noise is used to test loudspeakers and "tune" a room for optimum audio reproduction or masking systems.
SSR	Sound sensitive receiver

APPENDIX B - DIAGRAMS, GRAPHS AND TABLES

Figure B.1 – Approximate Weather History for Friday, 28 May - Tuesday, 01 June 2021



Note: Taken from www.wunderground.com - weather station IABERD38 located in Aberdare [Elev 49 m, 51.706° N, 3.424° W]

Figure B.2 – Time History at Position A (Friday, 28 May 2021 to Tuesday, 01 June 2021)

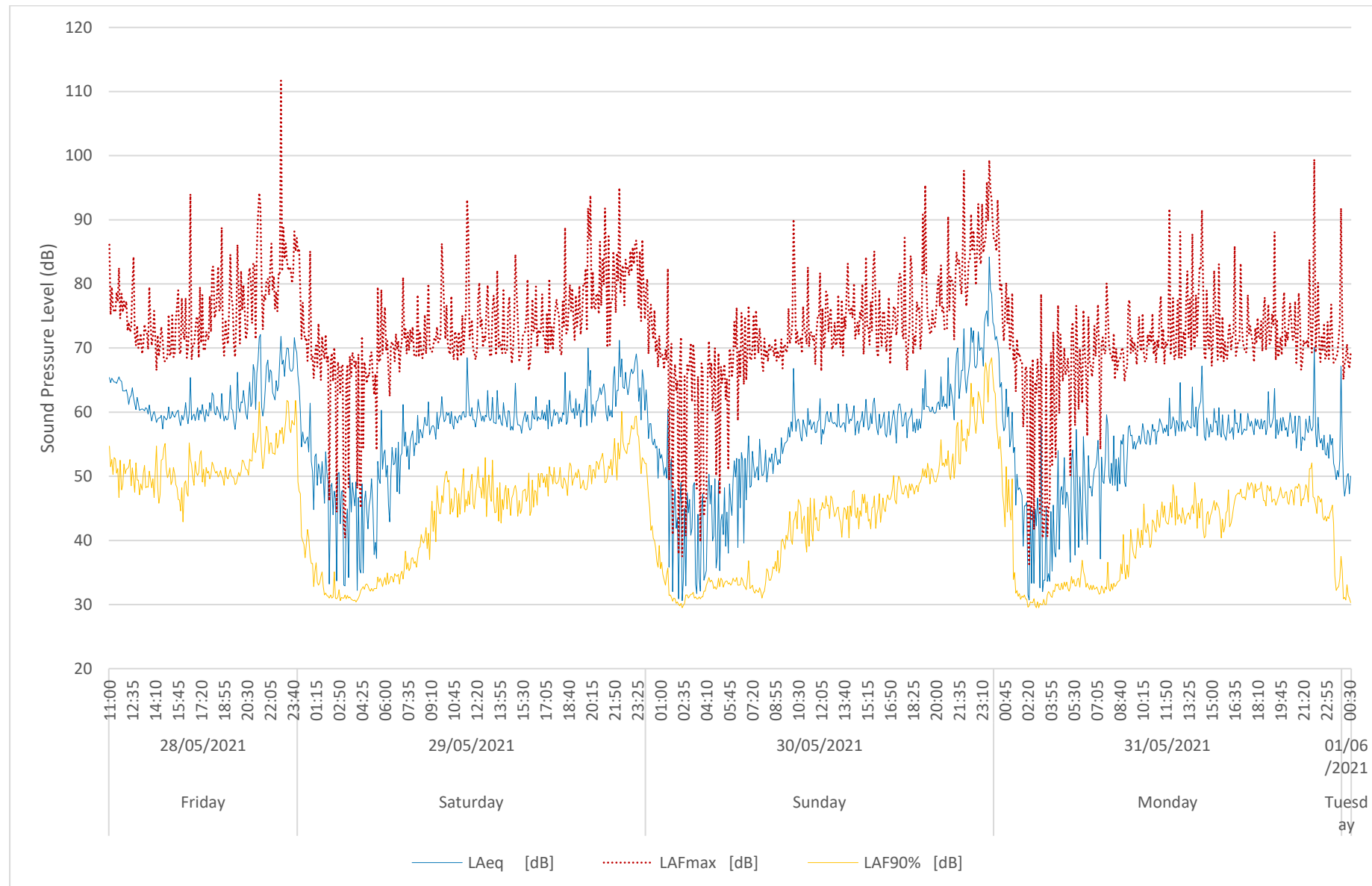


Figure B.3 – Time History at Position B (Friday, 28 May 2021 to Monday, 31 May 2021)

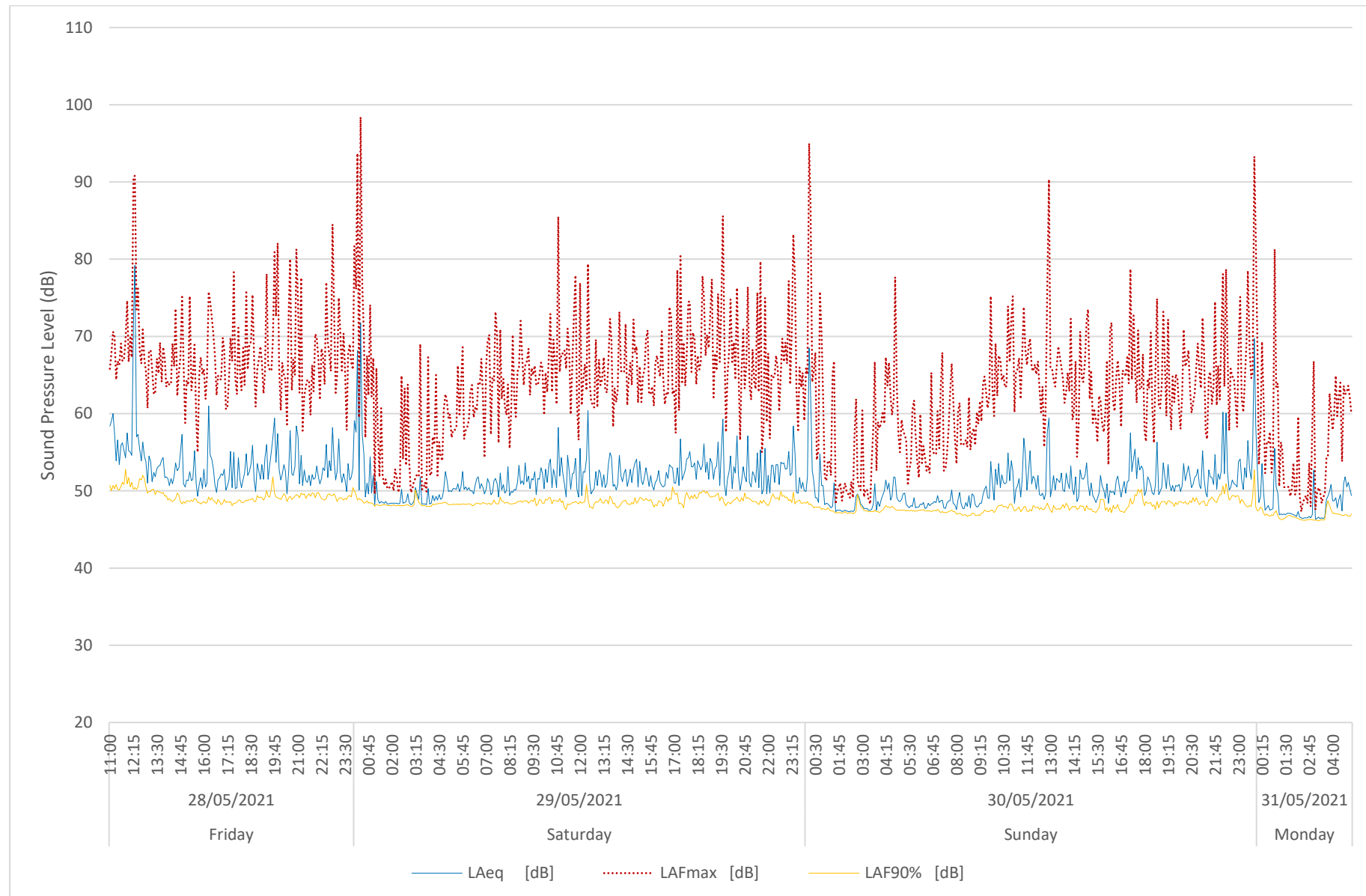


Figure B.4 – Statistical Analysis of Background Sound Levels Measured at Position A (Friday, 28 May - Monday, 31 May 2021)

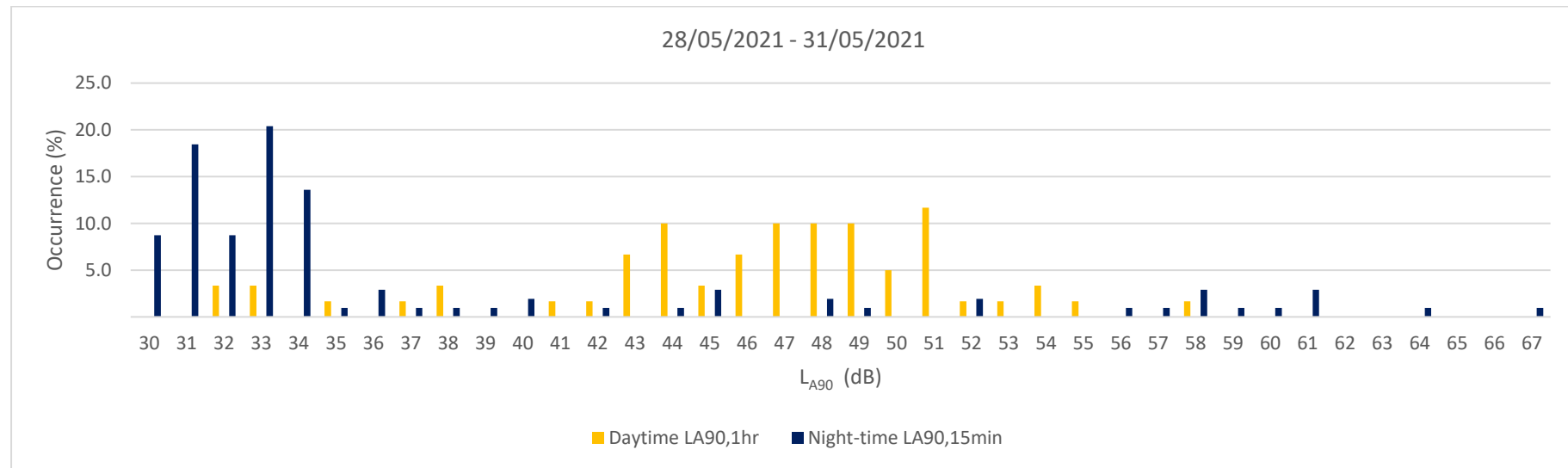


Figure B.5 – Statistical Analysis of Background Sound Levels Measured at Position B (Friday, 28 May - Sunday, 30 May 2021)

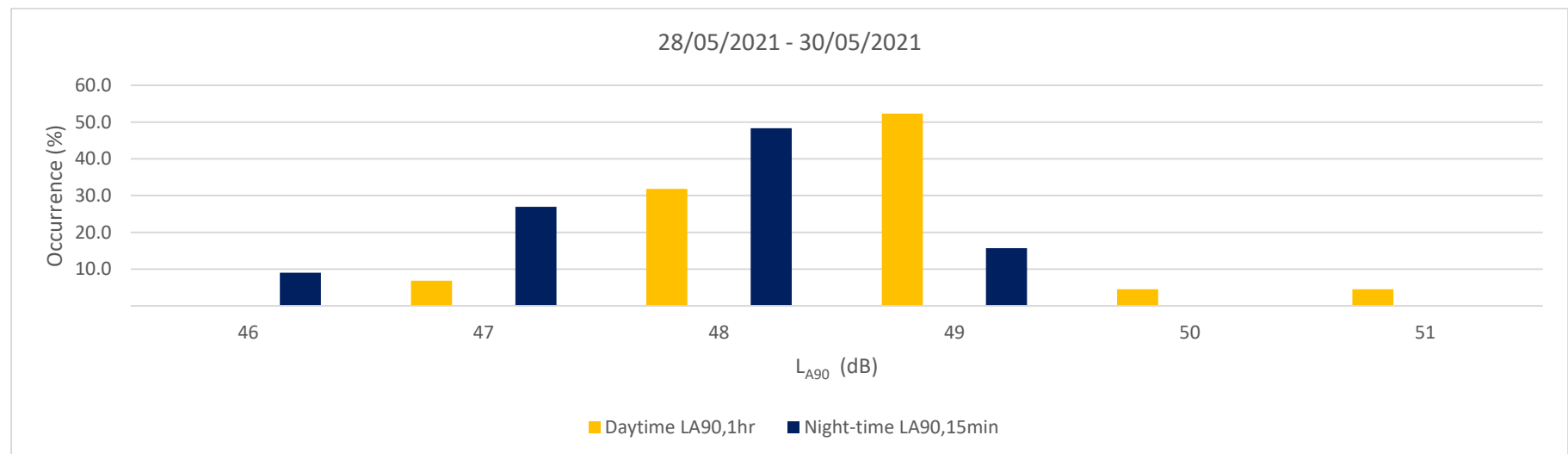


Figure B.6 – Barcode Music Breakout Test to External Front (Typical Pre-Pandemic Levels Set by Operator)

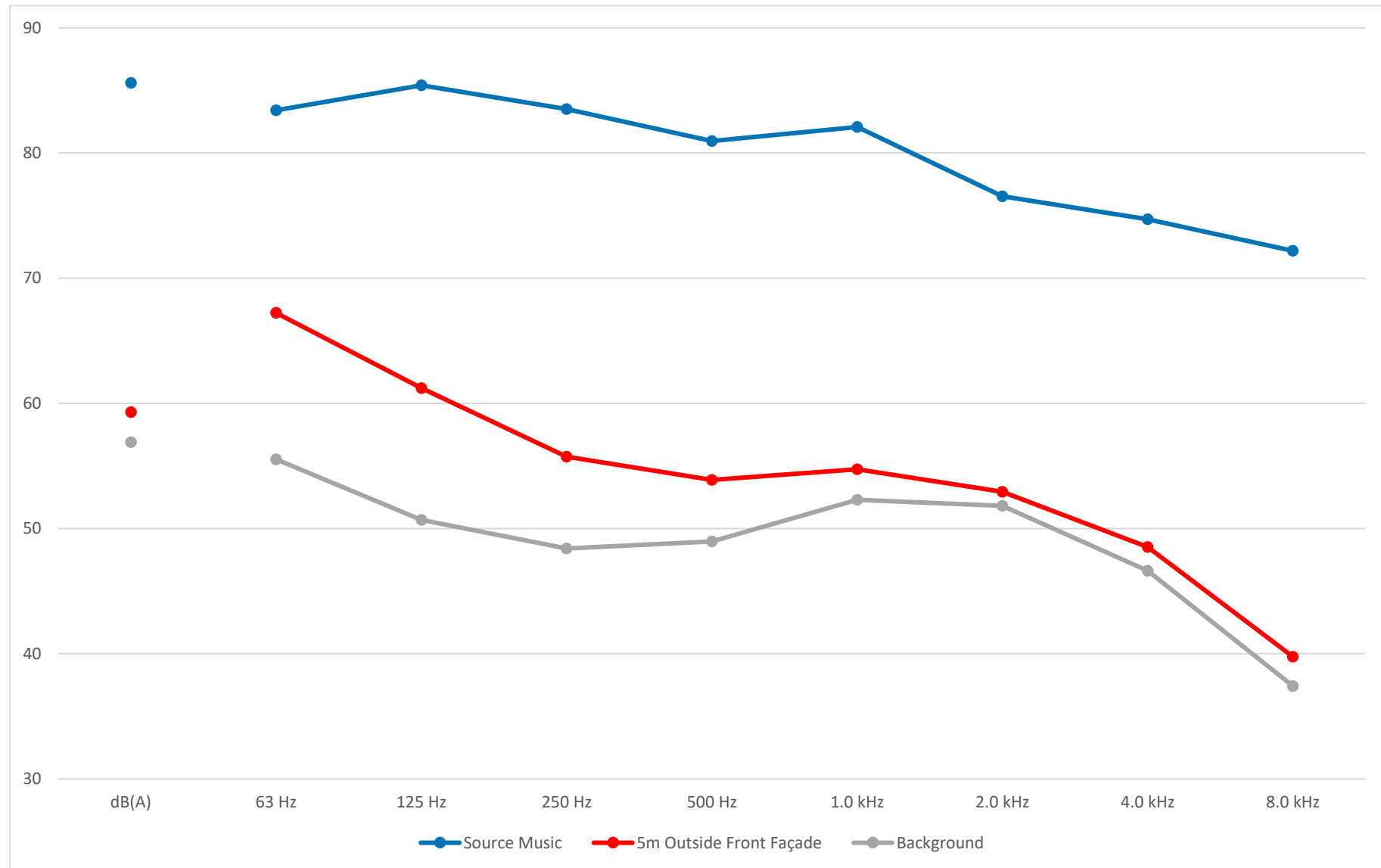
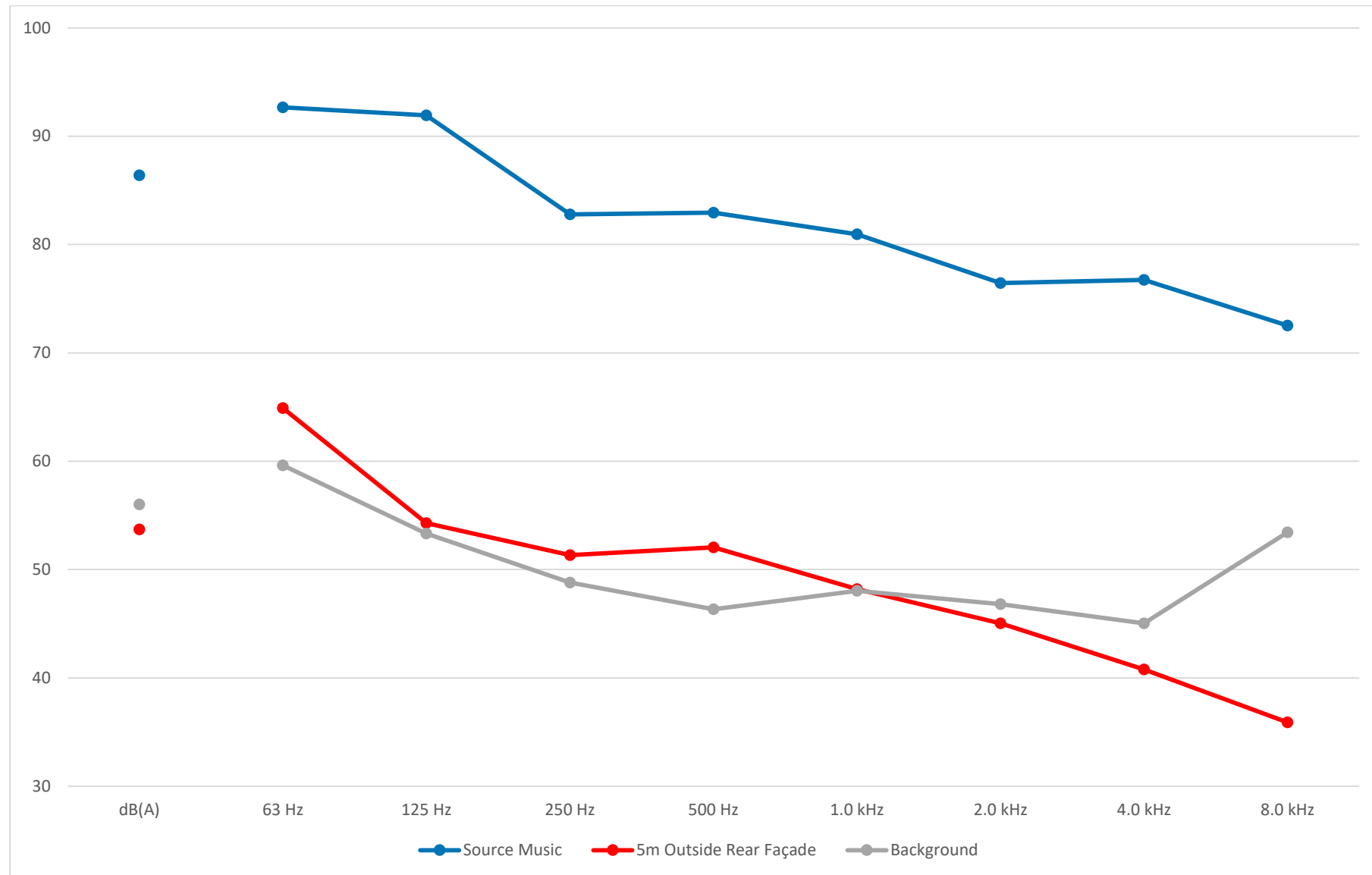


Figure B.7 – Barcode Music Breakout Test to External Rear (Typical Pre-Pandemic Levels Set by Operator)



APPENDIX C - DRAWING LISTS

The following DRY Architects Limited drawings and documents have been used in our assessment;

Table C.1 – Drawing List

Drawing Title	Drawing Number	Rev	Date
LOCATION AND SITE PLAN	9438-101	P1	12/2020
PROPOSED PLANS	9438-103	P	06/2021
EXISTING AND PROPOSED SECTIONS	9438-104	-	11/2020
EXISTING AND PROPOSED ELEVATIONS	9438-105	P1	11/2020