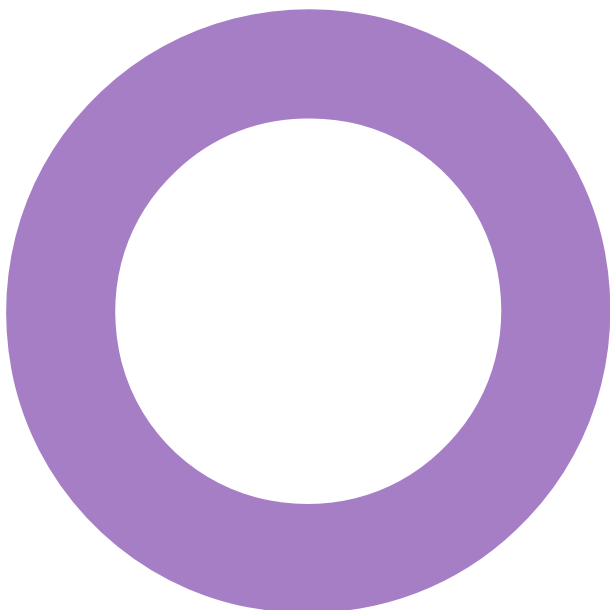


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ACOUSTICS

PLANNING NOISE ASSESSMENT

REVISION 03 – 24 MARCH 2022



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
00	03/02/2022	Draft issue for comment	AP	PM	PM
01	17/02/2022	Updated following comments	AP	PM	PM
02	09/03/2022	Updated following design development	AP	PM	PM
03	24/03/2022	Minor amendments	AP	PM	PM

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Project number: 10/13589

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Executive summary.

Hoare Lea Acoustics have been appointed by Diecast Ltd to provide acoustic advice for the proposed entertainment venue located on Store Street, Manchester.

An environmental noise survey has been carried out between 4 November and 8 November 2021 and a noise egress assessment undertaken in accordance with the requirements of Manchester City Council (MCC).

Based on the results of the noise survey, the typical existing background noise levels experienced at the worst affected sensitive receptors are as follows:

- Receptors located off Store Street - $L_{A90,5min}$ 45 dB during the daytime (07:00 to 23:00) and $L_{Aeq,5min}$ 39 dB at night (23:00 to 07:00).
- Receptors located off Ducie Street - $L_{A90,5min}$ 42 dB during the daytime (07:00 to 23:00) and $L_{Aeq,5min}$ 37 dB at night (23:00 to 07:00).

Based on the MCC's requirements, all plant, equipment and machinery associated with the development shall be controlled to ensure that the overall sound pressure levels at 1m from the façade of the nearest noise sensitive premises do not exceed 5 dB (L_{Aeq}) below the background noise levels stated above. If the plant contains any tonal or attention catching characteristics, a further correction will be required. In-duct attenuation is understood to be proposed to ventilation routes.

Acoustic testing has been carried out to determine the sound insulation performance of the existing building envelope to control noise emissions from amplified music. Based on this, 3D modelling has been undertaken to determine the maximum permissible internal noise levels due to music noise.

It is understood that envelope enhancement works are proposed to allow for higher internal amplified sound levels. From the results of the assessment, music noise limits are specified in line with MCC requirements. These would permit the following:

- Based on enhancement works to roof and lightweight cladding (specific measures discussed within the report) - amplified music typical of that experienced in a busy bar with DJ, although some limiting of bass may be required.

1. Introduction.

Hoare Lea Acoustics have been appointed by Diecast Ltd to provide acoustic advice for the proposed entertainment venue located on Store Street, Manchester. The site is located within the jurisdiction of Manchester City Council (MCC).

The proposed development comprises the redevelopment of an existing industrial unit to food and beverage facilities with provision for amplified music.

An environmental noise survey has been carried out on site between 4 November and 8 November 2021. The aim of the survey was to determine the existing noise levels in the vicinity of the site, including ambient, background and maximum noise levels. From this, appropriate noise egress limits for plant and entertainment noise associated with the development have been determined.

This report presents the findings of the noise survey and presents an assessment of maximum permissible entertainment noise and plant noise in accordance with MCC requirements.

2. Site description.

2.1 Proposals.

It is proposed to refurbish the existing industrial spaces to form an entertainment venue with food and beverage facilities and provision for amplified music. The site plan is provided below, with the following uses understood to be proposed:

- Beer hall - Large beer hall space containing a bar with a large seating area and adjoining ancillary uses.
- Night market - Food hall space with food stalls and further seating. An event space is also understood to be proposed at mezzanine level.

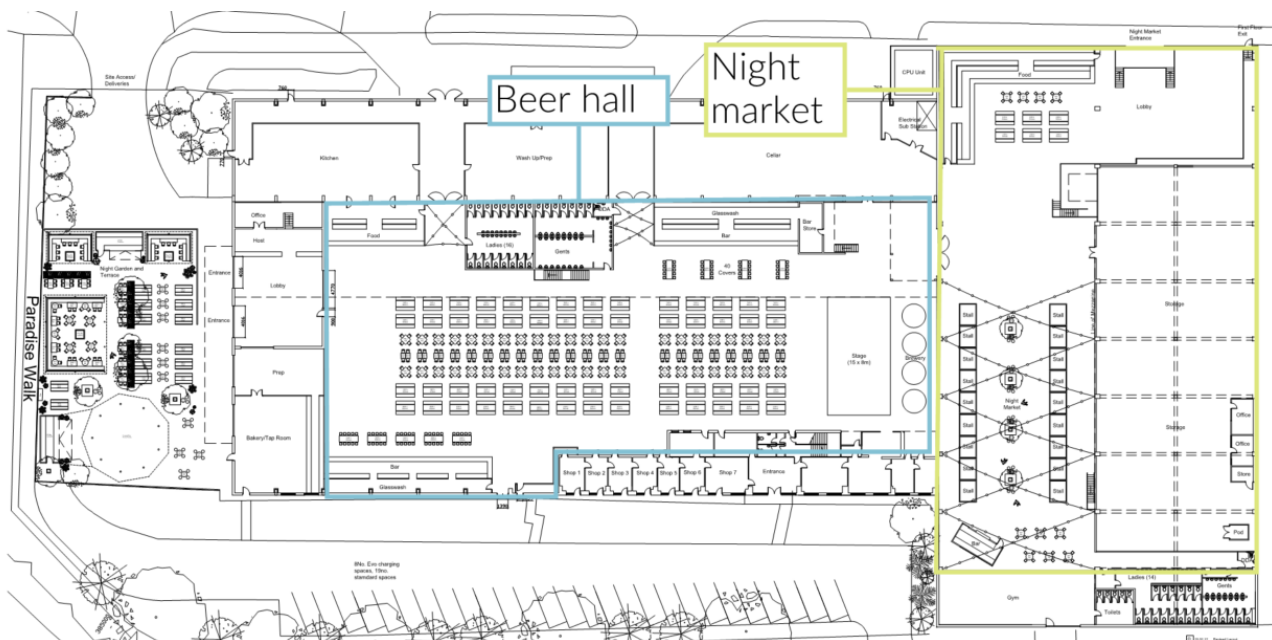


Figure 1 Proposed plan

2.2 Site location and nearby sensitive receptors.

The site in relation to its surroundings is shown in Figure 2. This shows the worst affected nearby residential receptors.

It is understood that there are two sites opposite the proposed venue on Ducie Street which have planning permission for new residential use, along with one site on Store Street. These sites are highlighted on Figure 2. These receptors are assessed as future potential sensitive receptors which would apply following occupation by residents.

It is understood that there a planning application has been submitted for a further residential scheme adjacent to the south west site boundary ('Paradise Mews'). If the planning application for this scheme is granted, the assessment will need to consider this receptor. However, due to the similar distance from the Beer Hall space to the Junction Works apartments, the outcome of the assessment is not expected to change significantly.

It should be noted that the following receptors have not been considered at this stage on the understanding that they are not currently being used for residential purposes:

- The Northern Quarters serviced apartments on Laystall Street. It is understood that the apartments are currently unoccupied.
- The Jolly Angler pub on Ducie Street. It is understood that the pub has closed and the site has been sold.



Figure 2 Annotated 3D aerial render image showing the site location as well as the nearest identified noise sensitive receivers

2.3 Local noise climate.

The existing local noise climate is currently dominated by road traffic noise from the roads around the site. Fairly constant traffic noise is audible from the ring road, although this is heard as a distant noise, particularly towards the south west of the site. Road traffic along Store Street and Dulcie Street is more intermittent.

3. Local Authority planning context.

Criteria for plant noise egress and entertainment noise egress is provided in the Manchester City Council (MCC) "Planning & Noise Technical Guidance (December 2015)" document. This is referenced in the subsequent sections.

3.1 Plant noise egress.

With regards to noise from fixed plant/equipment, MCC refers to BS 4142:2014 and also states the following:

"Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location."

3.1.1 BS 4142:2014.

The MCC "Planning & Noise Technical Guidance (December 2015)" document refers to BS 4142:2014 'Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas'. The general principle of the BS 4142 assessment criteria is that noise nuisance can be avoided provided there is no significant change in the prevailing background noise conditions at any surrounding noise sensitive premises once the new equipment is operational.

Where the assessment indicates that the noise rating level of new plant would be 10 dB or greater above the background noise level, the standard judges that sound to be of significant adverse impact. A difference of 5dB is considered to result in adverse impact. Where the rating noise level of the plant is equal to or below background noise, there is likely to be low impact.

Further corrections should be applied if the plant noise contains tonal, intermittent and/or impulsive characteristics. The magnitude of these corrections is dependent upon the subjective perceptibility of the tones/impulses present.

3.2 Entertainment noise egress.

Manchester City Council (MCC) stipulate the following with regards to the control of noise emissions from amplified music/entertainment sound:

'Entertainment noise (L_{Aeq}) should be controlled to 10dB below the background noise level (L_{A90}) without the entertainment noise present, in each octave band at the nearest noise sensitive location'.

4. Environmental noise survey.

An environmental noise survey was carried out on site over a period of 4 days between 4 November 2021 and 8 November 2021. During this time, long-term unattended measurements were carried out. Full details of the method and equipment used, as well as weather information are provided in Appendix A.

The survey measurement position at site is indicated in the annotated 3D render image presented in Figure 3. Positions L1 and L2 indicate the unattended measurement positions.



Figure 3 Annotated 3D render image indicating measurement position (courtesy of Google Earth)

4.1 Observations.

As set out in Section 2.3, the noise climate during the attended survey was driven by road traffic along the local roads.

4.2 Results.

4.2.1 Position L1 - Store Street.

The results of the unattended noise measurements at Position L1 are presented to follow. A graph showing the results from the unattended logging survey are provided in Appendix B.

Table 1 Ambient noise levels measured during unattended measurements at Position L1

Date	Ambient sound pressure levels measured (dB) at position L1	
	Daytime (07:00 - 23:00) L _{Aeq} , 16hr	Night (23:00 - 07:00) L _{Aeq} , 8hr
04/11/2021	60 ^[1]	55
05/11/2021	62	58
06/11/2021	60	58
07/11/2021	59	54
08/11/2021	62 ^[1]	N/A

[1] – Measurement not made over full period.

In line with BS 4142:2014, for the purpose of analysis and establishing representative background noise levels during the periods of interest, the background noise levels have been quantified using statistical analysis from the continuous logging measurements. These are presented in Appendix C.

From the analysis carried out, the representative background noise levels measured during the survey were as follows:

- Daytime (07:00 - 23:00) - $L_{A90,5min}$ 45 dB
- Night-time (23:00 - 07:00) - $L_{A90,5min}$ 39 dB.

The octave band values for these levels are presented in Table 2.

Table 2 Position L1 - Octave band representative background noise level

Amplified sound noise limits	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Daytime / evening (07:00 - 23:00) L_{eq} (dB)	57	47	42	42	42	35	23	15
Night (23:00 - 07:00) L_{eq} (dB)	52	42	37	36	35	27	15	14

4.2.2 Position L2 - Ducie Street.

The results of the unattended noise measurements at Position L2 are presented to follow. A graph showing the results from the unattended logging survey are provided in Appendix B.

Table 3 Ambient noise levels measured during unattended measurements at Position L2

Date	Ambient sound pressure levels measured (dB) at position L2	
	Daytime (07:00 - 23:00) $L_{Aeq, 16hr}$	Night (23:00 - 07:00) $L_{Aeq, 8hr}$
04/11/2021	49 ^[1]	45
05/11/2021	55	50
06/11/2021	55	47
07/11/2021	49	43
08/11/2021	59 ^[1]	N/A

[1] – Measurement not made over full period.

In line with BS 4142:2014, for the purpose of analysis and establishing representative background noise levels during the periods of interest, the background noise levels have been quantified using statistical analysis from the continuous logging measurements. These are presented in Appendix C.

From the analysis carried out, the representative background noise levels measured during the survey were as follows:

- Daytime (07:00 - 23:00) - $L_{A90,5min}$ 42 dB
- Night-time (23:00 - 07:00) - $L_{A90,5min}$ 37 dB.

The octave band values for these levels are presented in Table 4.

Table 4 Position L2 - Octave band representative background noise level

Amplified sound noise limits	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Daytime / evening (07:00 - 23:00) Leq (dB)	55	45	40	39	38	31	18	15
Night (23:00 - 07:00) Leq (dB)	52	42	36	35	34	24	13	14

5. Plant noise emissions.

5.1 Plant noise.

5.1.1 Plant noise limits.

Based on the MCC criterion set out in Section 3.1 and the survey results, the cumulative maximum sound pressure levels for fixed plant, equipment and machinery associated with the development shall not exceed the levels presented in Table 5 at 1m from the nearest noise sensitive premises.

Table 5 Maximum permissible sound pressure levels at 1m from the nearest noise sensitive premises from plant and equipment noise

Time of day	Maximum allowable sound pressure level at 1m from the nearest noise sensitive premises (L _{A,r} , dB) *
<i>Noise limits to Store Street side (i.e. Oxygen, Piccadilly Village)</i>	
Daytime (07:00 to 23:00)	40
Night (23:00 to 07:00)	34
<i>Noise limits to Ducie Street / courtyard side (i.e. Junction Works, Whittles Croft, future receptors)</i>	
Daytime (07:00 to 23:00)	37
Night (23:00 to 07:00)	32

*If plant noise contains any tonal or impulsive characteristics, a further correction shall be applied to the levels set out above, see Section 3.1.1 for details.

5.1.2 Attenuation measures.

At this stage, the design is not sufficiently advanced to comment on specific attenuation measures and will need to be assessed in detail as the design progresses. However, all noise generating plant and equipment associated with the development will be designed to ensure that the noise egress limits specified above are achieved. The specific attenuation measures will depend on the type and location of the plant items but typical measures to be considered include in-duct attenuation, acoustic screening or enclosures, low noise equipment, acoustic lagging, and acoustically rated louvres.

6. Entertainment noise assessment.

6.1 Amplified sound noise limits.

Based on the results of the noise survey and MCC criteria, the following noise limits are to apply at the nearby residential receptors.

Table 6 Amplified sound noise limits at nearby residential receptors

Amplified sound noise limits	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
<i>Noise limits to Store Street side (i.e. Oxygen, Piccadilly Village)</i>								
Daytime / evening (07:00 - 23:00) L _{eq} (dB)	47	37	32	32	32	25	13	5
Night (23:00 - 07:00) L _{eq} (dB)	42	32	27	26	25	17	5	4
<i>Noise limits to Ducie Street / courtyard side (i.e. Junction Works, Whittles Croft)</i>								
Daytime / evening (07:00 - 23:00) L _{eq} (dB)	45	35	30	29	28	21	8	5
Night (23:00 - 07:00) L _{eq} (dB)	42	32	26	25	24	14	3	4

6.2 3D acoustic modelling & noise breakout testing.

A 3D acoustic model of the site has been developed using the industry standard software package CadnaA by Datakustik to assess the predicted levels of amplified music noise breakout.

Acoustic testing was carried out on 8 November 2021 to investigate noise level breakout from the existing building and noise transmission to the surrounding areas. This involved producing high level pink noise and amplified music over a PA system. The testing results were used to calibrate the acoustic 3D model based on the existing building envelope sound insulation performance.

Measurements were carried out at various locations around the building, including on the raised Ashton Canal tow path, but not directly above the roof. However, the breakout testing of the existing roof was limited due to existing weaknesses (e.g. penetrations / holes for defunct ventilation fans) that are to be sealed and made good as part of the works. It is proposed that verification measurements will be undertaken, including at roof level, following the completion of enhancement works to determine the in-situ performance achieved.

A screenshot from the model is provided below.

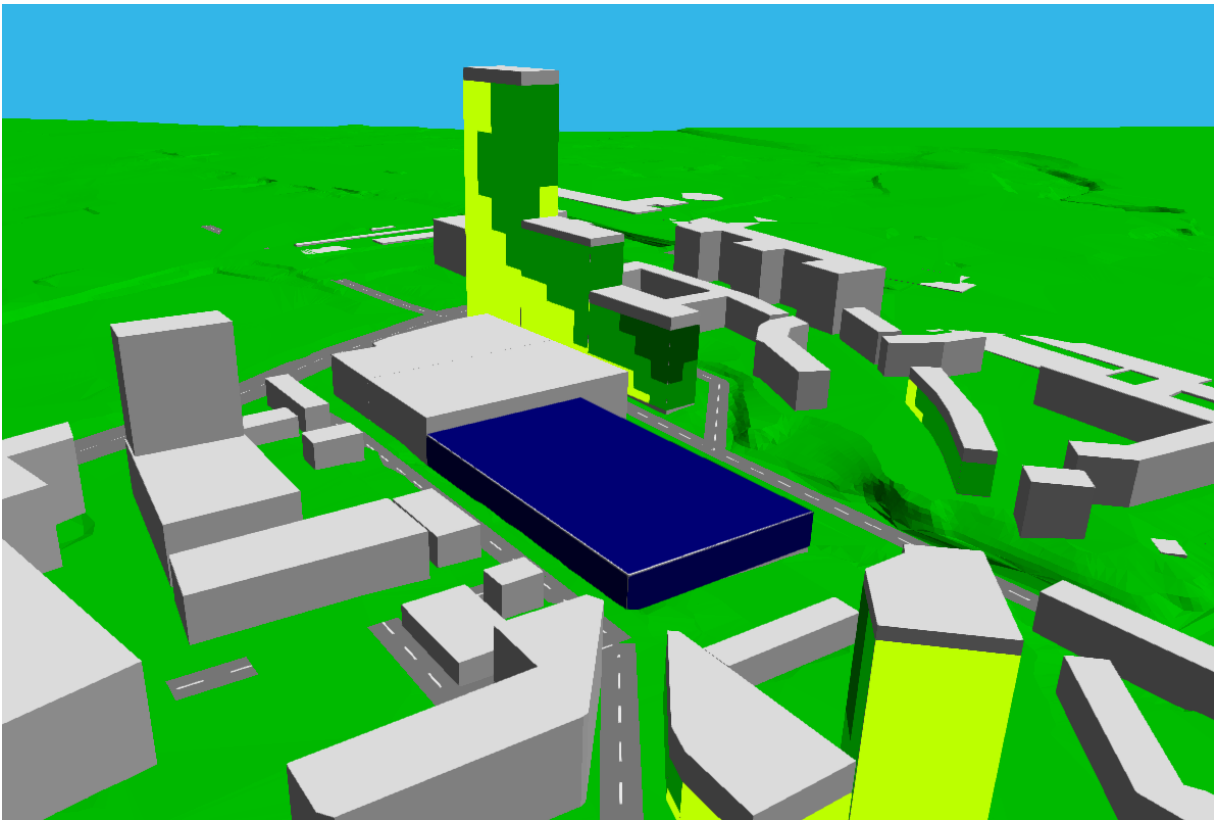


Figure 4 Screenshot from 3D acoustic model

6.3 Basis of assessment.

Noise breakout from the venue due to internal amplified sound has been modelled to predict the impact on the surrounding sensitive receptors. Based on this, the maximum permissible internal amplified sound that would allow for compliance with the MCC criteria at all surrounding receptors has been determined.

General.

The assessment assumes the following:

- All holes and openings through the existing building envelope (e.g. defunct wall-mounted ventilation fans) will need to be acoustically sealed with a material equivalent to the surrounding envelope construction.
- Where there are existing roller shutter doors, these were found to act as an acoustic weak point. These should either be replaced with a suitably acoustically rated alternative, or have a lobby provided between the roller shutter and any internal area with provision for amplified sound.
- It is assumed that any ventilation routes / openings will be suitably acoustically treated to control amplified sound emissions via the ventilation routes.

Envelope enhancements.

It is understood that enhancements to the existing building envelope are proposed to permit higher internal noise limits. The strategy outlined in the following table is understood to be proposed.

Table 7 Proposed envelope enhancements

Space	Building envelope / enhancements
Beer hall	Roof - The existing roof to the beer hall is understood to be formed from double skin steel construction with approximately 100 mm cavity between the outer sheets containing insulation. Further investigative works are understood to be proposed to determine the specific build-up. The proposed enhancement strategy is understood to be as follows: – Install a spacer system to the outside of the existing roof to provide approx. 260 mm zone to be fully filled with mineral fibre insulation. – Overclad the existing roof with outer steel / mass sheet (e.g. 0.7 mm steel cladding). Walls - The existing lightweight walls to the beer hall is understood to be formed from double skin steel construction with approximately 100 mm cavity between the outer sheets containing insulation. Further investigative works are proposed to determine the specific build-up. The proposed enhancement strategy is understood to be as follows: – Install mineral fibre insulation to the internal side to the full depth of the cladding rails. – Provide an internal lining / mass sheet to the inner face of the cladding rails (e.g. 0.7 mm steel liner). It is understood that the lower walls to the beer hall are formed from cavity masonry. No enhancements are proposed to these masonry elements.
Night market	Roof - The lightweight roof construction to the night market is not yet known. Further investigative works are proposed to determine the specific build-up. The proposed enhancement strategy is understood to be as follows: – Install a spacer system to the outside of the existing roof to provide approx. 260 mm zone to be fully filled with mineral fibre insulation. – Overclad the existing roof with outer steel / mass sheet (e.g. 0.7 mm steel cladding). Walls - It is understood that the night market walls are formed from deep (>200 mm) masonry. No enhancements are proposed to these walls.

At this stage, the assessment has used available laboratory sound insulation test data available for the following build-up as the basis of the performance for the enhanced roof and lightweight walls:

- Euroclad Elite 3 system with 0.7 mm steel outer linings
- 260 mm cavity formed by spacer system with medium density mineral fibre insulation to the full depth

This is considered to provide a reasonable approximation of the performance achieved following the enhancement works. However, the proposed construction works will require further detailed design development as the design progresses, including suitable detailing at the junction between different elements. The in-situ performance achieved following the works will need to be verified through suitable acoustic testing at commissioning stage.

6.4 Assessment of permissible internal amplified sound (enhanced envelope).

The results of the assessment carried out are presented in Table 8 and Table 9 along with initial comments on the permissible types of entertainment noise that are likely. The internal noise limits are considered indicative at this stage and will require refinement following design development. Final limits will be set following validation testing to ensure that the MCC criteria are achieved based on the final installed construction.

6.4.1 Based on existing nearby sensitive premises.

Table 8 Maximum permissible amplified sound levels - Existing sensitive receptors / existing cladding

Time period	Proposed internal noise limit due to amplified sound	Commentary on likely entertainment noise activities
Beerhall		
Daytime (07:00 – 23:00)	$L_{Aeq,15min}$ 90 dB; L_{eq} 81 dB and L_{eq} 84 dB at 63 Hz and 125 Hz respectively	Suitable for loud amplified music typical of that experienced in a busy bar with DJ. Limited bass may be required.
Night (23:00 – 07:00)	$L_{Aeq,15min}$ 85 dB; L_{eq} 78 dB and L_{eq} 81 dB at 63 Hz and 125 Hz respectively	Suitable for loud amplified music typical of that experienced in a busy bar with DJ. Limited bass may be required.
Night market		
Daytime (07:00 – 23:00)	$L_{Aeq,15min}$ 90 dB; L_{eq} 79 dB and L_{eq} 81 dB at 63 Hz and 125 Hz respectively	Suitable for loud amplified music typical of that experienced in a busy bar with DJ. Limited bass may be required.
Night (23:00 – 07:00)	$L_{Aeq,15min}$ 85 dB; L_{eq} 76 dB and L_{eq} 78 dB at 63 Hz and 125 Hz respectively	Suitable for loud amplified music typical of that experienced in a busy bar with DJ. Limited bass may be required.

6.4.2 Following occupation of future sensitive premises.

Table 9 Maximum permissible amplified sound levels - Future sensitive receptors / existing cladding

Time period	Proposed internal noise limit due to amplified sound	Commentary on likely entertainment noise activities
Beerhall		
Daytime (07:00 – 23:00)	$L_{Aeq,15min}$ 85 dB; L_{eq} 75 dB and L_{eq} 78 dB at 63 Hz and 125 Hz respectively	Suitable for loud amplified music typical of that experienced in a busy bar with DJ. Limited bass may be required.
Night (23:00 – 07:00)	$L_{Aeq,15min}$ 80 dB; L_{eq} 72 dB and L_{eq} 75 dB at 63 Hz and 125 Hz respectively	Suitable for loud amplified music typical of that experienced in a busy bar with DJ. Limited bass may be required.
Night market		
Daytime (07:00 – 23:00)	As per Table 8.	As per Table 8.
Night (23:00 – 07:00)	As per Table 8.	As per Table 8.

6.5 Recommendations.

The following best practice measures are advised to ensure that the acoustic strategy is maintained:

- The use of noise limiters and sound level meters is recommended on the house PA and any external equipment brought in by guests to control amplified music levels within the venue and at the nearest noise sensitive receptors.
- A lobbied door arrangement is recommended to all access routes from outside the building to any internal space with provision for amplified sound.
- As noted above, the building envelope enhancement works would require further detailed design development as the design progresses.

6.6 Assessment of external area.

The assessment suggests that low level background amplified sound music within the external garden area would cause the MCC noise criteria to be exceeded at the nearby Junction Works residential premises.

6.7 Patron and anti-social behaviour noise.

It should be noted that conversation noise from patrons is assumed to fall with the 'Security and Crowd Management Plan' and not part of the typical entertainment noise.

Appendix A: Survey and equipment details.

Unattended noise measurements were carried out between 12:05 on 4 November 2021 and 09:30 on 8 November 2020.

Prior to commencement of the unattended survey, a subjective assessment of the noise climate was undertaken and compared to that of the immediate vicinity of the nearby residential premises. The chosen logger positions were deemed to be representative of the noise levels at the nearest noise sensitive premises.

For each logger, the microphone was fitted with a windshield. The meter was calibrated before and after the survey and no significant drift was noted. A photo of the equipment is provided in Figure 5.

Equipment details.

Table B1 summarises the details of the equipment used during the environmental noise survey. All equipment used was within dates of calibration and calibration certificates are available on request.

Table B1 Equipment used during environmental noise survey

Item	Description	Serial Number	Calibration Date
Unattended sound level meter	Rion - Microphone: UC-59 Rion - Pre-amplifier: NH-25 Rion - Sound Level Meter: NL-52	05354 32190 00732162	02/03/2020
Unattended sound level meter	Rion - Microphone: UC-59 Rion - Pre-amplifier: NH-25 Rion - Sound Level Meter: NL-52	14887 88079 00297868	07/04/2021

Weather information.

Weather reports for the area indicate that temperatures remained mild. Wind speeds and rain were minimal and not expected to contribute adversely, therefore the measured data is considered suitable as being representative of typical conditions.

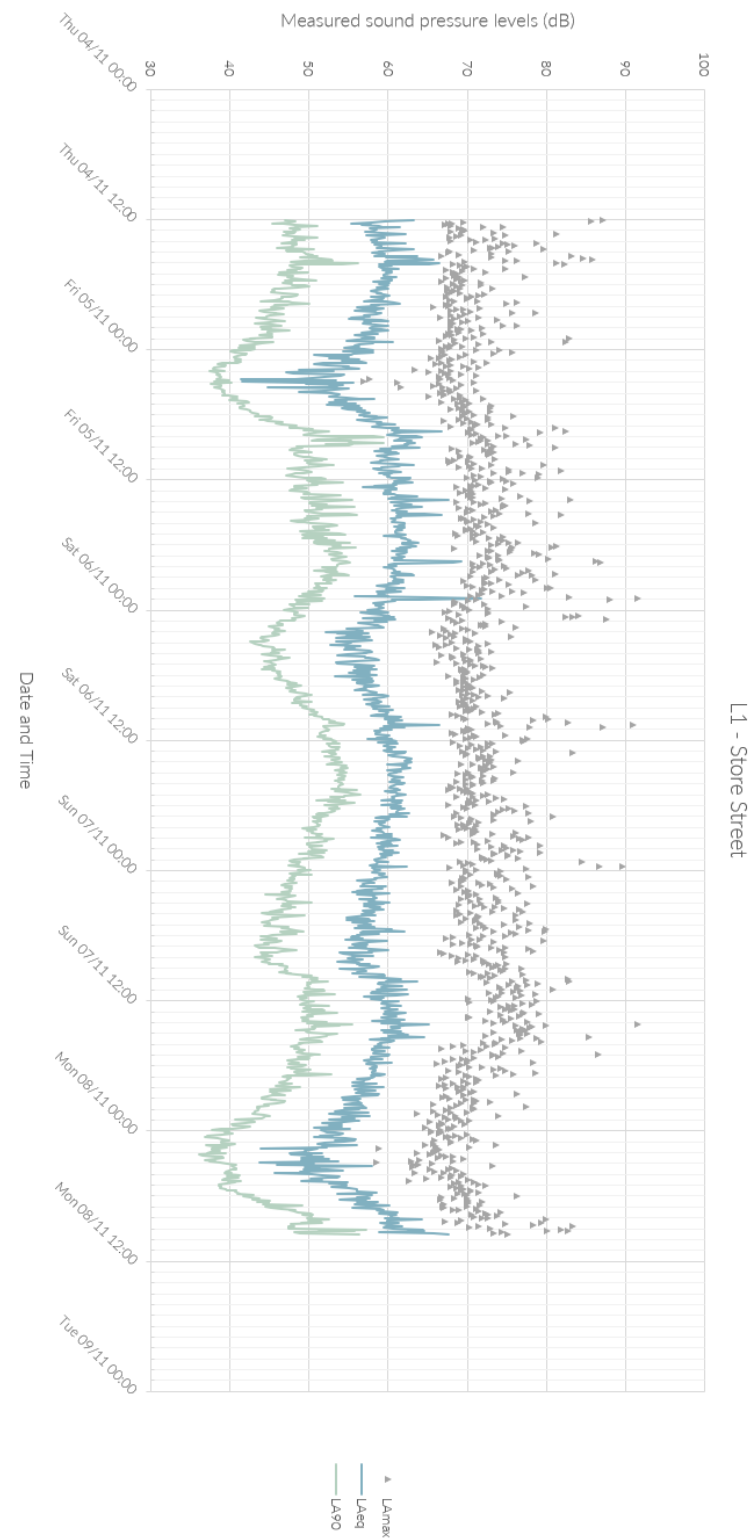


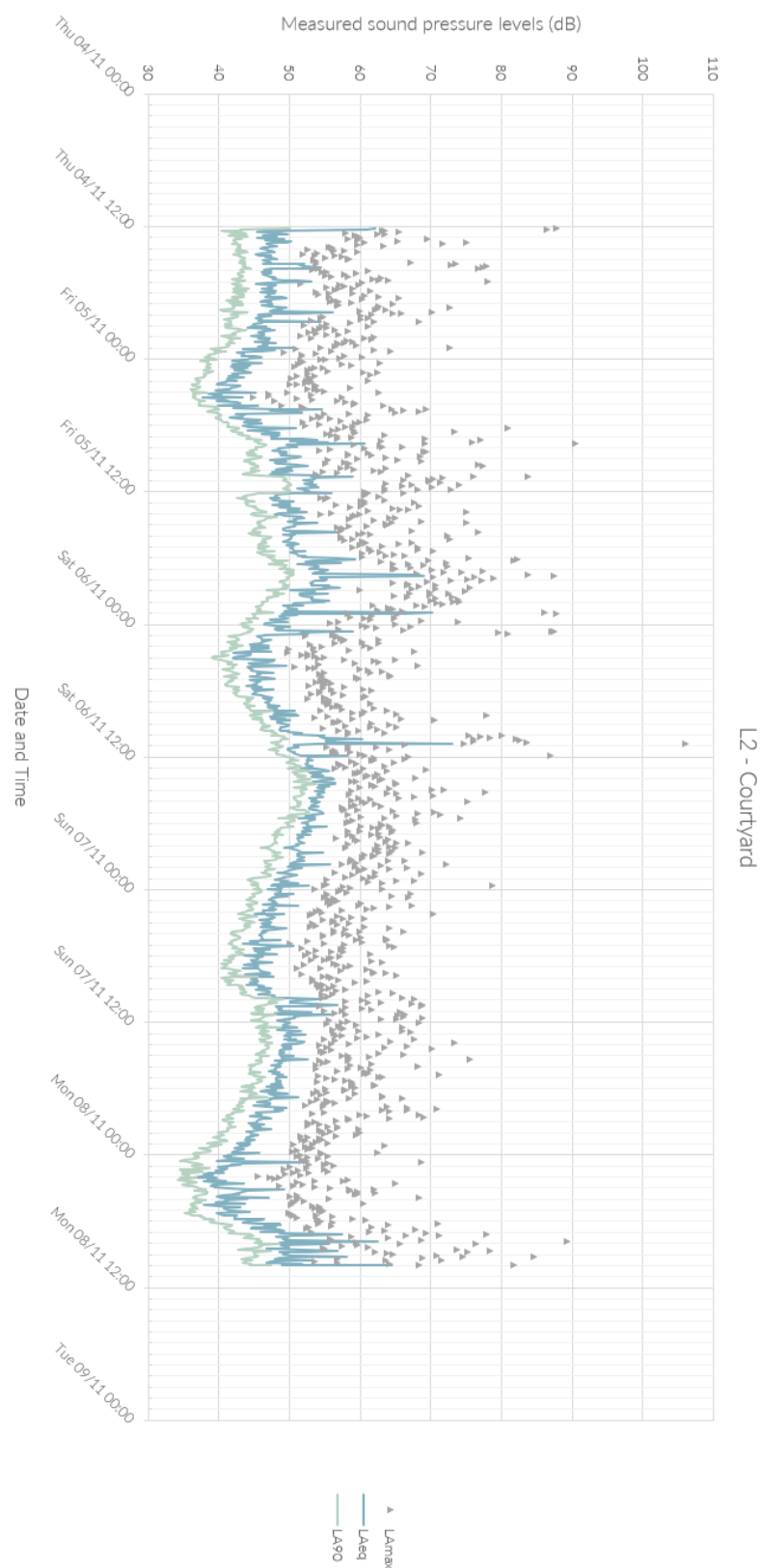
Figure 5 Photo showing noise monitoring position L1



Figure 6 Photo showing noise monitoring position L2

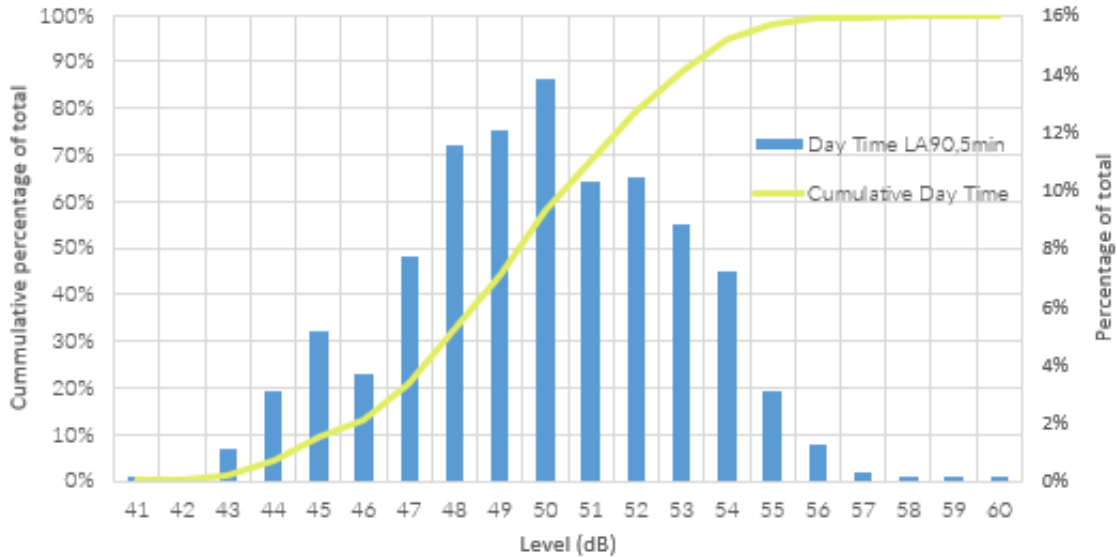
Appendix B: Time history of unattended measurements.



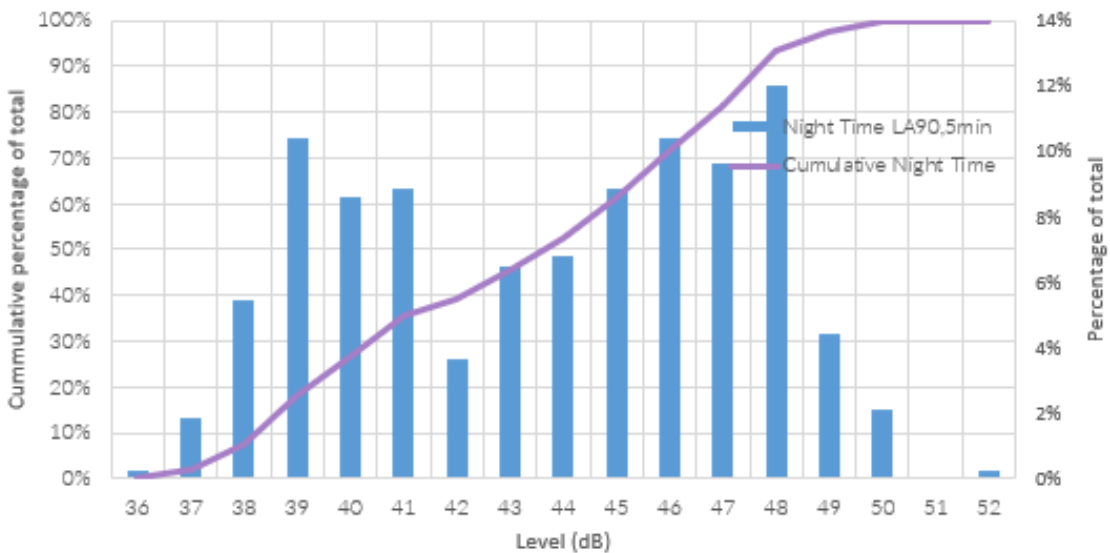


Appendix C: Statistical analysis of noise data.

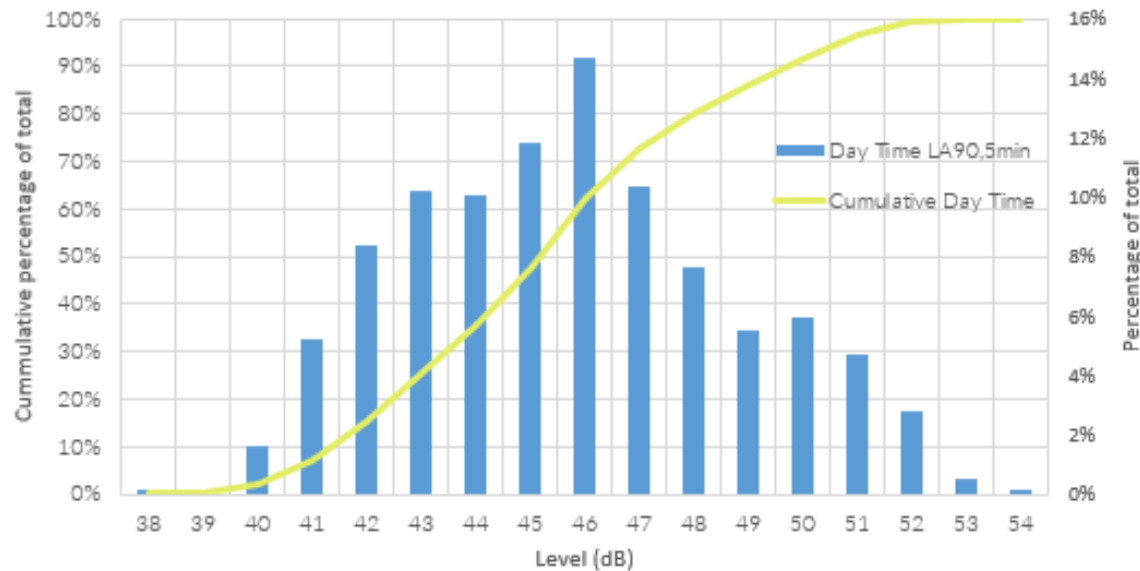
Day (16hr) LA90,5min at L1 - Store Street



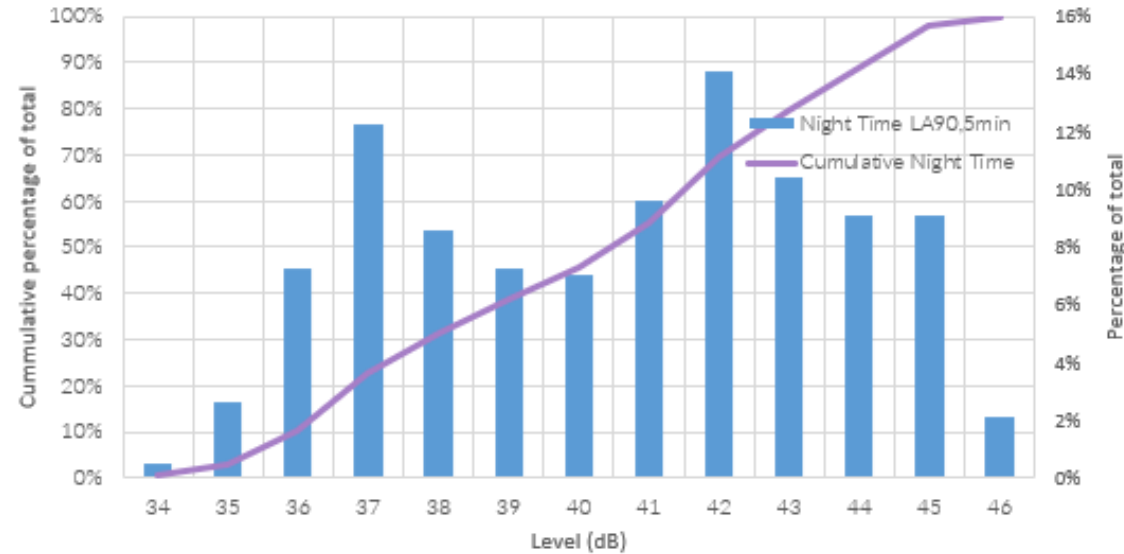
Night LA90,5min at L1 - Store Street



Day (16hr) LA90,5min at L2 - Courtyard



Night LA90,5min at L2 - Courtyard





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