

Noise Assessment

Site Address: The Suffolk Arms, 40 Suffolk Road, Cheltenham, GL50 2AQ

Planning authority: Cheltenham Borough Council

Agent: Taylor and Co Architects, The Studio, Ombersley, Worcestershire, WR9 0DT

Document Ref: WA/0124/NA-716

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Date: 16/01/2024

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1 Introduction and summary

Walnut Acoustics have been engaged to assess a proposed covered outdoor dining area to be constructed in the rear courtyard of The Suffolk Arms in Cheltenham.

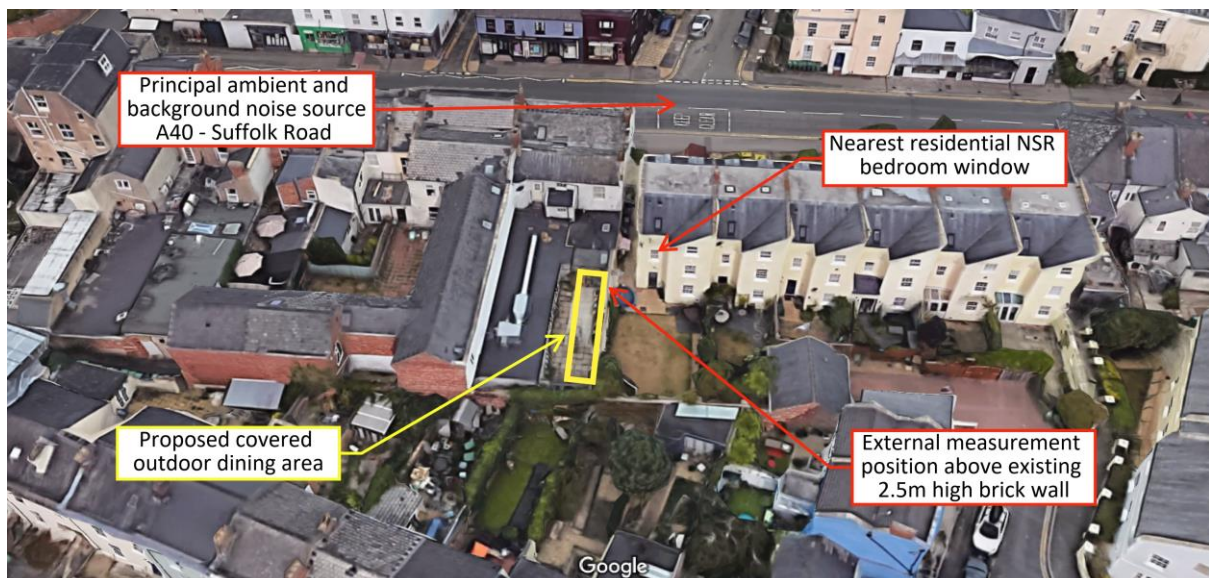
The sound attenuation properties of the proposed construction have been evaluated and a patron noise assessment carried out to the nearest line of site residential noise receptor (NSR), a first-floor bedroom window at the rear of the neighbouring property on Suffolk Road.

The predicted patron noise level from the proposed new dining area of 47 dBA is 1 dB below the lowest 15-minute ambient noise level measured at the NSR and is not considered to add significantly to the ambient noise climate at this location, during the proposed hours of use.

The ambient and background noise climate in this area is dominated by road noise from Suffolk Road (A40). With the proposed covered canopy design and patron usage finishing at 9.30pm, the noise emanating from the outdoor dining area is considered likely to have low impacts on local residents in this context.

This document should be read in conjunction with all relevant planning documentation provided for this application. See Appendix 1 for plan and elevation drawings of the proposed dining area.

2 Site details and operational hours



Picture 1: proposed new dining area location, principal noise source, measurement position and NSR

The proposed covered outdoor dining area has six dining pods arranged under a canopy construction (see layout in design drawings) and this is the sole proposed usage type for the space. There is an existing high wall to the nearest neighbours which already provides significant noise attenuation from the currently unused courtyard area of the pub to the ground floor, and external amenity areas of this property.

Construction details

The external walls of the structure are to be constructed of 20mm timber cladding mounted onto 18mm plywood, and the roof comprises of 25mm triple cell polycarbonate sheets.

External grade acoustic absorption panels are to be fitted around the interior of the dining pods to absorb the sound of patrons talking and reduce the reflected patron noise emanating from the dining area.

See Appendix 3 for details of an example absorption panel product and fitting option. See Appendix 1 for full details of the proposed layout plans, elevations and construction details.



Picture 2: courtyard – location of proposed covered dining area - nearest neighbour and high wall

Operational hours

Monday to Sunday 1200 to 2130

Note: currently the Suffolk Arms on-line information shows that they are closed on a Monday and Tuesday.

3 Noise summary

The principal noise source for ambient and background noise levels at this location is the traffic on Suffolk Road (A40), as indicated in Picture 1 in the site details section. Patron noise from the Suffolk Arms was minimal during the measurement as the existing courtyard doors are closed with no access for patrons to this area.

The kitchen extraction system located on the single storey building adjoining the courtyard was also present in the ambient and background noise climate but was observed to be much less significant than road noise from the A40.



Picture 3: external measurement position above existing wall - assessment NSR window in view

External measurement – background and ambient noise levels

External measurement	Date	Time	Duration hr:min:sec	L _{Aeq, T} dB	L _{A90, T} dB
Proposed opening hours for covered outdoor dining area 1200 to 2130	14/10/23 Saturday	1400 - 2130	09:30:00	50.5	44.0
	15/10/23 Sunday	1200 - 1400			

Table 1: external measurement data summary during outdoor dining area during opening hours

A measurement was conducted in the courtyard area with a Class 1 sound level meter installed above the height of the existing boundary brick wall to the rear of the neighbouring property on Suffolk Road.

The meter was placed as close to the nearest line of sight first floor residential window as possible to acquire representative data for ambient and background noise levels for the NSR used in this assessment.

See picture 1 in the site details section for the locations of the measurement position and the NSR.

External measurement <i>15-minute intervals</i>	Maximum value dB	Minimum value dB
Background noise level Daytime – 1200 to 2130 <i>L_{A90, 15min}</i>	46	41
Ambient noise level Daytime – 1200 to 2130 <i>L_{Aeq, 15min}</i>	60	48

Table 2: background and ambient noise levels - 15-minute max and min levels – levels rounded

See Appendix 2 for the noise data summary and Appendix 4 for measurement and equipment details. Further information on the data presented can be provided on request.

4 Patron noise assessment - covered outdoor dining area

Location	Normal Voices (x10) <i>L_{p,1m}</i> dBA	Raised Voices (x5) <i>L_{p,1m}</i> dBA	Patron noise level dBA
Proposed covered outdoor dining area <i>Patron noise (voice)</i>	67	72	73

Table 3: worst-case patron noise (voice) level from the proposed covered outdoor dining area

Note: The noise level data used in the patron noise assessment comes from widely recognised sources including BS 3382-3:2012 Section 6.1: Sound power spectrum of normal speech.

A worst-case scenario of 15 patrons talking simultaneously whilst dining - with 5 of these using raised voices - has been used to determine the patron noise level for the proposed covered outdoor dining area.

This has been used in the assessment of patron noise levels at the residential NSR - the nearest first floor window which is 6 metres from the edge of the covered area as shown in the elevation designs provided (see Appendix 1).

A propagation over distance correction at the NSR assessment position (1 metre from the façade) has been calculated using a standard point source formula - $20\log(r1/r2)$ - giving a value of 16 dB.

The canopy construction is assumed to have a patron noise attenuation value of 10 dB derived from the barrier effect of the construction situated between the patron noise sources and the NSR window. As noted in the site details section, the sound reflections from the dining pods will also be reduced by the installation of absorption panels.

A predicted patron noise level of 47 dBA at the NSR assessment position has been calculated by subtracting the attenuation value of 10dB and the propagation distance correction value of 16 dB from the patron noise level of 73 dBA.

This predicted patron noise level at the NSR is compared to the lowest ambient noise levels measured on site (48 dBA), and to WHO criteria for external amenity area daytime noise levels (50 dBA), in the following assessment.

Source	Predicted patron noise level at NSR	Compared to minimum existing ambient noise levels and WHO guidance	Noise assessment	Action
<p>Proposed covered outdoor dining area</p> <p><i>Patron noise (voice)</i></p>	47 dBA	1 dB below minimum 15-minute average ambient noise level (48dBA) and 3 dB below WHO guidance levels of 50 dBA	Low observed adverse effects are expected in the context of exiting ambient noise climate	No additional mitigation measures required

Table 4: noise assessment for patron noise emanating from proposed covered outdoor dining area

The patron noise emanating from the proposed new dining area is 1 dB below the lowest 15-minute ambient noise levels measured at the NSR and is not considered to add significantly to the ambient noise climate at this location. The patron noise is also 3 dB below WHO criteria for external daytime amenity noise levels of 50 dBA.

When considering the patron noise level in comparison to measured background noise levels (ranging from 41 dB to 46 dB) the potential for adverse noise impacts on nearby residents is low in the context of the local noise climate (dominated by road noise from the A40).

5 Conclusion

Patron noise emanating from the proposed covered outdoor dining area has been assessed to the nearest residential first floor window and the predicted patron noise levels are not expected to add significantly to the ambient noise levels at this location. Low impacts are expected when considering existing background noise levels.

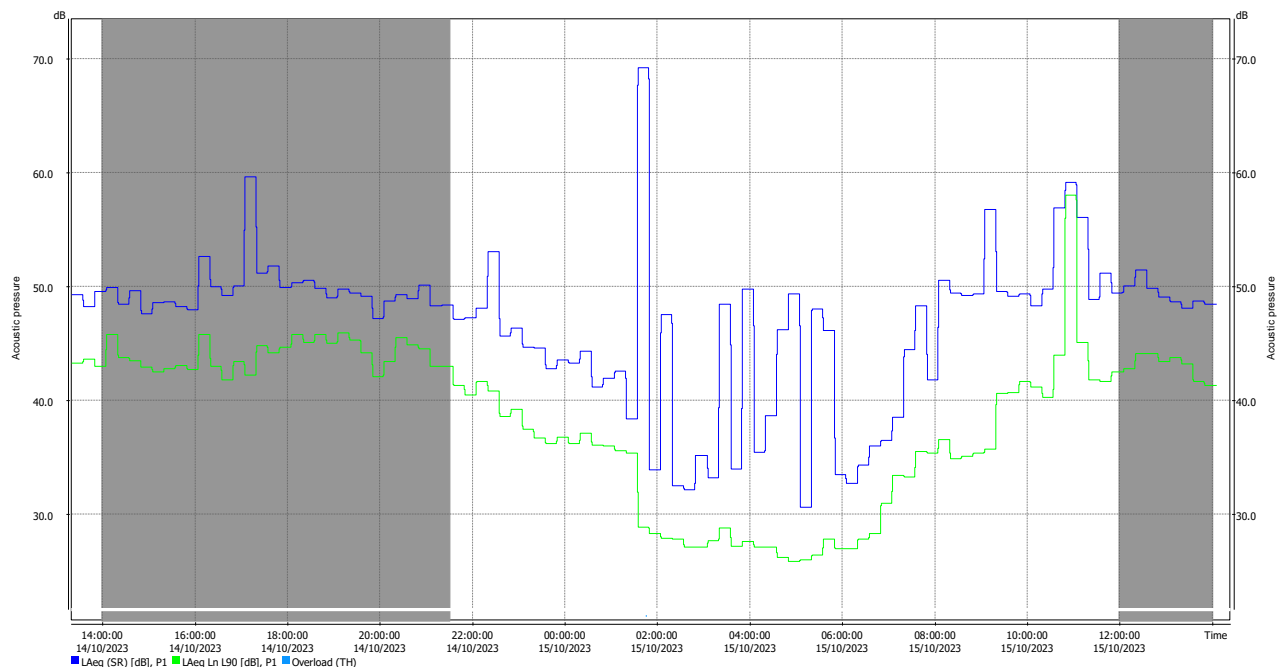
Appendix 2: External noise measurement - data summary

Project name	The Suffolk Arms - Cheltenham
Author name	Nick Myerscough - Walnut Acoustics
Location	External - pub courtyard

Instrument configuration

Measurement start	14/10/2023 13:19:24	
Measurement stop	15/10/2023 14:15:56	
Measurement elapsed time [HH:MM:SS]	1 day(s) 00:56:32	
Unit type	GA 117	
Unit S/N	34260	
Integration period	15 m	
Logger step	1 s	
Range	Low	
Calibration drift	0.22 dB	
Mic field correction	Free	
Windscreen	ON	
Description	Profile	Value
Filter	1	A
Detector	1	Fast

Logger results



Note: measurements in 0130 to 0920 are not representative of the NSR as the sound level meter had been pushed over at 0130 by an angry neighbour - the meter was moved back to the measurement position at 0920.

Appendix 3: Absorption panels - seating pods

Quietstone – 50mm absorption panels – technical data sheet



QuietstoneLight
Rigid, lightweight sound absorption panels

Versatile, sustainable sound absorbers

Quietstone Light is a rigid, durable absorber made from recycled glass. The material is suitable for external use, indoor use and settings which require high impact resistance. It can be worked on site, pigmented or treated with a range of finishes and is non combustible, chemically inert and non fibrous. Panels can be either mechanically fixed or bonded and a range of sizes are available including custom options.

Key Features

- High sound absorption
- Non combustible
- Weather resistant
- Self bearing
- Easily cut on site
- 94% recycled glass
- Bespoke sizes available

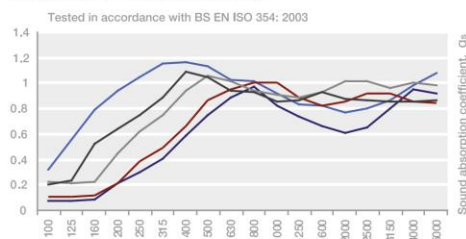
Technical properties

Physical properties

Standard width 600mm
Standard length 1200mm
Thicknesses 15 -100mm
We can make other sizes with a maximum length of 2.4m.
A small set up charge is incurred
Weight at 25mm thickness: 8 kg/m²
Weight: 320kg/m³



Acoustic Performance



Fire resistance

85476: Part 6: 1989 - Class 1
85476: Part 7: 1997 - Class 0

Freeze/thaw resistance

EN 1338 - Class 0



The main constituent of Quietstone Light - expanded glass beads

Mounting parameters:	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	EN-ISO 11654, α_w
25mm panel, 50mm air gap	0.10	0.30	0.75	0.85	0.65	0.90	0.60 (M) (H) (H): class C
25mm panel, 50mm mineral fibre	0.55	1.05	1.10	0.90	0.80	0.90	0.90 (L): class A
50mm panel	0.10	0.35	0.85	0.95	0.85	0.85	0.65 (M) (H) (H): class C
50mm panel, 25mm air gap	0.20	0.60	1.00	0.90	1.00	1.00	0.90: class A
85mm panel 12 gap for fixings	0.30	0.75	1.00	0.90	0.90	0.85	0.95: class A



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W: www.quietstone.co.uk
Company Reg. No. 07592216

Quietstone UK Ltd.
Quietstone Works, Nab Quarry
Pott Shrigley, Macclesfield
Cheshire, SK10 5SD, UK

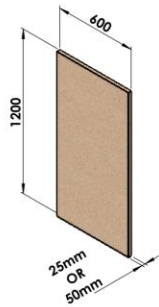


Quietstone – 50mm absorption panels – fixing example

Quietstone Light -
Wall Installation - Direct Fixing



Panels

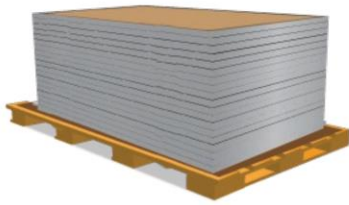


Tools



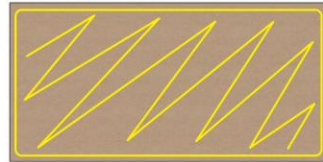
Sika Flex
(as specified by Quietstone)
& application gun

1.



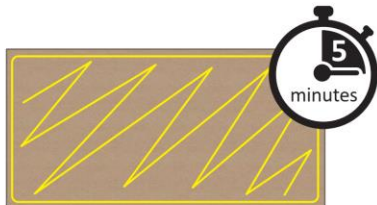
Use pallet or clean surface to store panels
prior to installation

2.



Apply Sika Flex around perimeter, approx. 30mm from
edge, and in zig zag pattern to rear of panel

3.



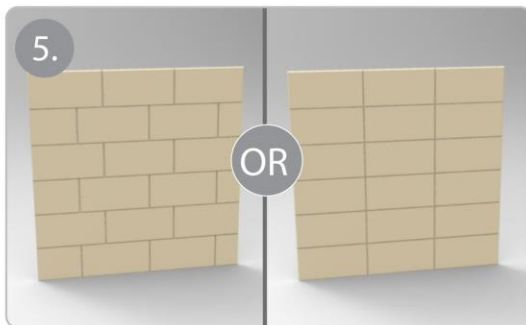
Allow 5 minutes for Sika Flex to go tacky

4.



Apply to wall, holding in position until secure

5.



Quietstone UK Ltd, Nab Quarry, Pott Shrigley, Macclesfield, Cheshire, SK10 5SD
Telephone : +44(0)1625 576970 E-mail : info@quietstone.co.uk

Appendix 4: Measurement details and calibration certificates

Personnel and Equipment

All testing, calculation and evaluation was conducted by Nick Myerscough of Walnut Acoustics. Nick is a member of the Institute of Acoustics (MIOA).

Contact Details

Nick Myerscough
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3 Furrow Way
Mickleton
Chipping Campden
Gloucestershire
GL55 6TW

Office: 01386 438722
Mobile: 07811 382738
E-mail: nick@walnutacoustics.co.uk

Equipment Specifications

Measurement Device	Serial Number	Calibration Date	Calibration Certificate No.
Castle Mirus GA117 Class 1 Integrating Sound Level Meter	34260	16/08/2022	34260/81717
Castle Mirus GA607 Class 1 Calibrator	043479	16/08/2022	043479/81717

Table 5: Measurement equipment details

Note: current equipment calibration certificates can be found below.



Calibration Certificate

With Results

Issued By: Castle Group Ltd

Date Of Issue : 16/08/22

Certificate No : 34260/81717

Page 1 of 5

All instruments are tested to check compliance with particular specifications. These may be an appropriate British or International Standard, or if the instrument was not originally designed to meet any such Standard, or when the instrument was originally manufactured a relevant Standard did not exist, the instrument will be tested to the manufacturer's original specification.

Absolute acoustic calibration of acoustic calibrators and sound level meters is checked at one or more standard frequencies against an independent sound source with calibration directly traceable to a National Standards Laboratory. The applicable reference for the calibration of the test equipment is shown below.

The performance of the instrument was determined by comparison with the manufacturers' specification as found in the instrument handbook or other technical publication. Any significant uncertainty of the measuring system will also be included.

The instrument was allowed to stabilise for a period of 30 minutes prior to measurements made.

The ambient temperature and relative humidity throughout calibration were 23 ± 2 °C and 54% RH respectively.

Instruments used to carry out this calibration are as follows: -

Multifunction Calibrator 4226 Serial No: 3290080

Applicable Reference: CDK2101873.

Subject of Calibration: GA117

Instrument: Integrating 1/1 Octave Band SLM

Serial No: 34250

Preamplifier Data

Preamplifier Type: SV 18

Preamplifier Serial No: 32089

Microphone Data

Microphone Type: 7052E

Microphone Serial No: 54378

Basis Of Test: Compliance to IEC 61672-1 : 2002 Class 1, & IEC 61260: 1995 Class 1

Calibrated By:

O. L. Wrightson
(Approved Signatory)

Checked By:

M. Mann
(Approved Signatory)

Date of Calibration: 16 Aug 2022

Completed Status: Pass

Client: Walnut Acoustics

Address: 3 Furrow Way
Mickleton
Gloucestershire
GL55 6TW

Client Reference:

Castle Group Ltd

Seller Road, Scarborough Business Park, Scarborough, North Yorkshire YO11 3UZ, United Kingdom
t: +44 (0)1723 584250 f: +44 (0)1723 583728 e: esales@castlegroup.co.uk

www.castlegroup.co.uk



Calibration Certificate

Issued By: Castle Group Ltd

Date Of Issue : 16/08/22

Certificate No : 043479/81717

All instruments are tested to check compliance with particular specifications. These may be an appropriate British or International Standard, or if the instrument was not originally designed to meet any such Standard, or when the instrument was originally manufactured a relevant Standard did not exist, the instrument will be tested to the manufacturer's original specification.

Absolute acoustic calibration of acoustic calibrators and sound level meters is checked at one or more standard frequencies against an independent sound source with calibration directly traceable to a National Standards Laboratory. The applicable reference for the calibration of the test equipment is shown below.

The performance of the instrument was determined by comparison with the manufacturers' specification as found in the instrument handbook or other technical publication. Any significant uncertainty of the measuring system will also be included.

The instrument was allowed to stabilise for a period of 30 minutes prior to measurements made.

The ambient temperature and relative humidity throughout calibration were 23 ± 2 °C and 54% RH respectively.

Instruments used to carry out this calibration are as follows:-

Multifunction Calibrator 4226 Serial No: 3290080

Applicable Reference: CDK2101873.

Sound Level Meter 117 Serial No: 35781

Applicable Reference: UCRT21/1930

Subject of Calibration: GA607

Instrument: Dual level Calibrator with Barometer

Serial No: 043479

Supplied Barometer Data (If applicable)

Barometer Type: GA690

Barometer Serial No: 069353

Output Data Corrected for test conditions at 1kHz.

Reference Level (dB) : 94.0 & 103.9

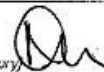
Refer to calibrator handbook for any applicable microphone cavity insertion correction.

Basis Of Test: Compliance to IEC 60942: 2003 Class 1/C

Calibrated By:
O. L. Wrightson
(Approved Signatory)



Checked By:
M. Mann
(Approved Signatory)



Date of Calibration: 16 Aug 2022

Completed Status: Pass

Client: Walnut Acoustics
Address: 3 Furrrow Way
Mickleton
Gloucestershire
GL55 6TW

Client Reference:

— Indicates item or information not available

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Appendix 5: Glossary of terms

Ambient Noise: Total sound level in a given situation at a given time usually composed of sounds from many sources near and far.

Assessment Level: the difference between a rating level and the background noise level in a BS4142 assessment.

Attenuation: A reduction in the intensity (and level) of a sound signal.

Background Noise Level: The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of a given time interval T, measured using the time weighting F, and quoted to the nearest number of whole decibels. [BS 4142:2019]

Decibel (dB): a unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 Pa, the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.

dBA: decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dBA broadly agree with people's assessment of loudness. A change of 3 dBA is the minimum perceptible under normal conditions, and a change of 10 dBA corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).

Distance Correction: a theoretical measure of how levels from sound sources reduce over distance through propagation.

Free Field:

1. A free sound field is a field in a homogeneous, isotropic medium free from boundaries. In practice it is a field in which the effects of the boundaries are negligible over the region of interest. The actual pressure impinging on an object (e.g., a microphone) placed in an otherwise free sound field will differ from the pressure which would exist at the point with the object removed, unless the acoustic impedance of the object matches the acoustic impedance of the medium.

2. An environment in which there are no reflective surfaces within the frequency region of interest.

3. A region in which no significant reflections of sound occur.

4. [BS 4142] suggests that free-field environmental noise measurements need to be made at least 3.5m from any reflecting structure.

$L_{A90,T}$: the A weighted noise level exceeded for 90% of the specified measurement period (T). In BS 4142:2019 it is used to define background noise level.

$L_{Aeq,T}$: the A-weighted equivalent continuous sound level - the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T).

L_{den} : (**day-evening-night noise level**) is the A-weighted, L_{eq} (equivalent noise level) over a whole day, but with a penalty of +10 dB(A) for night-time noise (22:00-07:00) and +5 dB(A) for evening noise (19:00-23:00).

L_{Amax} : the highest A weighted noise level recorded during a noise event. The time weighting used (F or S) should be stated.

Rating Level : The specific noise level plus any adjustment for the characteristic features of the noise in a BS 4142 assessment

Residual Noise : The ambient noise remaining at a given position in a given situation when the specific noise level is suppressed to a degree such that it does not contribute to the ambient noise.

Specific noise source : The noise source under investigation for a BS 4142 assessment.

Specific noise level: the A-weighted equivalent continuous sound level of the noise source under investigation for a BS 4142 assessment.

Steady Noise: Noise that gives fluctuations over a range of not more than 5 dB on a sound level meter set to frequency weighting A and time weighting S. [BS 4142:2019]

Appendix 6: Disclaimer

Recommendations in this report are for acoustics purposes only, and it is the responsibility of the client, project manager, construction company or architect to ensure that all other requirements are met including (but not limited to) structure, fire and Building Controls.

The calculations within this report are based upon sourced and/or calculated data. Complex flanking transmission paths through structures can lead to excessive vibration transmission. Also, build quality can greatly affect final sound levels and Walnut Acoustics takes no responsibility for the integrity of any physical work carried out. All reasonable and practicable installation techniques should be employed with noise reduction in mind including the use of isolation and anti-vibration materials in the mounting of all parts of any mechanical systems.

The opinions and interpretations presented in this report represent our best technical interpretation of the data made available to us. However, due to uncertainty inherent in the estimation of all parameters, we cannot, and do not, guarantee the accuracy or correctness of any interpretation. We shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, cost, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees.

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.

Except for the provision of professional services on a fee basis, Walnut Acoustics does not have a commercial arrangement with any person or company involved in the interests that are the subject of this report.

Walnut Acoustics cannot accept any liability for the correctness, applicability or validity for the information they have provided, or indeed for any consequential costs or losses in this regard. Our efforts have been made on a “best endeavours” basis and no responsibility or liability is warranted or accepted by Walnut Acoustics.

All data and mathematical content in this report has been checked thoroughly and is believed to be accurate at the time of issue. Errors and Omissions excepted.