

REFURBISHMENT OF NEPTUNE MILL, CHAPELTOWN STREET, MANCHESTER
PLANNING NOISE IMPACT ASSESSMENT

On behalf of:
Capital & Centric (Rush) Limited

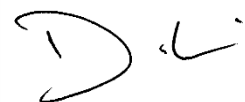
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1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Capital & Centric (Rush) Limited to carry out a noise impact assessment in connection with a proposed planning application for a refurbishment of Neptune Mill, Chapeltown Street, Manchester.
- 1.2 The location of the proposed commercial development is shown in Figure 1, and is currently a four/five-storey traditional mill building that comprises unused space formerly used as site welfare facilities for a nearby construction site on the ground floor, a mixture of open plan offices and meeting rooms currently used by Capital & Centric on the first floor, with the remaining floors unused. The site is bounded by Chapeltown Street to the north, Congou Street to the west, Baird Street to the south and the Crusader apartment development to the east. There is also a permitted apartment development to be located to the east of Portugal Street East diagonally opposite the front elevation of the building.
- 1.3 It is proposed to refurbish the site for commercial use to form a café/bar unit on the ground floor, refurbished offices for Capital & Centric on the first floor and further flexible office space to be let to third party tenants on the upper floors. No tenants for the ground floor café/bar demise or upper floor offices have been confirmed at this stage, but it is understood that the weekday daytime trading noise levels within the ground floor café/bar are anticipated to be low such that noise transfer to the first floor offices will not be significant. On that basis, this assessment focuses on the impact of existing external noise on the proposed offices and the potential impact of café bar evening trading noise and plant/equipment noise on nearby dwellings.
- 1.4 The assessment has been based on the layout shown on drawings prepared by the project architect J Davidson Architects, with the ground floor and first floor layouts shown in Figure 2 and Figure 3 respectively. We understand that proposals are for new double-glazed windows throughout and a natural ventilation strategy for the building. As such, the only likely new plant and equipment that will be installed will be some small WC extract fans on the roof and kitchen ventilation equipment for the ground floor café/bar and potentially AC/chiller condensers where future tenants require these. There are however no details of any proposed plant and equipment available at this stage.
- 1.5 The noise assessment has included:
 - An inspection of the site and surrounding area;

- Measurement of noise levels during representative periods of the daytime and night/early morning;
- Determining appropriate trading noise limits for the café/bar; and
- Advising on suitable noise limits for new fixed plant and equipment.

1.6 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 RELEVANT GUIDANCE & CRITERIA

Manchester City Council Criteria

- 2.1 Manchester City Council have well-established noise design criteria that are relevant to this development as follows:

‘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.’

‘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.’

- 2.2 Manchester City Council however have no specific noise criteria that apply to offices.

Indoor Ambient Noise Levels for Offices & Ground Floor Café/Bar

- 2.3 In adopting criteria for the control of indoor ambient noise level (IANL) criteria for the offices in respect of external noise ingress, we have referred to the following relevant guidance.

- BS 8233: 2014 *Guidance on sound insulation and noise reduction for buildings*
- British Council for Offices (BCO) *Guide to specification 2014*
- CIBSE Guide A 1999

- 2.4 Each of the above provides slightly different design targets, so we have adopted reasonable targets based upon our experience of the various guidance documents and similar developments. The adopted performance targets are set out below:

Table 1: Adopted IANL criteria for critical spaces.

Internal space	Adopted IANL criteria in dB $L_{Aeq,T}$
Open plan offices	40
Meeting rooms/executive offices	35
Café/restaurant dining area	45

- 2.5 It is noted that the natural ventilation strategy means that the indoor ambient noise level criteria may not be achieved in all circumstances since open windows, regardless of glazing specification, only

provide around 15 dB reduction of external noise. As such, we recommend that the indoor ambient noise criteria should apply with windows closed.

3.0 NOISE SURVEY

- 3.1 A noise survey has been carried out to quantify the baseline environmental noise climate at the site. The results have been used as a basis for evaluating the need to control the impact of existing environmental noise on noise sensitive elements of the scheme and for determining the relevant noise design limits for noise generating parts of the scheme.
- 3.2 The noise survey was carried out on Friday 24 to Monday 27 March 2023. The noise measurements were taken at two positions as described below and shown in Figure 1:
- A. Adjacent to Baird Street opposite the Metrolink. This measurement location was chosen to be representative of the Crusader apartments with a view of the Metrolink line and the approved apartments on Portugal Street East, southeast of the site.
 - B. To the rear of the building, with a view of Chapeltown Street. This measurement location was chosen to be representative of the sensitive receptors at the Crusader residential dwellings to the rear of the building and those on the opposite side of Chapeltown Street.
- 3.3 At Locations A & B, noise measurements were taken with automatic data-logging equipment as a series of consecutive 15-minute periods (in line with the guidance set out in BS 4142: 2014+A1:2019) over a full survey period and included one-third octave band analysis and audio recording. Weather conditions during the survey were generally dry, calm and mild with daytime temperatures of around 11°C and therefore generally suitable for noise measurements. There was however a period of rain in the late afternoon and evening of Friday 24 March 2023. This has not however affected the following analysis and the corresponding adopted noise limits.
- 3.4 The full results of the noise survey at Locations A and B are shown in Appendix II and the daytime and adopted office hours noise exposure values are summarised below.

Table 2: Summary of Noise Levels Measured (dB)

Location	Range of Measured daytime $L_{Aeq,15min}$ noise levels (dB)	Adopted office hours average dB $L_{Aeq,T}$ (08:00 – 18:00)
A – Baird Street	41 – 71*	60
B – Chapeltown Street	45 – 70*	53

*There was a single 15-minute period of anomalously elevated noise levels during the early evening of 25 March 2023 due to a security PA system in the vicinity of the site.

- 3.5 From observations whilst on site and review of the recorded audio, the noise climate was found to be predominantly due to local Metrolink activity along with distant road noise traffic.
- 3.6 The measured background noise levels for daytime, evening and night-time periods at Locations A & B were as follows:

Table 3: Summary of measured background noise levels

Period	Measured $L_{A90,15min}$ noise levels (dB)		
	Range	Mean	Mode
Location A			
Daytime (07:00 – 19:00)	46 – 58	52	49
Evening (19:00 – 23:00)	44 – 56	51	56
Night-time (23:00 – 07:00)	38 – 55	47	51
Location B			
Daytime (07:00 – 19:00)	43 – 54	49	46
Evening (19:00 – 23:00)	44 – 52	48	45
Night-time (23:00 – 07:00)	40 – 52	46	45

- 3.7 In order to establish the appropriate design limit for the control of noise break-out from the ground floor café/bar to the nearest residential receptor, we have analysed the results of the octave band background noise levels measured at Location A (i.e. the front elevation above the proposed café/bar shopfront) during the late evening to obtain a logarithmic average for the most sensitive period of Sunday 22:00 – 23:00. It should be noted that the measured background noise levels from around 20:00 hours onwards were very similar to those between 22:00 and 23:00. The resulting adopted values are as follows:

Table 4: Adopted representative mid-late evening background noise levels

Description	Octave Band Centre Frequency (Hz)							A
	63	125	250	500	1k	2k	4k	
Adopted background noise in dB $L_{90,1hour}$	49	45	45	41	41	35	23	45

4.0 NOISE ASSESSMENT & RECOMMENDATIONS

External Noise Ingress

- 4.1 The typical daytime noise levels at the site were found to be 60 dB and 53 dB L_{Aeq} at the front and rear elevations respectively. On the basis that standard thermal double glazing provides an airborne sound insulation performance of around 25 dB $R_w + C_{tr}$, the corresponding internal noise levels will be no higher than around 35 dB L_{Aeq} and therefore within the most stringent adopted IANL criteria (i.e. that for meeting rooms/executive offices).

Café/Bar Trading Noise Impact on Dwellings

- 4.1 Instead of adopting noise levels for the ground floor café/bar during busy evening trading periods and determining whether there will be any resulting noise impact outside nearby dwellings, we have instead calculated the maximum permissible entertainment (i.e. music) noise levels that can be accommodated by the ground floor shell whilst still meeting the Manchester City Council noise criteria.
- 4.2 Our calculations have taken into account the sound reduction indices of the solid masonry and glazed areas of the premises shopfront and the distances from the centre of the shopfront to the nearest/most exposed dwellings those being the approved apartments on Portugal Street East diagonally opposite the site, since apartments at the adjacent Crusader development do not have any direct line of sight of the main shopfront. The calculations are shown in Appendix III. The calculated maximum permissible entertainment (i.e. music) noise levels are as follows:

Table 5: Maximum permissible ground floor café/bar music noise levels during evening trading (dB)

Description	Octave band centre frequency (Hz)							A
	63	125	250	500	1k	2k	4k	
Maximum permissible music noise in L_{eq}	89	91	87	88	85*	85*	80	91

*Note – the actual calculated highest permissible noise levels in these frequency bands are considerably higher, but such levels would not be desirable in the context of the highest permissible values at lower frequencies, so we have recommended appropriate alternative values.

- 4.3 The above music noise limits should provide a reasonable degree of flexibility in terms of trading style for the ground floor tenant, but it is unlikely that high foreground recorded music noise levels or live music will be feasible.
- 4.4 We recommend that ground floor doors and windows are kept closed during mid-late evening periods. We also recommend that lease for the ground floor café/bar demise includes appropriate wording to

limit evening period music noise levels to no more than the values set out in Table 8 unless the tenant commensurately improves the sound insulation of the shell (e.g. by installing a suspended mass barrier acoustic ceiling).

Noise limits for Fixed Plant & Equipment

- 4.5 At this stage, no details are available of any plant and equipment to be installed as part of the development. As such, we have recommended appropriate noise design limits which can be considered in the selection and installation of the equipment.
- 4.6 Based upon the measured background noise levels as set out in Table 3 and the requirements of the relevant Manchester City Council criterion, the relevant rating noise limits that apply outside the nearest dwellings are therefore as follows (using either the mode or mean, whichever was lower to be a robust assessment):

Table 6: Plant Noise Limits in dB L_{Ar}

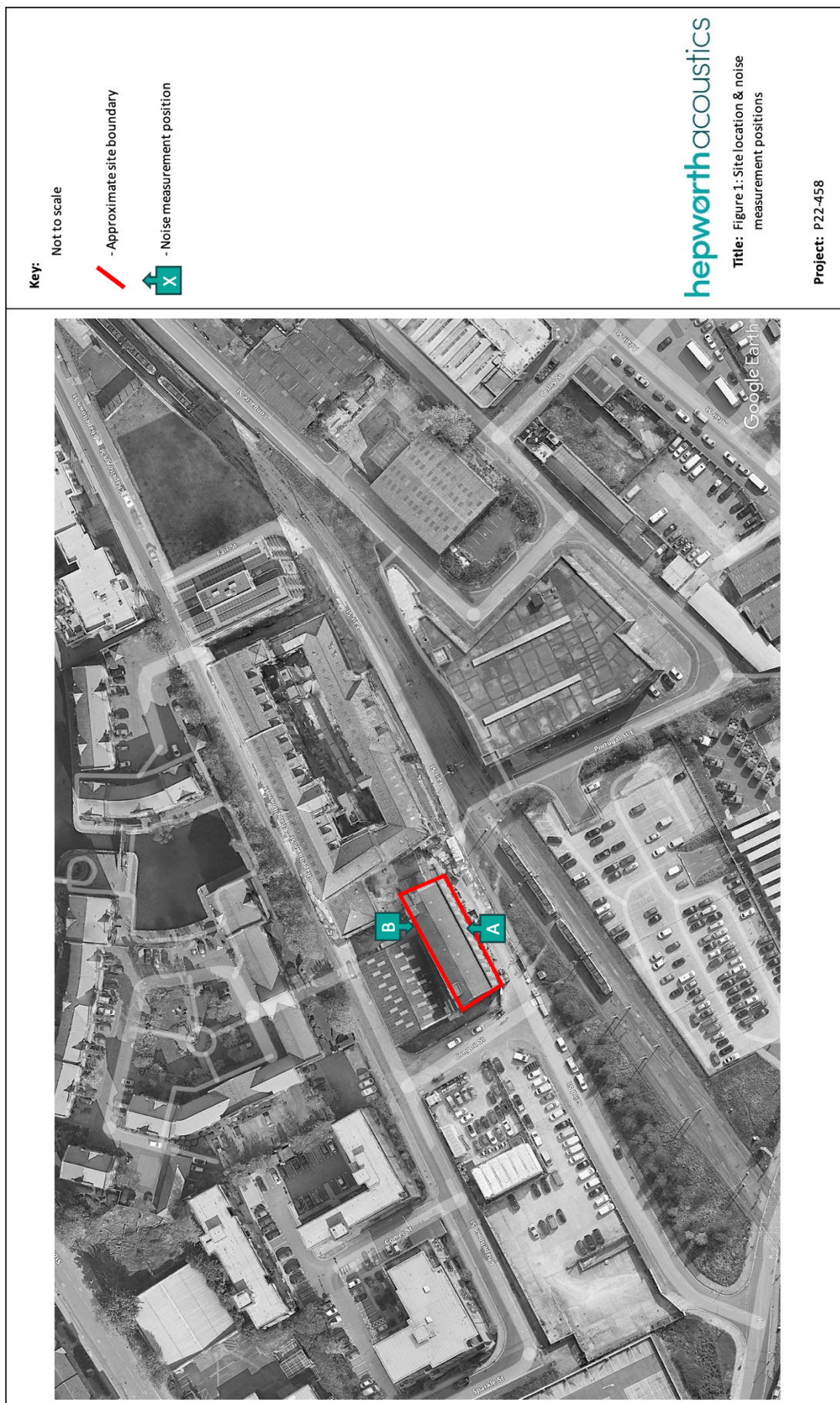
Location	Noise rating (L_{Ar}) limit for all plant combined		
	Day (07:00 – 19:00)	Evening (19:00 – 23:00)	Night (23:00 – 07:00)
Outside dwellings to the front	44	46	42
Outside dwellings to the rear	41	40	40

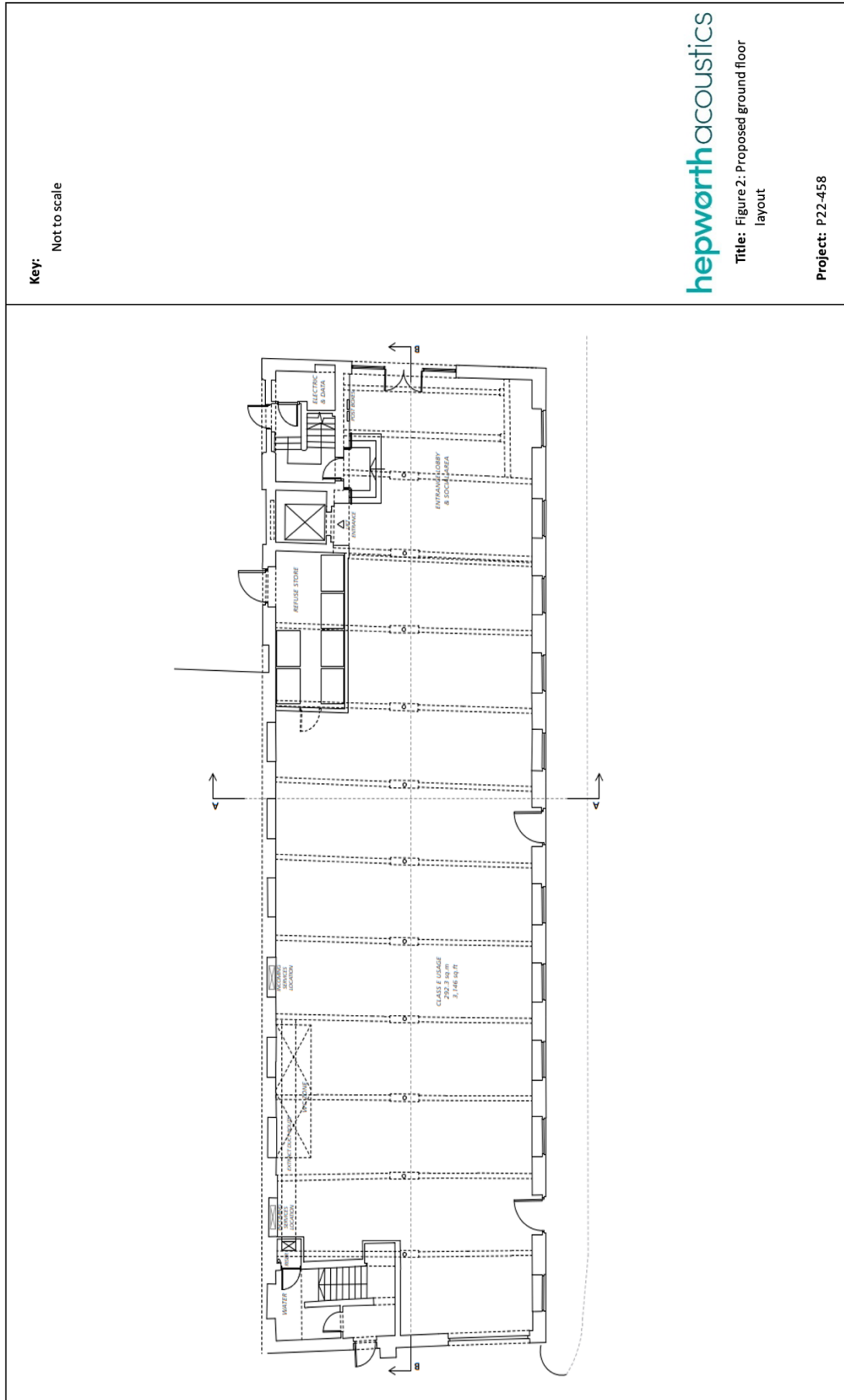
- 4.7 The need to adequately control plant and equipment noise can be secured by an appropriately worded planning condition.
- 4.8 We recommend that lease for the ground floor café/bar demise includes appropriate wording to ensure that the tenant is responsible for ensuring any necessary plant/equipment meets relevant planning noise limits.
- 4.9 For general guidance purposes, the following measures may need to be incorporated to adequately control noise:
- Specifying low noise equipment;
 - Careful siting of equipment as far from apartment windows as possible;
 - Installation of acoustic enclosures around the fixed plant and machinery where necessary;
 - Any equipment that has the potential to generate vibration should be isolated from the building with effective anti-vibration mounts; and

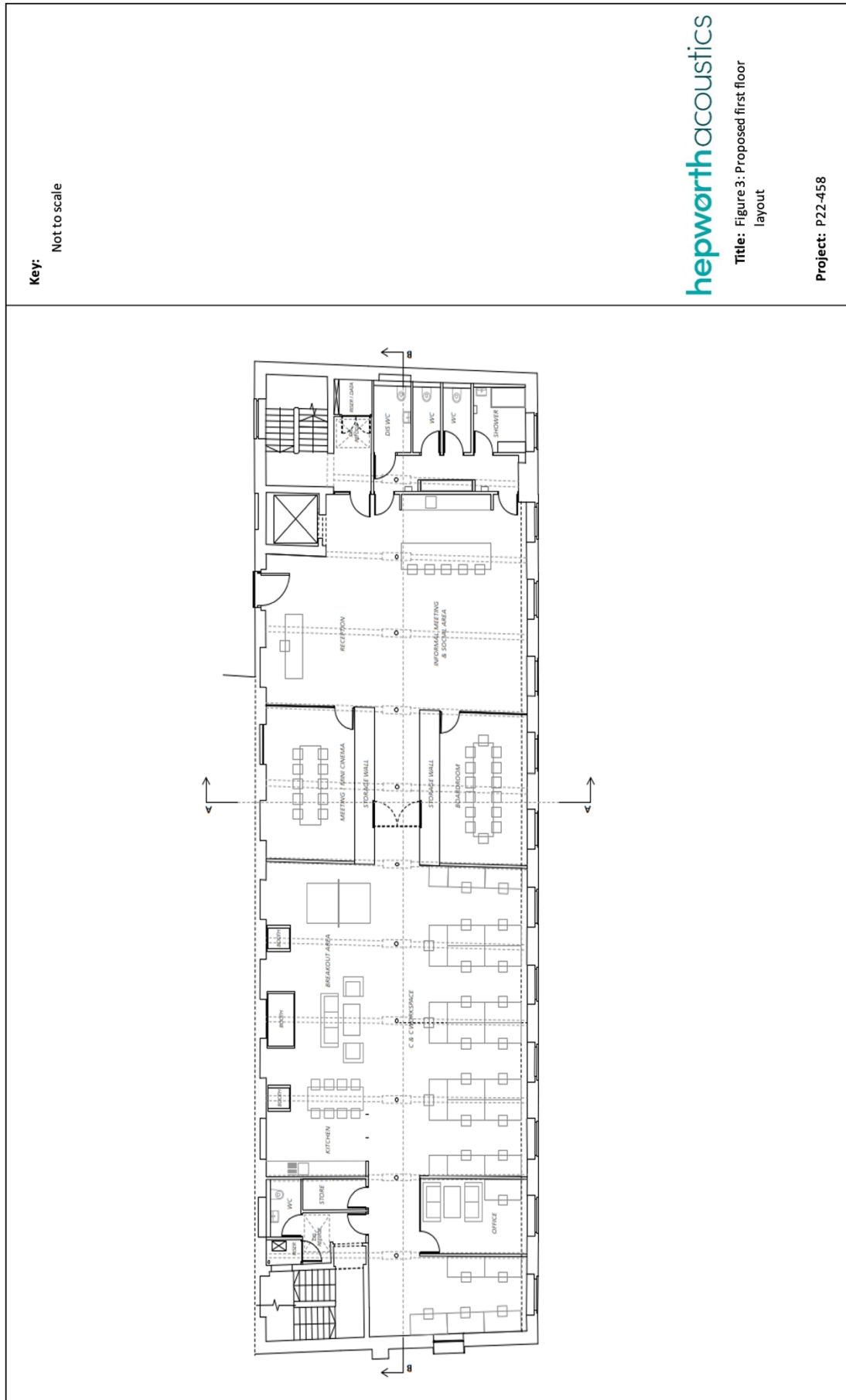
- Carrying out regular maintenance of equipment to minimise noise emissions.

5.0 SUMMARY

- 5.1 Hepworth Acoustics Ltd was commissioned by Capital & Centric (Rush) Limited to carry out a noise impact assessment in connection with a proposed planning application for a refurbishment of a commercial development at Neptune Mill, Chapeltown Street, Manchester.
- 5.2 The development will comprise a ground floor café/bar demise, with offices on the upper floors.
- 5.3 The assessment has included a baseline environmental noise survey to establish the existing noise climate of the area.
- 5.4 Based upon the findings of the noise survey, and taking into account the usual noise control requirements of Manchester City Council and other relevant guidance, we have made a series of recommendations in order to control the ingress of external noise at the site, café/bar noise transmission to nearby dwellings, and recommended appropriate noise limits for new external plant/equipment.
- 5.5 Subject to our recommendations, appropriate acoustic conditions will be achieved within the development and there will be no unacceptable noise impact as a result of the development.







Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as Kilohertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

The frequency spectrum can be divided up into octave bands or third octave bands.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

$L_{Aeq,T}$ This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, $L_{Aeq,T}$ is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

$L_{A90,T}$ This is the A-weighted noise level exceeded for 90% of the time period. $L_{A90,T}$ is used as a measure of background noise.

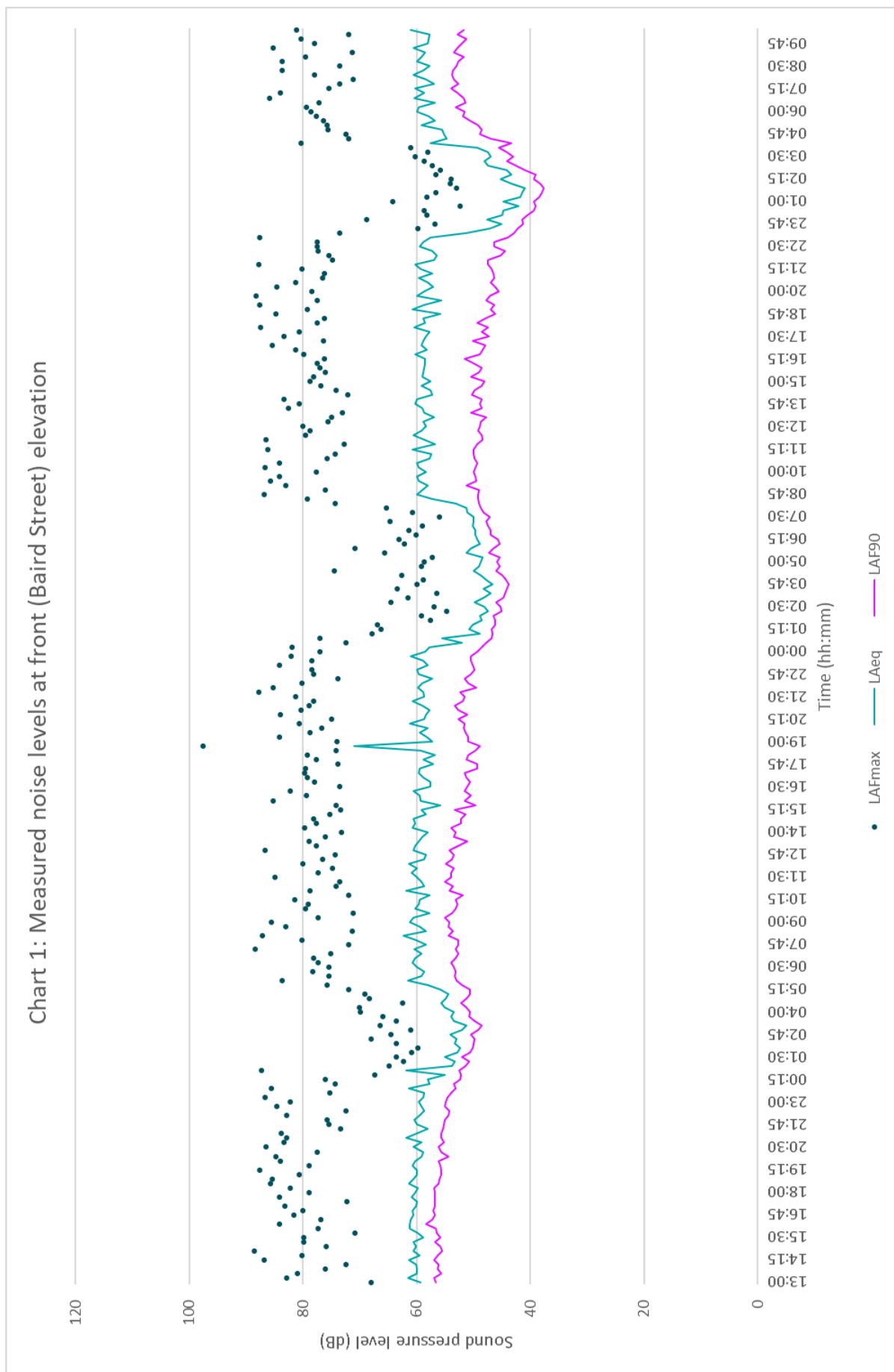
R_w This is the 'Weighted Sound Reduction Index' (R_w), which is a single figure quantity of R , the laboratory measured Sound Reduction Index.

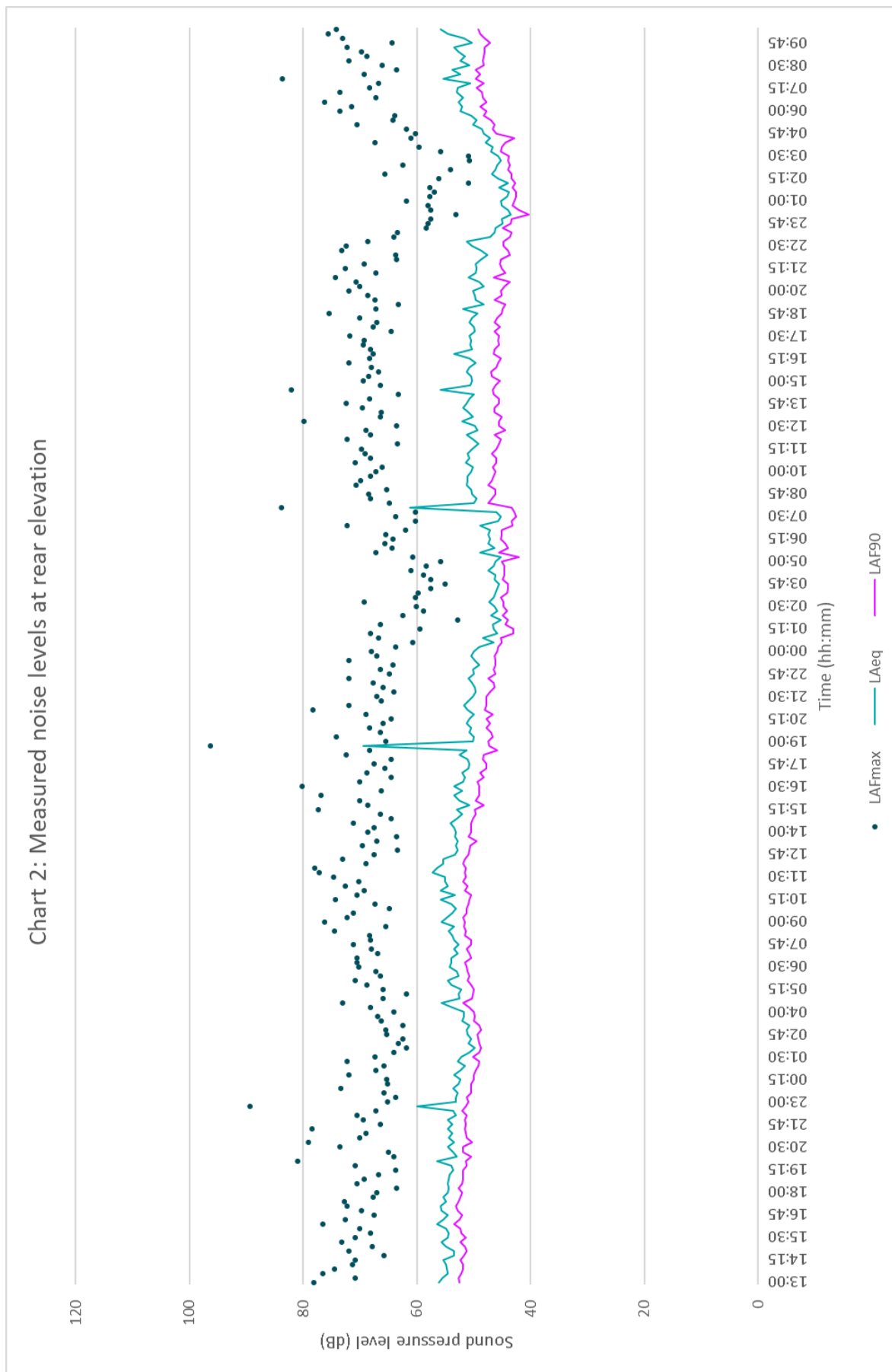
C_{tr} This is a weighted transport noise spectrum, which can be added to $D_{nT,w}$ or R_w in some standards to account for the spectral composition of different sound sources.

Appendix II: Noise Survey Results

Date(s):	Friday 24 March 2023 – Monday 27 March 2023
Equipment	2 x NTi XL2 'Class 1' sound analysers (s/n: A2A-20361-E0 & A2A-20228-E0) with associated calibrator and environmental outdoor monitoring kit
Weather	Light rain and elevated winds during the evening on Friday 24 th March 2023, otherwise generally calm and wise. Daytime temperatures around 11°C.

Charts overleaf





Appendix III – Entertainment Noise Break-out Calculations

Project Number	P22-458
Description	Internal noise breakout from café/bar to nearest residential receptor

hepworthacoustics

Noise Break-out v6.0 February 2019

Source - Woods Practical Guide to Noise Control

	63	125	250	500	1k	2k	4k	A
SPL_{int}	89	91	87	88	85	85	80	91

Element 1 - Wall

SPL_{int}	89	91	87	88	85	85	80	91
Element SRI	34	40	44	45	51	56	56	
Area (S) =	104.0	20	20	20	20	20	20	
Distance (r) =	51.0	-34	-34	-34	-34	-34	-34	

858233 Example - Brick and block external wall

At receiver	27	23	15	15	6	1	-4	15
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 $\rightarrow = SPL_{int} - SRI + 10 \log S - 20 \log(r) - 14$

Element 2 - Glazing

SPL_{int}	89	91	87	88	85	85	80	91
Element SRI	18	24	20	25	35	38	35	
Area (S) =	29.3	15	15	15	15	15	15	
Distance (r) =	51.0	-34	-34	-34	-34	-34	-34	

4:12:4 mm

At receiver	38	34	34	30	17	14	12	30
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 $\rightarrow = SPL_{int} - SRI + 10 \log S - 20 \log(r) - 14$

Element 3 - Door

SPL_{int}	89	91	87	88	85	85	80	91
Element SRI	18	24	20	25	35	38	35	
Area (S) =	14.1	11	11	11	11	11	11	
Distance (r) =	51.0	-34	-34	-34	-34	-34	-34	

4:12:4 mm

At receiver	34	30	30	26	13	10	8	26
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 $\rightarrow = SPL_{int} - SRI + 10 \log S - 20 \log(r) - 14$

Overall Results

	63	125	250	500	1k	2k	4k	A
Resulting	39	35	35	31	18	15	13	31

Background/limit	39	35	35	31	31	25	13	35
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L90 - 10 dB

Difference	0	0	0	0	-13	-10	0	-3
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