BRAIDEN ACOUSTICS LTD

Innovation Forum | 51 Frederick Road | Salford | Manchester | M6 6FP

NOISE IMPACT ASSESSMENT

Prepared For : Samuel Maugham Date : 2 Sep 2024

Site : Former Granada Cleaners, Bridge St, Manchester Report No. : 11214revH

1 INTRODUCTION

Braiden Acoustics has been commissioned by Samuel Maugham to undertake an acoustic survey at the site of the Former Granada Cleaners, Bridge St, Manchester to discharge noise conditions related to planning application 139482/FO/2024 which proposes "Change of use from existing dry cleaners to bar/eatery - proposals include front elevational changes and internal alterations.".

1.1 PLANNING APPLICATION

Planning application 39482/FO/2024 was approved with conditions on the 7 May 2024. The relevant noise conditions are as follows:

8) a) The premises shall be acoustically insulated and treated to limit the break out of noise in accordance with a noise study of the premises and a scheme of acoustic treatment that has been submitted to and approved in writing by the City Council as local planning authority. The scheme shall be implemented in full before the use commences or as otherwise agreed in writing by the City Council as local planning authority.

Where entertainment noise is proposed the LAeq (entertainment noise) shall be controlled to 5dB below the LA90 (without entertainment noise) in each octave band at the facade of the nearest noise sensitive location, and internal noise levels at structurally adjoined residential properties in the 63HZ and 125Hz octave frequency bands shall be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (Leq,5min), respectively.

b) Prior to occupation of the development a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that acceptable criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.

Reason - To safeguard the amenities of the occupiers of the building and occupiers of nearby properties pursuant to policies DM1 and SP1 of the Manchester Core Strategy (2012) and saved policy DC26 of the Unitary Development Plan (1995)

9) a) 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 (LAeq) below the typical background (LA90) level at the nearest noise sensitive location. Prior to commencement of the use hereby approved the scheme shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site. The scheme shall be implemented in full before the use commences or as otherwise agreed in writing by the City Council as local planning authority.

b) Prior to the operation of the scheme a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall also undertake post completion testing to confirm that the noise criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.

Reason - To minimise the impact of the development and to prevent a general increase in pre-existing background noise levels around the site pursuant to policies DM1 and SP1 of the Manchester Core Strategy (2012) and saved policy DC26 of the Unitary Development Plan (1995)

10) The premises shall not be open outside the following hours unless otherwise agreed in writing by the City Council as local planning authority:-

-Sunday to Thursday: 10:00 to 01:00

-Friday and Saturday 10:00 to 02:00

Reason - To safeguard the amenities of the occupiers of nearby residential accommodation pursuant to policy DM1 and SP1 of the Manchester Core Strategy (2012) and Unitary Development Plan for Manchester (1995).

12) The openable section of the shopfront shall be kept secured shut at all times to prevent an unacceptable level of breakout noise.

Reason - in the interest of the amenity of surrounding occupiers, pursuant to policies DM1 and SP1 of the Manchester Core Strategy (2012) and saved policy DC26 of the Unitary Development Plan for Manchester (1995)

Further comments were made by the EHO in an email dated Friday, 26 July 2024:

NSE4 – Noise breakout condition

1. Section 5.2.1.1 includes recommendations with regard to the internal repairs and the replacement ceiling requirements which we can accept and must be complied with fully by the contractor. Validation will need to be provided as part of the verification element of the condition to confirm compliance with the recommendations. (to be addressed at validation stage)

2. The assessment has included a brief assessment of noise breakout from the front to the residential receptor at 65 Bridge Street with doors closed and based on a lobbied door set recommended in section 5.2.2.1. We can accept the lobbied door set recommendations and Validation will need to be provided as part of the verification element of the condition to confirm compliance with the recommendations. (to be addressed at validation stage)

3. The report still hasn't included assessment with the retractable doors / glazing open and has just stated that these will need to be closed by 9pm. We will need an assessment of noise at the receptor with the retractable glazing system open based on the proposed internal noise level of 90dB up to 9pm. The background noise assessment has only taken measurements at the rear of the building which may not be entirely representative at the front as the rear is impacted by building services plant. I understand the background noise levels for the assessment for breakout post 9pm (with doors closed and lobbied door set in situ) at the front has been taken from another report for this location undertaken by Nova Acoustics so this report can be used for daytime LA90 at the front of the building for assessment with retractable glazing open. 90dB with doors open seems excessive so this will require review.

4. Confirmation of how the internal noise levels will be set and subsequently controlled will also need to be provided and how a reduced level will be controlled automatically or music automatically shut off when the glazed panels are retracted or after a certain time to avoid human error.

NSE6 – Plant Noise

As above, the acoustic report has not been uploaded to the portal for this application which will be required. However, we have had some discussion already and based on the latest Braiden Acoustic assessment dated 4th February 2024 revD I can accept the plant noise assessment for the KEF and the 2x Chiller units. We will require a validation assessment to address part b) of the condition which will need to include actual noise measurements at the receptor to demonstrate that the calculated noise level and the condition criteria has not been exceeded when all the plant is in full use during the most noise sensitive times. (to be addressed at validation stage)

To summarise, the remaining issues to be addressed, at this stage, are:

1. Assess noise break out via the front façade with retractable windows open and closed in relation to proposed residential at 65 Bridge St.
2. Confirmation of how the internal noise levels will be set and subsequently controlled

1.2 AIM

This report will address all the relevant noise sources (as described above) and receivers and suggest mitigation, where necessary, to ensure relevant noise thresholds are achieved so that the following conditions can be either partially or wholly discharged:

Condition 8
Condition 12.

2 DESCRIPTION OF SITE

The site is a three-storey building within a commercial terraced row on Bridge Street in Manchester city centre.



Figure 1
Street view of site

2.1 SITE LOCATION AND SURROUNDING USES

The property is bounded by Bridge Street to the south (front) and Back Bridge Street to the north (rear). There are commercial units either side with some office / storage above. Directly above the site, and to the front, is The One Thai Massage (as shown in Figure 1).



Figure 2
Site location

On the other side of Back Bridge Street, on the upper floors, are more storage / office spaces, namely the Bruntwood office of Kings House, highlighted in orange. The same can be said for the uses above the commercial units on each side of Bridge Street, although these are predominantly storage / commercial on the upper floors.

There is potential residential accommodation on the upper floors of 65 Bridge Street, as shown in Figure 2. The pertinent planning application is 131395/FO/2021 which was approved with conditions on the 1st November 2021.

2.1.1 Nearest sensitive receptors

The nearest potential receptors will be residential dwellings on the upper floors of 65Bridge Street.



Figure 3
Proposed residential in relation to proposed bar and eatery

2.2 PROPOSED USE

It is proposed to fit out the building as shown in Figure 4 and Figure 5.

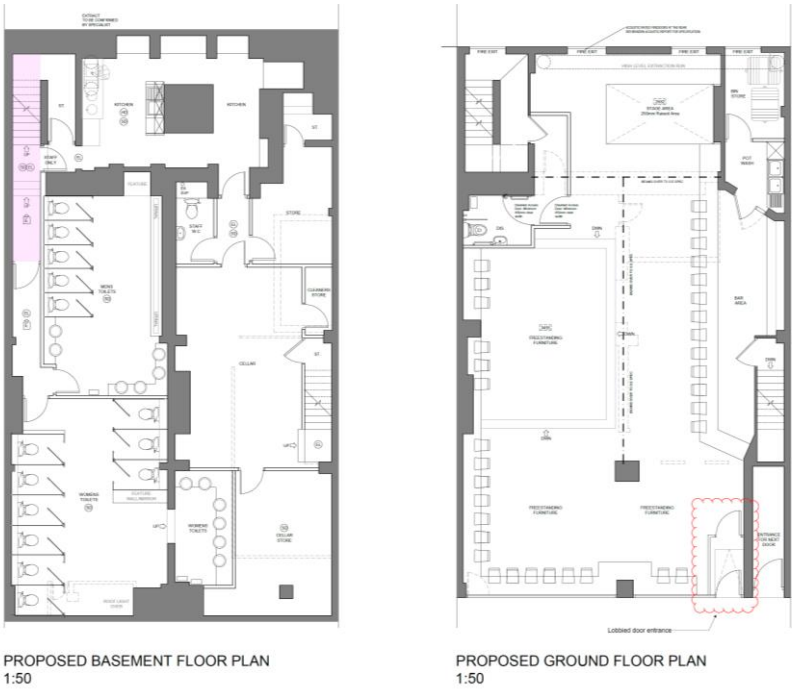


Figure 4
Proposed Basement and Ground floor layouts

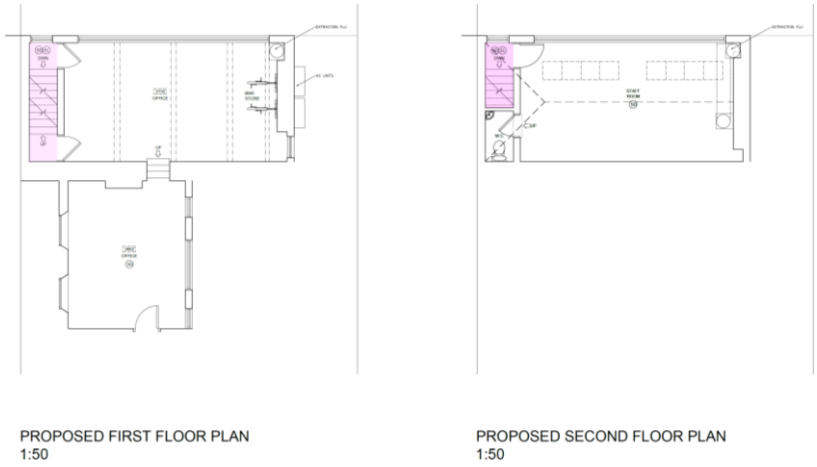


Figure 5
Proposed First and Second floor layouts

2.2.1 Opening hours

The site will be open during the following hours:

Daily 10:00 – 04:00

2.2.2 Building services

The external plant comprises of kitchen extract ventilation.

There are also 2no. AC external condenser units at first floor level behind a retaining wall.



Figure 6
Rear elevation showing AC condensers and extract duct

2.2.2.1 Kitchen Ventilation

The comments from the Ventilation engineer are as follows:

[…] diameter of ductwork is 450mm

John Braiden BSc & MSc Acoustics, MIOA
Acoustic Consultant

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S&P CVAT-4-6000-450 ND 0.75KW Centrifugal Acoustic Kitchen Extract Fan + Inverter VFD 1Ph>3Ph 2.2KW - CVAT PACK 5

The Jet Cowl will be 1000mm past the ridge,

all ductwork fan odour controller and silencers are all internal

Ductwork is from the basement through to the top floor followed by jet cowl 1000mm above ridge. within this route is the Fine Filtration which is 1200w x 800h x 600d and OZONE, fan and silencer

The silencer is a 1D unpodded type, assumed 450mm in diameter.

Extraction Fan

S&P CVAT/4-6000/450N D

Silencer

1x 1D Attenuator

Ductwork

The fan will be within the canopy in the basement. The ducting will rise vertically through the ground floor turn 90deg horizontally and travel along the rear of the building and turn 90deg and rise vertically to the second floor, turn 90deg horizontally and turn 90deg to rise vertically near to the roof ridge. The cowl will terminate 1m above the ridge, as shown in Figure 6.

The kitchen extract ventilation system will only operate during opening hours.

2.2.2.2 External Condenser units

The location of the proposed external condenser units is shown in Figure 5 and Figure 6.

2 x Midea MOU-36HDN1-Q - Outdoor Units.

		DC INVERTER	MOU-36HDN1-Q Outdoor Unit
CAPACITY	COOLING CAPACITY	Btu/h Kw	36000 10.5
	HEATING CAPACITY	Btu/h Kw	38000 11.4
ELECTRICAL	POWER SUPPLY	V~Hz, ph	240, 50, 1
	POWER INPUT (kw)	COOLING HEATING	
PERFORMANCE	EER	W/W	
	COP	W/W	
	AIR FLOW VOLUME	M3/H	5000
	NOISE LEVEL dB(A)		55
DIMENSIONS	DIMENSION (mm)	BODY (wxhxd) PANEL	990x966x354

Figure 7
Midea Outdoor Unit specifications

The Sound Pressure Level (SPL) of the Midea outdoor unit is 55 dB @ 1m.

2.2.3 Sound system

The sound system, at the time of writing, is unknown.

3 ACOUSTIC CRITERIA AND METHODOLOGY

3.1 BS 4142

BS 4142:1999 "Method for rating industrial noise affecting mixed residential and industrial areas" [1] assesses industrial noise with regards to nearby residential dwellings. The guidance is commonly used to compare the equivalent noise from an industrial source only (*specific noise level*), L_{Aeq}, to the background noise level, L_{A90}, at the nearest sensitive receptor (NSR).

This Standard has been recently updated, BS 4142:2014 "Methods for rating and assessing industrial and commercial sound" [2]. Whereas the old standard added 5dB 'penalty' to the Specific Noise Level (SNL) if the noise source has a 'character' that can draw attention that may be described as tonal, intermittent or impulsive, the new standard gives clearer guidance on noise 'character'. Furthermore, the previous Standard gave only one 5 dB penalty whereas the new Standard may not. When added to the specific noise level it forms the *rating level*. The new Standard gives the guidance for the following types of noise character:

> *Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed.*
>
> *Correct the specific sound level if a tone, impulse or other characteristic occurs, or is expected to be present, for new or modified sound sources.*
>
> *NOTE 1 The prominence of tonal or impulsive sound from a source can be masked by residual sound. In many cases the amount of masking varies as the residual sound changes in level and possibly character. The source's tonal and/or impulsive characteristics could also vary with time.*
>
> *Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention.*
>
> *Tonality*
>
> *For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.*
>
> *Impulsivity*
>
> *A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible.*
>
> *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 3 dB can be applied.*
>
> *NOTE 2 Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.*
>
> *Intermittency*
>
> *When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.*

Once a penalty for noise character is added to the Specific Noise Level then this is termed the *Rating Level*.

The background level is then compared to the rating level. It is usual that the rating level due to the source should be below the background noise level at the nearest sensitive receptor; indeed BS 4142 states:

> *"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."*

3.2 BS 8233: 2014

3.2.1 Residential spaces

The British Standard BS 8233:2014 "Guidance on sound insulation and noise reduction for buildings" gives guidance on recommended indoor ambient noise levels for residential dwellings.

Room	Criterion	$L_{Aeq,T}$	
		night	day
Bedroom	Sleeping	30	35
Dining Room/Area	Dining	--	40
Living Room	Resting	--	35

Table 1
Recommending indoor ambient noise level thresholds from anonymous noise (taken from Table 4, BS 8233:2014)

Internal levels are simply predicted by the subtraction of the estimated sound reduction index (SRI) of the building façade from the external free field noise measurements. When considering the SRI of a particular façade it is usual to only consider the glazing as this is the weakest element acoustically.

3.2.2 Non-residential spaces

Permitted noise ingress levels in non-residential spaces is given in Table 6 of BS8233 "Typical noise levels in non-domestic buildings".

Activity	Location	Design range dB $L_{Aeq,T}$
Speech or telephone communications	Department store Cafeteria, canteen, kitchen	50 – 55
	Concourse Corridor, circulation space	45 – 55
Study and work requiring concentration	Library, gallery, museum	40 – 50
	Staff/meeting room, training room	35 – 45
	Executive office	35 – 40
Listening	Place of worship, counselling, meditation, relaxation	30 – 35

Figure 8
Table 6 of BS8233 "Typical noise levels in non-domestic buildings"

3.3 COUNCIL CRITERIA

3.3.1 External plant noise

It is usual for Councils to adhere to a BS4142:2014 for industrial noise. Manchester council are no different and state that:



... Rating noise level of 5dB below the existing background (La90) in each octave band at the nearest noise sensitive location

4 Measurement Details

External noise measurements were made at the rear of the property where the external plant will be located.

4.1 Visit 1 - REAR

4.1.1 Monitoring overview

Personnel: John Braiden, BSc & MSc Acoustics, MIOA.

Equipment: NTi XL2 integrated real time analyser & B&K 4231 calibrator.

The sound level meter was calibrated before after the measurements with no drift reported.

Monitoring was unmanned but with audio recorded.

4.1.2 Monitoring locations

The microphone was placed one metre from a rear window on the second floor, as shown in Figure 9.

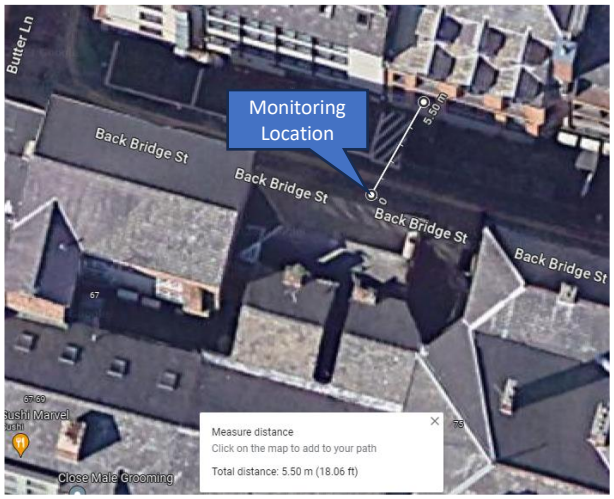
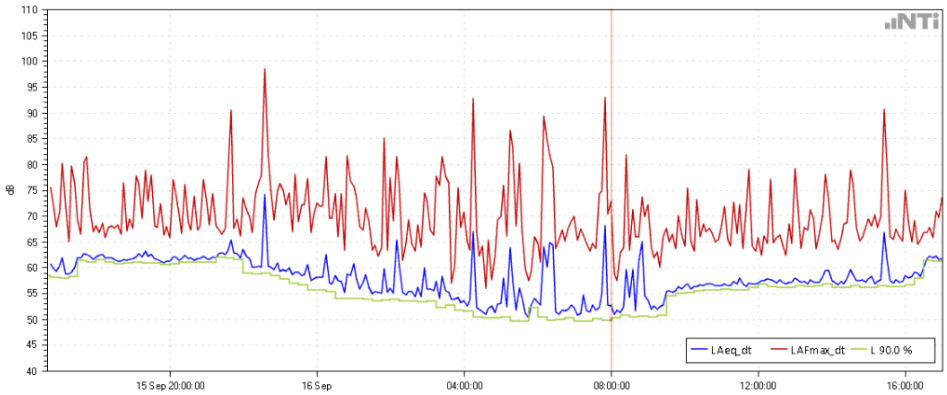


Figure 9
Monitoring location

4.1.3 Monitoring results

Noise levels at the rear were high due to an abundance of external plant in Back Bridge Street, servicing the various commercial uses on Bridge Street and also air conditioning for the offices in Kings House. There was also city centre 'hum' from road traffic noise and general urban noise.



Cursor: Position=2023-09-16 08:00:00 LAeq_dt=52.5 dB LAFmax_dt=72.7 dB L 90.0 %=49.8 dB

Figure 10
Time History - REAR

The lowest 15-minute Background Noise Level, when the offices would be in use was 49.9 dB L_{A90}.

4.1.3.1 Background Noise Level

The typical Background Noise Level, for both the night and day time periods was determined by histograms, as can be seen in figures below.

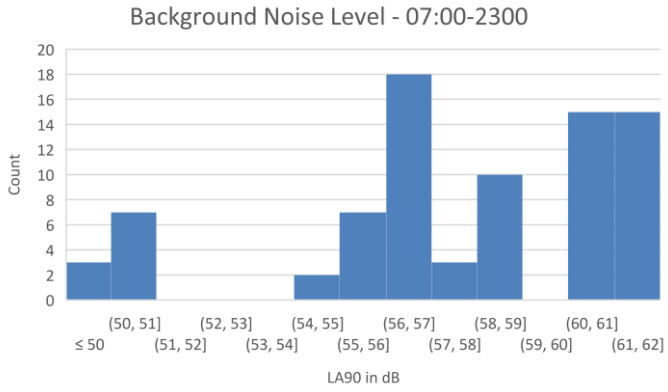


Figure 11
Background Noise Level histogram 07:00 – 23:00

Therefore, the typical Background Noise Level during the day time is 56 dB L_{A90}.

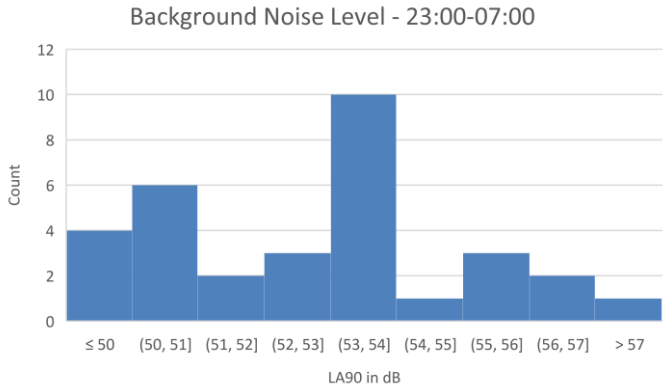


Figure 12
Background Noise Level histogram 23:00 –07:00

Therefore, the typical Background Noise Level during the night time is 53 dB L_{A90}.

4.2 VISIT 2 – FRONT

4.2.1 Monitoring overview

Personnel: John Braiden, BSc & MSc Acoustics, MIOA.

Equipment: NTi XL2 integrated real time analyser & B&K 4231 calibrator.

Weather 14- 18degC, <5m/s wind, 20-40% cloud

Time / Date: Tuesday 06/08/2024 at 20:05:24 for over 23 hours.

The sound level meter was calibrated before after the measurements with no drift reported.

Monitoring was unmanned but with audio recorded.

4.2.2 Monitoring location

The microphone was placed one metre from a front window on the first floor facing Bridge St.

4.2.3 Monitoring results

Noise levels at the front were high due to Bridge Street being a busy street with frequent bus movements.

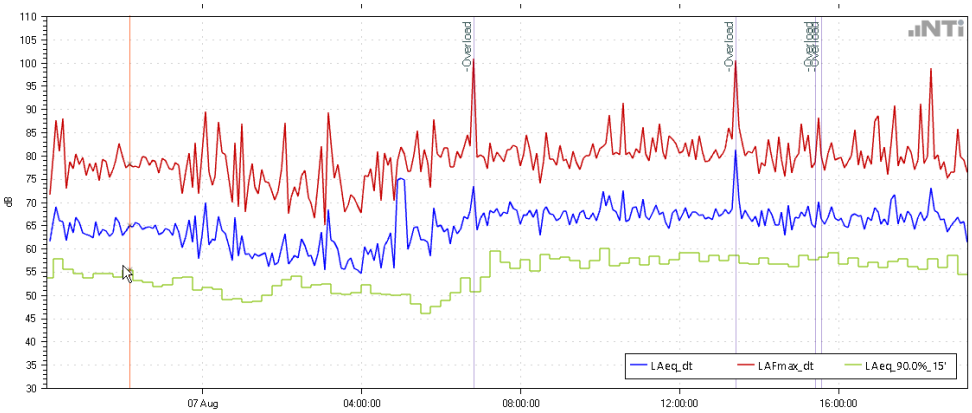


Figure 13
Time History - FRONT

4.2.3.1 Background Noise Level

The typical Background Noise Level, for both the night and day time periods was determined by histograms, as can be seen in figures below.

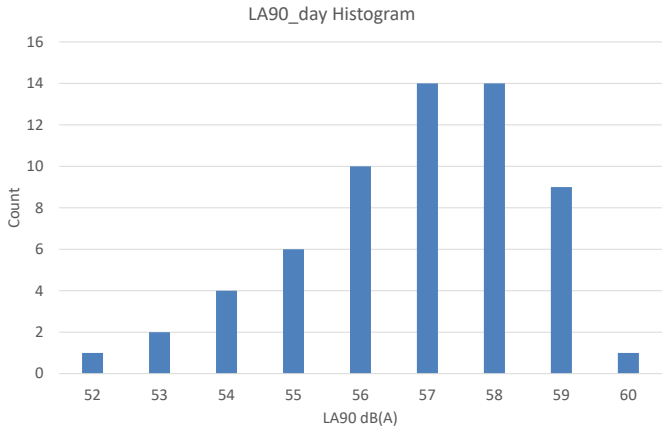


Figure 14
Background Noise Level histogram 07:00 – 23:00

Therefore, the typical Background Noise Level during the day time is 57 dB L_{A90}.

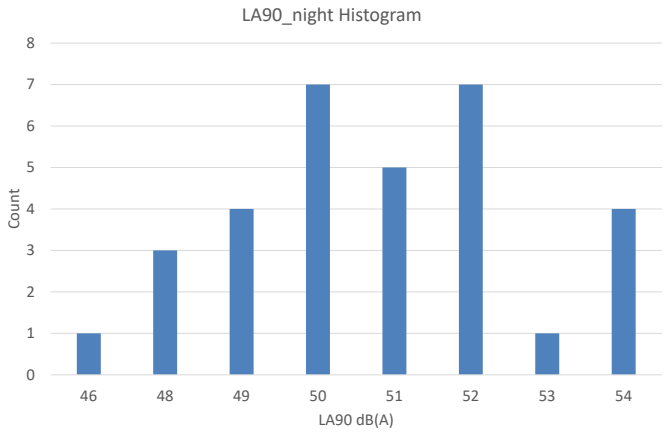


Figure 15
Background Noise Level histogram 23:00 –07:00

Therefore, the typical Background Noise Level during the night time is 50 dB L_{A90}.

5 Acoustic Assessment

The potential noise sources are:

1. noise from 'external plant'
    a. the kitchen ventilation
    b. noise from condenser units
2. noise transmission via the separating floor (ground to first)
3. noise break-out.

5.1 External plant noise assessment

The most sensitive receptors to external plant noise are the residential apartments at 65 Bridge Street.

The specifications of the external plant are given in Section 2.2.2.

5.1.1 Distances

The distance from the condensers' location to 65 Bridge Street is 23m, as shown in Figure 16.

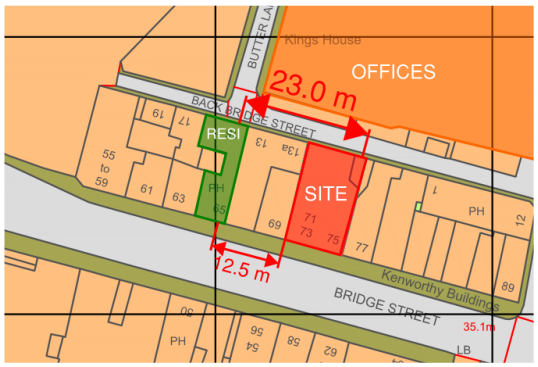


Figure 16
Distances from condensers to residential

The distance from the extract flue and condenser units is approximately 20m.

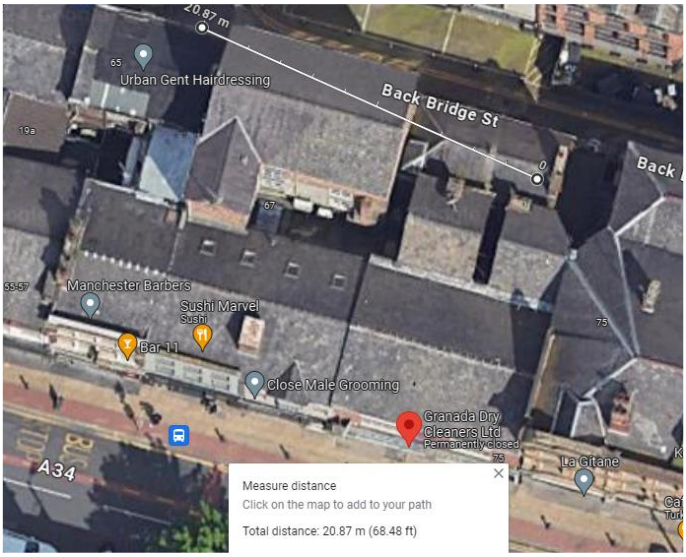


Figure 17
Distance to nearby apartments

5.1.2 Background noise levels

The typical background noise levels, to the rear, are given in Section 4.1.3.1 and are 57 dB L_{A90_day} and 54 dB L_{A90_night}.

5.1.3 Kitchen Extract

Duct noise calculations have included the fan's sound power level, type and length of duct, bends, attenuator and end reflection.

Noise propagation has taken account for distance.

Direct line of sight is assumed so no barrier attenuation has been attributed.

Full noise propagation calculations are shown in the Appendix.

5.1.3.1 BS 4142 assessment

BS 4142 Noise Assessment Kitchen Extract	Value	dB
Total Specific Noise Level @ NSR	L_{Aeq}	10
BS 4142		
Tonality	0/2/4/4	0
Impulsivity	0/3/6/9	0
Intermittency	0/3	3
Rating Noise Level		**13**
LA90_night		54
Rating minus Background		**-41**

Table 2
Kitchen extract BS4142 assessment

The Rating Level of the kitchen extract is well below the typical Background Noise Level so no further mitigation is required.

5.1.4 AC condensers

The BS 4142 assessment for the AC condensers is shown below.

BS 4142 Noise Assessment AC condensers	Value	dB
Total Specific Noise Level @ 1m	1	55
Number of units	2	3
Surfaces	3	9
Distance	23	-27
Barrier	yes	-10
Total Specific Noise Level @ NSR		30
BS 4142		
Tonality	0/2/4/4	0
Impulsivity	0/3/6/9	0
Intermittency	0/3	3
Rating Noise Level		**33**
LA90_night		54
Rating minus Background		**-21**
Target Met?		✓

Table 3
BS 4142 assessment of the AC condenser units

The above Table shows that noise from the two condensers will be within a suitable noise level, so no further mitigation is required.

5.2 External noise break- out

The potential residential accommodation on the upper floors of 65 Bridge Street may be affected by noise break out. Therefore, there should be mitigation measures for the building envelope at the front and rear of the property.

5.2.1 Background noise levels

5.2.1.1 Rear

The typical background noise levels, to the rear, are given in Section 4.1.3.1 and are:

L_{A90_night} 54 dB

L_{A90_day} 57 dB

5.2.1.2 Front

New measurements to the front of Bridge Street have now been undertaken to give the following Background Noise Level:

L_{A90_night} 50 dB

L_{A90_day} 57 dB

5.2.2 Via front façade

The front façade is to be replaced with bi-folding doors to the left of the middle column and fixed glazing to the right of same column.

The relative areas of the ground floor façade are shown below.





Figure 18
Proposed front façade showing bi-folding doors

In order to determine allowable noise levels within the venue, noise break-in calculations have been undertaken with the retractable doors open and closed.

5.2.2.1 Calculation

In order to determine the allowable internal noise levels, with the bi-folding windows open and closed, the Background Noise Levels for the day and night period are the bases for the two calculations.

Using the more recent and relevant Background Noise Levels, internal noise levels of the cafe/bar have been calculated using a detailed methodology.

The measured Background Noise represents the noise level at the nearest potential residential dwelling as shown in Figure 3. From the octave band data, 10dB is deducted (MCC criterion) to form the target noise level at the nearest resident. Distance attenuation and the sound reduction of the glazing / brickwork[1] are used to calculate the maximum permitted noise levels within the site. There are also corrections for an internal reverberant noise level being transferred to an external free field level.

Eqn (1) is a standard break out calculation from a reverberant room to outside [3:p97] to account for the fact that the external level is known (10dB below L_{A90}) and the unknown is the internal reverberant noise level.

$$SPL_{int,rev} = SPL_{ext} + SRI - 10\log S + A_{dist} + 14 \quad (1)$$

where
SPL_{ext} = external open air sound pressure level (SPL), dB
$SPL_{int,rev}$ = internal reverberant SPL, dB
SRI = sound reduction index of building element, dB
S = area of building element, m²
A_{dist} = attenuation due to distance, dB

5.2.2.2 Distance attenuation, A_{dist}

There will be attenuation due to distance, of the noise break out from the façade of the site to the nearby residents. However, the façade is too big to be considered a point source and not long enough to be thought of as a line source. Therefore, it is a plane source where the distance attenuation is calculated using Eqn (2) [3]

[1] The composite SRI calculation in BS 8233, Eqn. G.1, is used to determine the overall façade Sound Reduction Index (SRI).

$$A_{dist,plane} = 10\log_{10}\left(\frac{b/\pi}{a/\pi}\right) + 20\log_{10}\left(\frac{r}{b/\pi}\right) \quad (2)$$

where a = shorter façade length, m

b = longer façade length, m

r = source – receiver distance, m

5.2.2.3 Sound Reduction Index (SRI) of facade

The façade of the ground floors of the proposed site is comprised of brickwork and glazing, so a composite Sound Reduction Index has been determined using a modified version of Equation G.1 in BS 8233.

$$L_{eq,2} = L_{eq,ff} + 10\log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{ls}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S}10^{\frac{-R_{rr}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3 \quad (3)$$

The exterior wall build up is approximately:

- 100mm brick
- 100mm cavity with 50mm of insulation
- 100mm concrete block
- plaster / render finish.

5.2.2.4 Glazing

The glazing will be Pilkington Insulight™ Protect

Position	Product	Process	Thickness (nominal) mm	Weight kg/m²
Pilkington **Insulight**™ Protect				
Glass 1	Pilkington **Optilam**™ Clear	Laminated	6.8	
Cavity 1	Argon (90%)		18.0	
Glass 2	Pilkington **K Glass**™ S	Toughened	4.0	
Product Code	6.8L-18Ar-KS4T		28.8	25.76

Figure 19
Glazing details

The Sound Reduction Index of the glass is 30 dB $R_w + C_{tr}$.

5.2.2.5 Internal noise levels

Using the above methodology and assuming standard double glazing, the maximum permitted internal noise levels are shown for:

- Retractable windows open
- Retractable windows closed.

The full calculations are shown in the Appendix[2].

[2] The full calculation has used unweighted noise levels.

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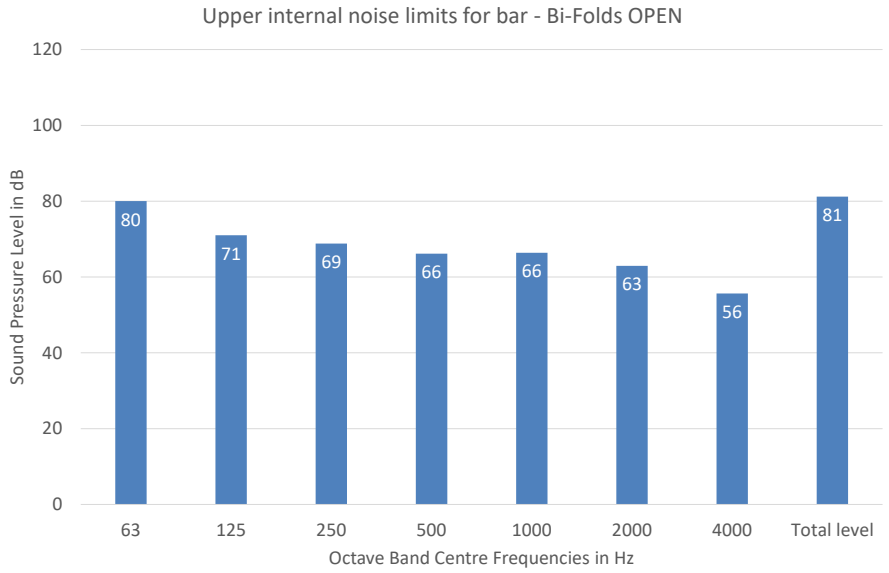


Figure 20
Maximum permitted noise levels within the cafe/bar with windows OPEN

NB Therefore, the upper noise level within the proposed bar when the bi-folding door are open / during opening hours of the commercial space above (10:00 – 20:00), should be no more than 80 dB (unweighted).**

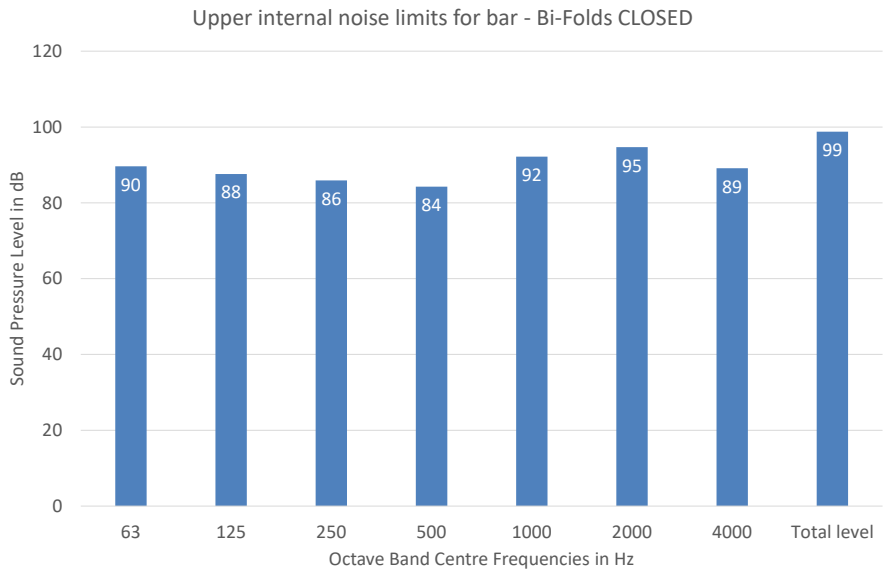


Figure 21
Maximum permitted noise levels with windows CLOSED

NB Therefore, the upper noise level within the proposed bar when the bi-folding door are closed / outside the open opening hours of the commercial space above (10:00 – 20:00), should be no more than 99 dB (unweighted).**

5.2.2.6 Limiter

In order to ensure noise thresholds are not breached, there will need to be a limiter fitted.

Such a limiter could be the SL 2000 – see Figure 22.

The limiter should have a clearly visible 'traffic light' system where it is easy to determine if noise levels are reaching the limit and can therefore be reduced before the limit is breached.



Figure 22
SL 2000 noise limiter

A separate traffic light indicator can be installed, for example, at the mix position, so that it can be viewed easily.

NB** Braiden Acoustics must measure the noise levels when commissioning and calibrating such a system

5.2.2.7 Lobbied door system

It is recommended to have lobbied door systems to minimise noise leaking out during the ingress and egress of patrons. This can be seen in the updated drawings in Figure 4.

5.2.2.8 Door seals

The lobbied doors will have acoustic seals including threshold seals. Integrity Acoustic Door Seal Range are available from Lorient Polyproducts Ltd (Tel: 01626 834 252). Recommended Lorient products are given below.

151212 Perimeter Batwing Seal

IS8020i Automatic Threshold Seal

184130 Threshold Plate 40mm wide x 4mm high

The two lobbied doors are shown in **Error! Reference source not found.** above.

5.2.2.9 Sound system

The exact details of the music system are not known at this stage; however it is advised that the speakers should be smaller and more frequently distributed in the bar rather than one or two large speakers in one place. This is so that the audience receive more of the direct sound of their local loudspeaker and hence the overall sound level need not have to overcome the reverberation noise floor. In addition to this, smaller speakers are less able to produce potentially problematic low frequencies.

The speakers should be resiliently isolated from the walls and ceiling. Such a product can be purchased from Powerdrive Drum Company Limited - http://www.mypowerdrive.com.

5.2.3 Via rear façade

In order to limit noise break out at the rear, the fire exit doors should be acoustically rated.

One such product, is as follows:

SAFE-Door Soundmax 48 dB R_w

The Soundmax doors come in single and double leaf configurations. Details in the following link:

https://www.safe-door.co.uk/soundmax.html

5.3 INTERNAL NOISE TRANSMISSION

The ceiling of the first floor was in some disrepair but that eased inspection.

Figure 23 shows the original lathe and plaster ceiling, as well as the floor joists and even the underside of the first-floor floorboards.

Remnants of the suspending ceiling can also be seen, that was hung from wooden battens connected to the supporting beams.

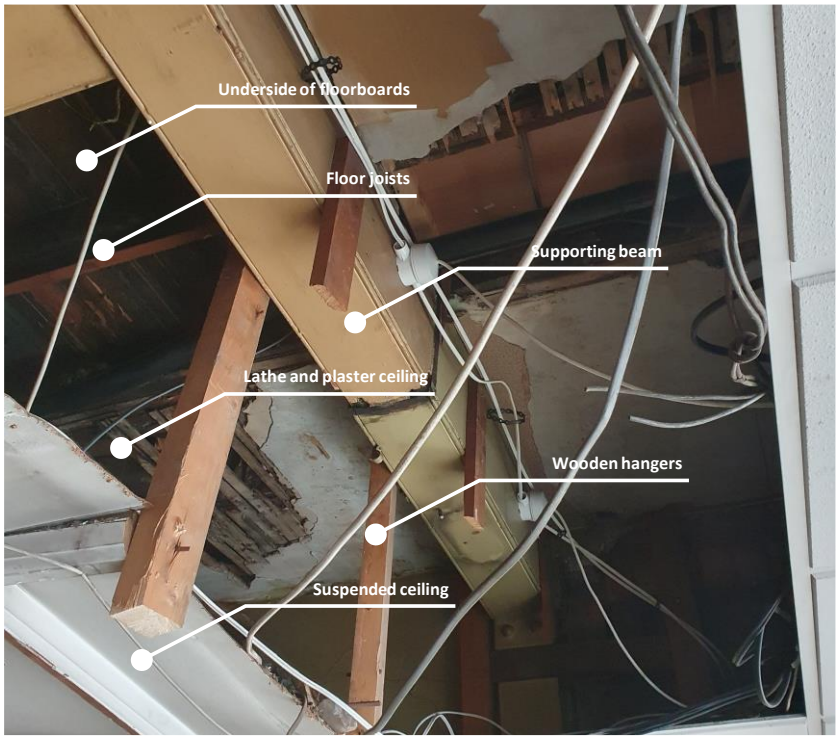


Figure 23
Ceiling of first floor

5.3.1 Proposed ceiling upgrade

It is proposed to remove with existing suspended ceiling AND the original lathe and plaster ceiling. The original ceiling should be upgraded to 2no. layers of SoundBloc acoustic plasterboard and acoustic mineral wool in the cavity (not shown in Figure 24). Once the original ceiling has been upgraded, then there should be an independent ceiling underdrawn that conforms to Floor Treatment 1 in Approved Document E.

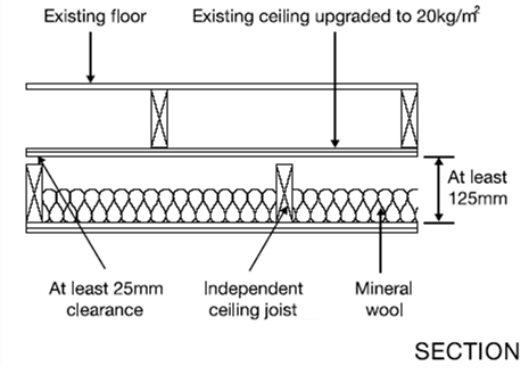


Figure 24
ADE Floor treatment 1 - Independent ceiling with absorbent material

The resistance to airborne (and impact) sound depends on the :

- the combined mass of the existing floor and the independent ceiling,
- the absorbent material,
- the isolation of the independent ceiling and
- the airtightness of the whole construction.

The construction of the separating floor is as follows:

- ***make good original ceiling so that it is airtight***;
    - *any gaps or repairs to the existing ceiling should be done using 15mm Soundbloc boards*
- the independent ceiling shall be supported by independent joists fixed only to the surrounding walls. A clearance of at least 25mm should be left between the top of the independent ceiling joists and the underside of the existing ceiling.
    - Additional support can be provided by Acoustic Hangers attached to the joist above.
- any supporting beams should sit within the cavity of the independent ceiling with enough space that the beams are at least 10mm from the topside of the acoustic boards of the acoustic independent ceiling.
- To form the new ceiling, at least 2 layers of 15mm acoustic plasterboard with staggered joints, minimum mass per unit area 20kg/m^2.
- an absorbent layer of mineral wool laid on the ceiling , minimum thickness 100mm, minimum density of 10 kg/m3.

NB** The plasterboards attached to the underside of the independent ceiling should be below any beams, so that the beams are within the cavity of the independent ceiling. Please contact Braiden Acoustics for further information, if required.



Product data sheet
Gypframe® GAH1 Acoustic Hanger

British Gypsum
SAINT-GOBAIN

Steel acoustic hanger.

Where to use

Resilient hangers used in conjunction with the GypCeiling MF ceiling system and timber joist ceilings and floors for increased sound insulation.

Certifications

Environmental Product Declaration (EPD) available
Click here.

Figure 25
Acoustic hanger

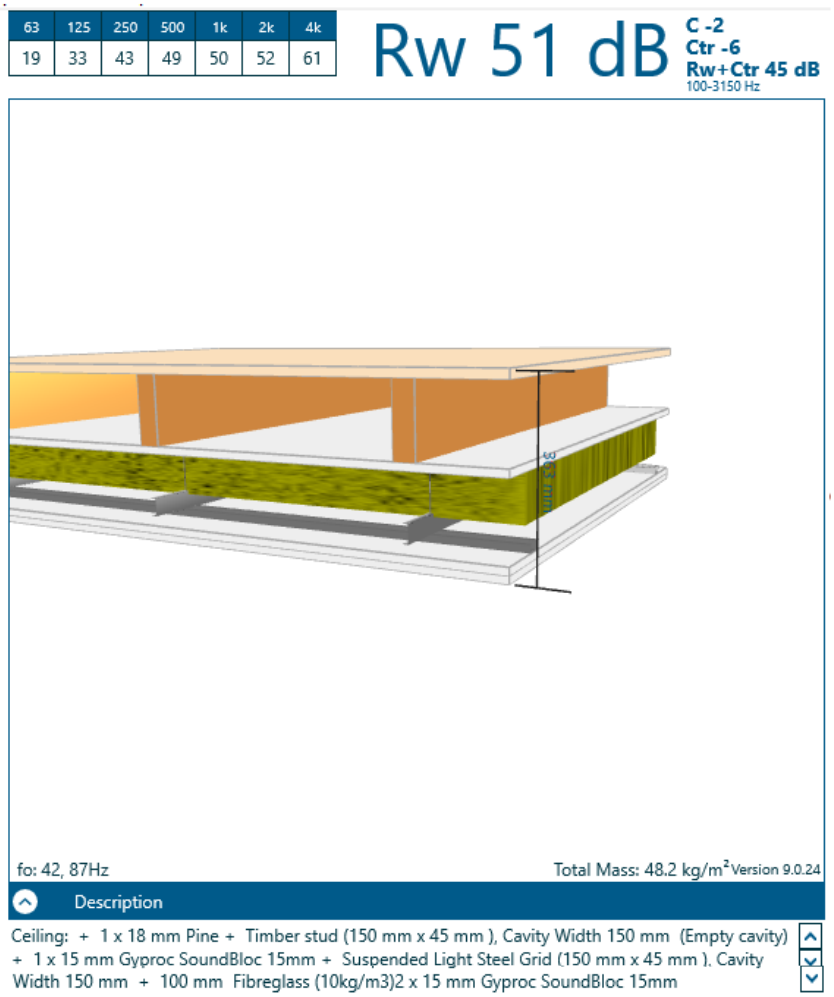


Figure 26
Computer model of proposed ceiling system

For services such as lights, smoke alarm etc. then there should be a sacrificial ceiling as shown below.

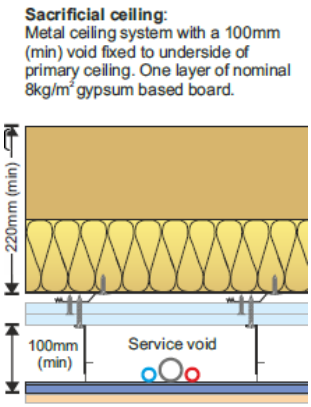


Figure 27
Typical sacrificial ceiling

The sacrificial ceiling should create a minimum of 100mm cavity.

One layer of standard plasterboard is sufficient for the sacrificial ceiling, as it will have no real acoustic performance.

5.3.1.1 Staircase

To the right of the proposed unit is the staircase to the first-floor commercial space; this too will need to be acoustically treated in order to minimise flanking sound bypassing the upgraded ceiling.

There should be an independent 'ceiling' under the stairs and also to the side of the stairs, to prevent sound leakage to the stairwell of the first-floor premises. The independent enclosure should NOT touch the stairs.

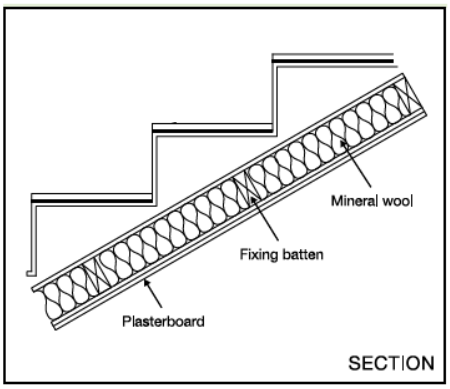


Figure 28
Typical sacrificial ceiling

The independent enclosure under and next to the stairs will be constructed as follows:

- 1no. layer of Acoustic Plasterboard
- 100mm battens with 100mm Isover APR1200 mineral wool in the cavity
- 2no. layers of Acoustic Plasterboard.

5.3.2 Noise transfer to first floor

The above construction described in Section 5.3.1 will give an on-site sound insulation performance of, at least, 45 dB. The upper noise level in the bar, ***during office hours of 08:00 – 20:00 / when the bi-folding doors are open***, will be 80dB (unweighted).

In order to determine the overall A-weighted noise level in the first floor commercial space, to align with the allowable noise levels in Figure 8, an octave band calculation is performed with the octave band Sound Reduction Indices of the proposed floor, as shown in Figure 26.

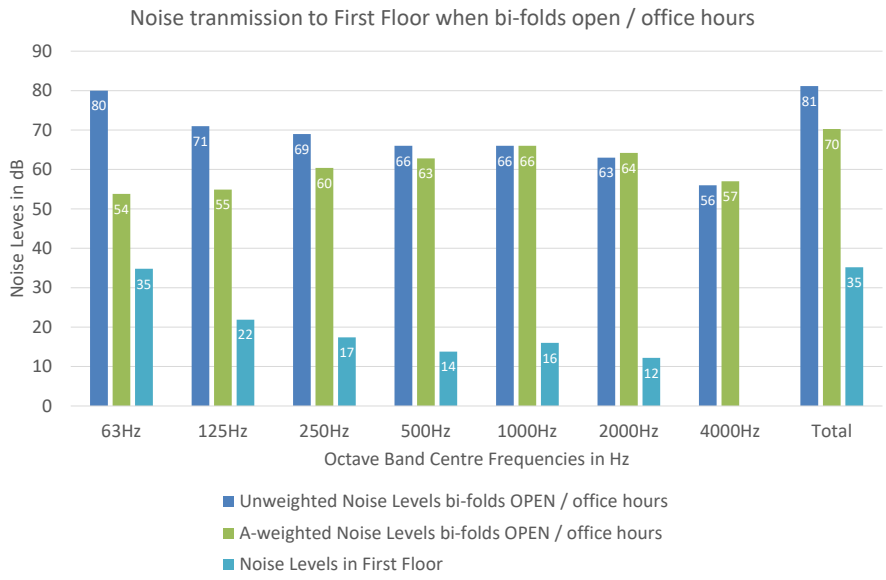


Figure 29
Octave band calculation of noise ingress to first floor when bi-folds open / office hours

Above the proposed bar is The One Thai Massage, which could fall into the 'Listening' activity in Figure 8 where relaxation / meditation may occur and therefore a noise-ingress range of 30-35dB(A).

Therefore, given the proposed ceiling upgrade, noise levels within the first-floor commercial space should not be breached.

5.3.3 Noise transfer to 65 Bridge Street

There will be no internal noise transfer to 65 Bridge Street due to the separation of two-party walls between the two sites – see Figure 2. Also, the accommodation is on the upper floors, whereas the proposed bar is at basement and ground floors.

6 Conclusion

An acoustic survey has taken place at Former Granada Cleaners, Bridge St, Manchester to assess noise levels from the proposed external plant, internal noise transfer and noise break out.

The report has detailed the assessment of the external plant at the nearest sensitive receptor and no further mitigation is required.

Design and discussion of the proposed upgraded ceiling has been described.

Noise breakout to the front has been mitigated by the use of a lobbied doors system and permitted upper noise levels have been stipulated for the following conditions:

- Bi-folding doors open / during office hours of 08:00 – 20:00
- Bi-folding doors closed / outside of office hours.

A noise breakout assessment has now been included for the front façade with the bi-folding doors both open and closed which reveals the upper noise thresholds for both situations. A limiter has been suggested to ensure noise levels are kept within the relevant noise limits.

Noise break-out at the ground floor, to the rear, has been mitigated by specifying acoustic fire exit doors.

7 References

[1] BS 4142: 1997
Method for Rating industrial noise affecting mixed residential and industrial areas
British Standards Institute, 1997.

[2] BS 4142: 2014
Methods for rating and assessing industrial and commercial sound
British Standards Institute, 2014.

[3] R. Watson & O. Downey
The Little Red Book of Acoustics
Blue Tree Acoustics, 2008.

Appendix

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A1 Drawings

A1.1 Basement and Ground Floor Layouts



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A2 ACOUSTICALLY RATING EXTERNAL FIRE DOORS

A2.1 Soundmax doors



A3 KITCHEN EXTRACT CALC

Granada Cleaners		Duct Calculation	Kitchen Extract	Octave band centre frequency							
Item	Quantity	Description	Details	63	125	250	500	1000	2000	4000	Total level
1a		Sound Pressure Level @ Xm	SWL data used	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.5
1b		Sound Power Level of unit	S&P CVAT/4-6000/450N D, LwA out	45.0	59.0	65.0	67.0	68.0	63.0	57.0	72.5
		A weighting	no	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2		PLENUM Insetion Loss	no								
3	18 m	Duct Length in metres	Round > 300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	4	Number of bends	500mm round bend	-4	-4	-8	-12	-12	-12	-12	
5	0 mm	Branch area	10log(branch mm2/duct mm2)	0	0	0	0	0	0	0	
6		Silencer attenuation (1)	CDA.1D (200-550 dia)	-2	-4	-6	-10	-14	-10	-7	
7		Silencer attenuation (2)	no silencer or n/a	0	0	0	0	0	0	0	
8		Att due to end reflection	500 mm end reflection	-8	-4	-1	0	0	0	0	
9		Louvre attenuation	no acoustic louvre or n/a	0	0	0	0	0	0	0	
10		Sound power at termination		31.0	47.0	50.0	45.0	42.0	41.0	38.0	53.4
11		Directivity**	0.25m2 @ 100° - 0 surface	-1	-1	-7	-7	-16	-33	-33	
	Q 1	Reflections	0 surfaces	0	0	0	0	0	0	0	
12	20 m	Distance Attenuation	20*log10(r)	-26.02	-26.02	-26.02	-26.02	-26.02	-26.02	-26.02	
		Air absorption	15°C; 80% humidity	0.00	-0.01	-0.02	-0.05	-0.08	-0.17	-0.47	
		Numerical correction	SPL = SWL - 20log(r) +DI - 11	-11.00	-11.00	-11.00	-11.00	-11.00	-11.00	-11.00	
	δ	Barrier	yes	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	
		SPL(A) at NSR	$L_{pA,NSR}$	**0.0**	**4.2**	**1.2**	**0.0**	**0.0**	**0.0**	**0.0**	**9.5** dB

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A4 Noise Break out calcs

A4.1 Bi-folding doors closed

71-75 Bridge St		BS 8233 Break-in calc	Front façade - noise break out (windows CLOSED)	Octave band centre frequency							
Term		**Description**	**Details**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**Total level**
$L_{90,façade}$		Typical background @ NSR	NIGHT - typical L90	56.2	50.7	49.2	46.1	45.5	41.5	33.5	
	-10 dB	MCC's criterion	below background	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	
SPL_{ext}		Target noise level at receiver		46.2	40.7	39.2	36.1	35.5	31.5	23.5	
r	13 m	Distance from S to R	plane source	14.8	14.8	14.8	14.8	14.8	14.8	14.8	
		Air absorption	15°C; 80% humidity	0.00	0.00	0.01	0.03	0.05	0.11	0.31	
δ	0 m	Barrier attenuation	Maekawa	4.8	4.8	4.8	4.8	4.8	4.8	4.8	
S	42 m2	Area of building element	Total area of façade	-16	-16	-16	-16	-16	-16	-16	
R_{wi}		SRI composite	Total SRI of façade	26.1	29.5	29.3	30.8	39.2	45.7	48.0	
		Numerical correction		14	14	14	14	14	14	14	
$L_{,int}$		Internal reverberant noise level	SPL_interior	**89.6**	**87.6**	**85.9**	**84.2**	**92.2**	**94.7**	**89.1**	**98.8** dB

A4.2 Bi-folding doors open

71-75 Bridge St		BS 8233 Break-in calc	Front façade - noise break out (windows OPEN)	Octave band centre frequency							
Term		**Description**	**Details**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**Total level**
$L_{90,façade}$		Typical background @ NSR	DAY - typical L90	66.5	57.4	55.2	52.5	52.7	49.2	41.7	
	-10 dB	MCC's criterion	below background	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	
SPL_{ext}		Target noise level at receiver		56.5	47.4	45.2	42.5	42.7	39.2	31.7	
r	13 m	Distance from S to R	plane source	14.8	14.8	14.8	14.8	14.8	14.8	14.8	
		Air absorption	15°C; 80% humidity	0.00	0.00	0.01	0.03	0.05	0.11	0.31	
δ	0 m	Barrier attenuation	Maekawa	4.8	4.8	4.8	4.8	4.8	4.8	4.8	
S	42 m2	Area of building element	Total area of façade	-16	-16	-16	-16	-16	-16	-16	
R_{wi}		SRI composite	Total SRI of façade	6.2	6.2	6.2	6.3	6.3	6.3	6.3	
		Numerical correction		14	14	14	14	14	14	14	
$L_{,int}$		Internal reverberant noise level	SPL_interior	**80.0**	**71.0**	**68.8**	**66.2**	**66.4**	**62.9**	**55.6**	**81.2** dB

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A5 FAÇADE GLAZING SPECIFICATIONS

PERFORMANCE

Light		
Transmittance	LT	82%
	UV %	1%
Reflectance Out	LR out	12%
Reflectance In	LR in	12%

Performance Code	
U_g-value/Light/Energy	1.2 / 82 / 66
Ra	97

The values of some of characteristics are displayed as NPD. This stands for No Performance Determined.

Energy		
Direct Transmittance	ET	57%
Reflectance	ER	17%
Absorptance	EA	26%
Total Transmittance	g	66%
Shading Coefficient Total		0.76
Shading Coefficient Shortwave		0.66
Sound Reduction	R_w (C;C_{tr}) dB	35 (-1; -5)
Thermal Transmittance	W/m^2K	1.2

Pilkington Spectrum allows you to combine a wide range of products available from Pilkington and determine their key properties such as light transmittance, g value and U value. The program includes restrictions that prevent some combinations being selected that may be considered unwise or impractical. Even with these restrictions, it is still possible to create product combinations that may not be available from your supplier. Please check with your supplier that your chosen product combination is possible, available in the sizes required and in a timescale appropriate to your project. Furthermore, it is essential that you check that your product combination is appropriate for satisfying local, regional, national and other project-specific requirements.

Calculations are made according to EN standards 410 and 673/12898

Pilkington Spectrum Version UK:7.3.1 22/11/2023

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