



ACOUSTIC
CONSULTANTS

**New Wine Bar, Restaurant & Shop
Victoria Square, Manchester
Noise Impact Assessment**

Report Prepared For:

Fish Associates

Report Prepared By:

Tom Dixon
PDA Ltd.

architectural
environmental
occupational
industrial
noise control at source
project management
planning
legal services
expert witness

Philip Dunbavin Acoustics Ltd.

3 Bridgewater Court · Barsbank Lane · Lymm · Cheshire WA13 0ER

Tel: 01925 759380 · www.pdaltd.com

Directors: P. R. Dunbavin · J. A. Dunbavin · M. de Salis · E. Evenden · R. Grant

Registered Number 2302847 England

Registered Office: 3 Bridgewater Court · Barsbank Lane · Lymm · Cheshire WA13 0ER



Document Control

Revision	1	2	3
Remark	First Issue	Second Issue	Third Issue
Date	1 st October 2020	24 th November 2020	30 th June 2021
Report prepared by	Tom Dixon BEng MIOA	Tom Dixon BEng MIOA	Tom Dixon BEng MIOA
Position	Consultant	Consultant	Consultant
Report checked by	Max de Salis PhD BEng Hons CEng MIOA	Max de Salis PhD BEng Hons CEng MIOA	
Position	Director / Principal	Director / Principal	

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1.0 SUMMARY

At the request of Fish Associates a noise impact assessment has been conducted in relation to the proposed new wine bar, restaurant and shop at Victoria Square, Northern Quarter, Manchester.

A noise survey has been conducted at site to establish the existing ambient and background noise levels at the nearest residential receivers.

Sound Insulation tests have been conducted across the existing separating wall and floor partitions between the proposed development and the neighbouring residential properties.

In regards to the internal noise sources to the proposed development, noise egress has been modelled to the nearest residential properties and compared against the existing noise climate and various guidance noise level criteria as given by Manchester City Council, Planning & Noise, Technical Guidance 2015 (MCCPNTG 2015), BS 8233 and WHO 1999.

The results of the noise modelling indicate that with the mitigation strategies (where appropriate) as outlined in this report, the noise level criteria as given by MCCPNTG 2015, BS 8233 and WHO 1999 will be achieved.

In regard to the egress of noise from the external seating area to the proposed development, noise egress to the nearest residential receivers has been modelled and compared against the existing acoustic climate. It is concluded that based on a worst-case scenario in regards to noise egress from the seating area, that the existing background noise level will be exceeded at the nearest residential receiver. However it can be noted that based on a closed window noise egress from the external seating area is not expected to exceed the recommended 35 dBA internal noise level criteria (BS 8233 & WHO 1999) for living rooms or bedrooms during the day time period (07:00-23:00). It can be noted that the external seating area is to be closed 23:00-10:00 hours, therefore sleep disturbance as a result of noise egress from the external seating area is considered unlikely. Additionally noise egress from the external seating area to the nearest garden has been calculated as 50 dBA. This achieves the lower (50dBA) and upper (55dBA) recommended criteria for external amenity spaces as detailed in BS 8233:2014 and WHO:1999 guidelines.

Noise egress from the proposed plant installations (kitchen & toilet extracts) has been modelled to the nearest residential window to the development. With the inclusion of the specified silencers to the kitchen extract and toilet extract external terminations as detailed in Section 6 of this report, noise egress from plant installations is predicted to achieve the MCCPNTG 2015 criteria.

2.0 SITE DESCRIPTION

The proposed development consists of the construction of a new wine bar, restaurant and shop within a currently vacant retail unit located at Victoria Square, Northern Quarter, Manchester. The site is attached to existing residential properties via a separating wall to the nearest property on George Leigh Street and via the separating floor/ceiling structure to the residential property on the first floor level of the same building. The site is also attached to the nearest residential property on Sherratt Street, although there is no separating wall to this property as a ginnel is located between the site and the residential property on this side of the building.

An overview of the site is shown in Figure 1.

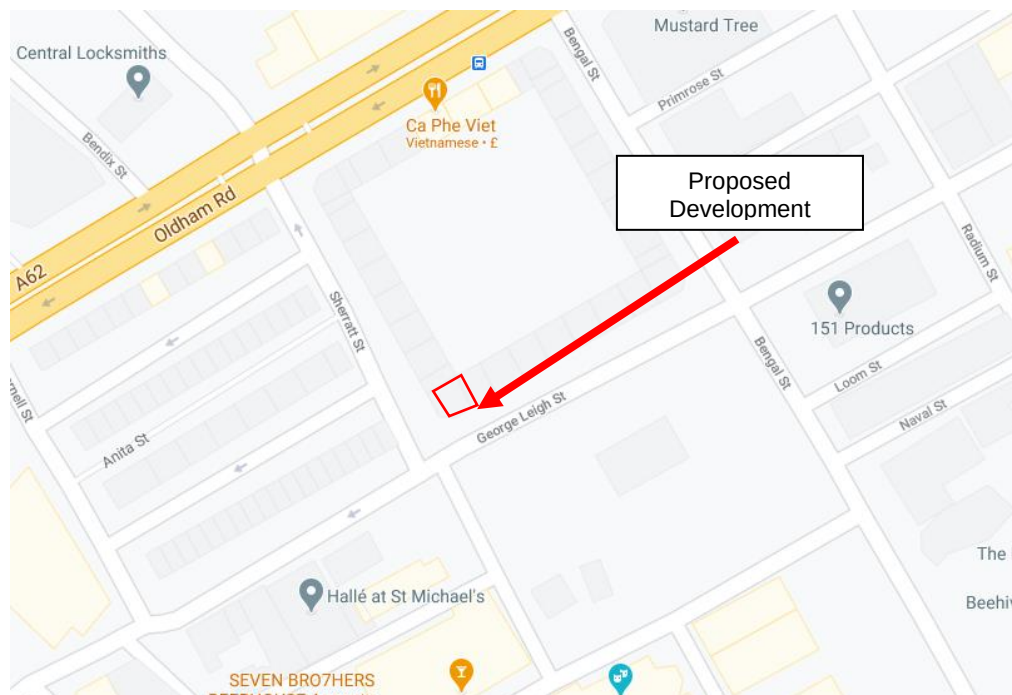


Figure 1: Site location (map view), Site highlighted red (indicative)

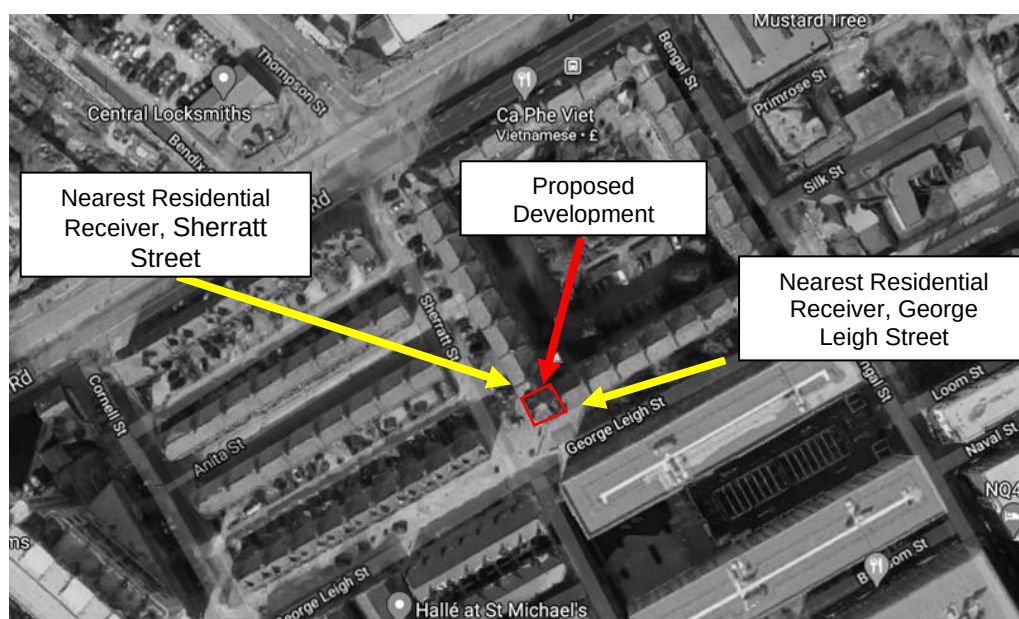


Figure 2: Site Location (aerial view), Site highlighted red (indicative)

2.1 Proposed Noise Sources

The room layout drawings for the proposed development are provided below.

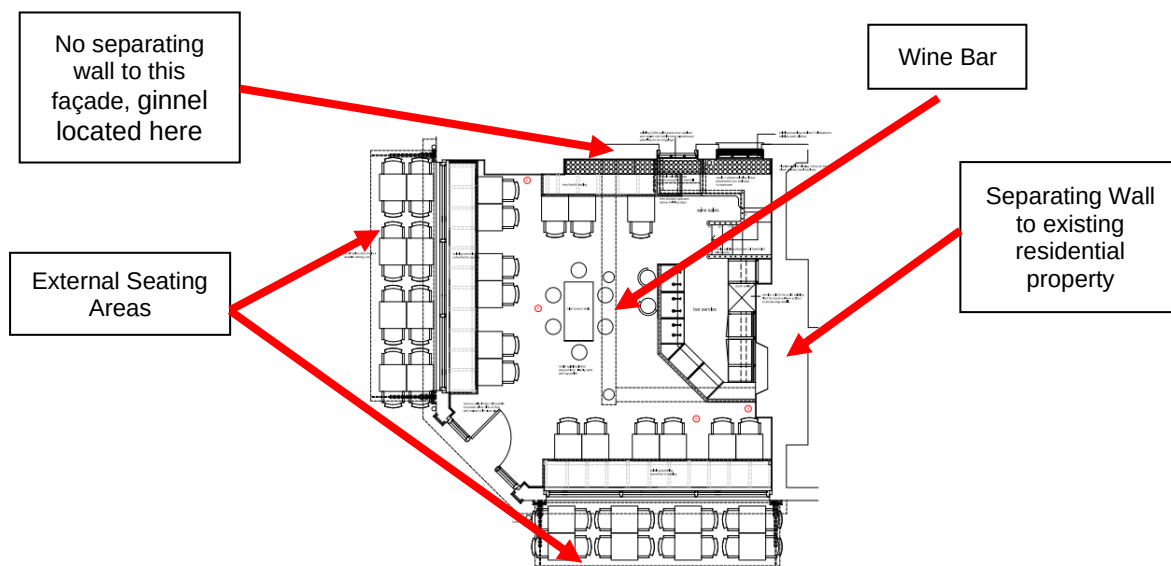


Figure 3: Proposed Layout Drawing, Ground Floor

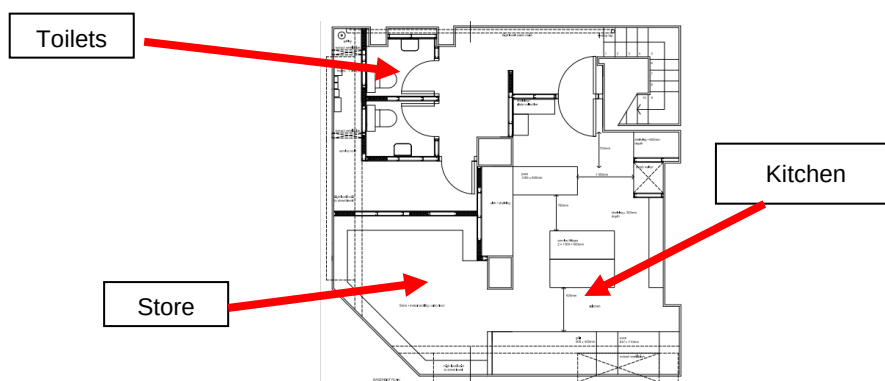


Figure 4: Proposed Layout Drawing, Basement Level

Noise Sources affecting First-floor

With regards to the first-floor level of the proposed development it is considered that the main noise sources will be the internal ambient noise level from the Wine Bar area (speech, background music etc) and the noise from patrons utilising the outdoor seating area (speech). It is understood that no music is to be played externally.

It is understood that the Wine Bar will be operational during following periods

10:00-22:00, Sunday-Thursday
10:00-00:00, Friday & Saturday

It is understood that the outdoor seating area will not be utilised from 1hr before the appropriate closing time. Therefore the latest time the outdoor seating area will be in operation to will be 23:00 hours.

Basement-floor Noise Sources

It is considered that the absolute noise levels associated with the Store, Toilets and Kitchen of the proposed development (with the exception of the possible kitchen extract and vent) are likely to be 'low'. Further to this it can be noted that these spaces are located to the basement level of the proposed development and that there are no separating walls, floors or windows to neighboring residential properties. Therefore it is considered that further assessment of the noise egress from the internal spaces to the ground floor of the proposed development is not required (with the exception of the possible kitchen extract/vent which is discussed in Section 6 of this report).

3.0 ASSESSMENT CRITERIA

3.1 Manchester City Council, Planning & Noise, Technical Guidance 2015 (MCCPNTG 2015)

MCCPNTG 2015 sets out MCC's noise design criteria to meet requirements of the NPPF for various types of developments.

Entertainment Venues

'Entertainment Venues' are not strictly defined within MCCPNTG 2015, however it is inferred that venues including for the playing of recorded music should be considered as an Entertainment Venue. Further to this MCCPNTG 2015 specifies that applicants and consultants in respect of the noise impact assessment for a new venue, should consider noise levels that are 'typical' the type of venue to be constructed, in anticipation that future owners of the venue may wish to provide some level of entertainment even if previously there was none.

The MCCPNTG 2015 considers that in regards to music, noise in the 63 Hz & 125Hz bands is particularly disturbing to local residents exposed to it. Therefore the assessment of the noise from entertainment venues should consider the overall noise (L_{Aeq}) and the 63 Hz and 125 Hz octave band noise levels (L_{eq}).

The following design criteria is given for new residential developments that are structurally connected to the entertainment venue (or vice versa).

'Music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (L_{eq}), respectively'

The MCCPNTG 2015 notes that the above criteria may also be applicable to new residential developments that are structurally separated from an existing entertainment venue.

In regards to a new entertainment venue that is structurally detached from other buildings, the following criteria is specified.

'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'

Noise From Plant Installations

In regards to fixed plant installations MCCPNTG 2015 gives the following design criteria.

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

3.2 National Planning Policy Framework (NPPF)

National Planning Policy is guided by the National Planning Policy Framework (NPPF) updated in June 2019. With regard to Noise the Framework states the following;

Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.*

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;*

The terms 'significant adverse impact' and 'adverse impact' are defined in the explanatory notes of the 'Noise Policy Statement for England (NPSE)' which states;

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The notes also offer an explanation of the term 'adverse impacts' as follows;

... refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

Although no specific noise limits for LOAEL and SOAEL have been defined, in 2014 (updated in July 2019) the UK Government published a planning practice guidance document for noise which indicates where these limits fall with relation to the

perception of noise. A summary is reproduced in Section 3.2 below, and the full document is published at <https://www.gov.uk/guidance/noise--2>. It is considered that guidance from other acoustic standards may be employed to determine suitable levels within the overall principal of the National Planning Policy Framework.

3.3 Planning Practice Guidance – Noise

The UK Planning Practice Guidance on noise offers further guidance on the typical levels which constitute the NOEL, LOAEL and SOAEL, reproduced in the table below;

Table 1: Planning Practice noise level guidance

Response	Examples of Outcomes	Increasing Effect Level	Action
-	-	No Observed Effect Level	-
Not present	No Effect	No Observed Effect	No specific measures required
-	-	No Observed Adverse Effect Level	-
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
-	-	Lowest Observed Adverse Effect Level	-
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

3.4 BS 4142:2014 + A1:2019 Methods for rating and assessing industrial and commercial sound'

The standard describes a method of determining the level of sound of a commercial nature, together with procedures for assessing the impact of such a sound outside nearby noise sensitive areas.

The standard may be thought of as a procedure for comparing the sound from commercial sources with background sound levels in the absence of the commercial sound and determining the likely impact of the sound on noise sensitive residences.

In accordance with BS 4142 the background sound level is the typical A-weighted sound pressure level at the assessment position that is exceeded for 90% of a given time interval (L_{A90}). The specific sound level is the equivalent continuous (L_{Aeq}) sound pressure level at the assessment position produced by the commercial source over a given time interval.

Certain acoustic features can increase the impact over that expected from a simple comparison between the specific sound level and the background level. Where such features are present, these are taken into account by adding corrections to the specific sound level.

This correction is applied based on whether the following features occur, or are expected to be present. The correction values can either be determined subjectively, or by various objective measurement procedures.

- The sound contains a distinguishable, discrete, continuous tone (whine, hiss, screech, hum, etc.). 0 – 6 dB penalty
- The sound contains distinct impulses (bangs, clicks, clatters, or thumps). 0 – 9 dB penalty.
- The sound is irregular enough to attract attention. 0 – 3 dB penalty.
- Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

From the addition of the above penalties where appropriate the rating level is established, this being the value that is compared with the background noise. Note that corrections for impulsivity and tonality may be added arithmetically where both are present and likely to affect perception within the same reference period. However, if any single feature is dominant to the exclusion of the others then it might be appropriate to apply a reduced or even zero correction for the minor characteristics.

According to BS 4142 an initial estimate of the impact is given based on the rating level value as follows:

- a rating level 10 dB(A) or more above the background is an indication of significant adverse impact, depending on the context.
- a rating level 5 dB(A) above the background is an indication of an adverse impact, depending on the context.
- where the rating level does not exceed the background level, this is an indication of the specific sound source having a low impact, depending on the context.

BS4142 indicates that the noise source should be evaluated over the appropriate time interval which is as follows:

- 1h during the day (07:00 – 23:00)
- 15 min during the night (23:00 – 07:00)

The above initial assessment may then be modified depending on the context, to take into account;

- The absolute level of the sound.
- The character and level of the residual sound compared to the character and level of the specific sound.
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
 1. Façade insulation treatment
 2. Ventilation and / or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
 3. Acoustic screening

Exclusions from BS 4142 scope of assessment

With reference to BS 4142, Section 1.3 the following sources of noise are beyond its scope of assessment.

The standard is not intended to be applied to the rating and assessment of sound from:

- a) recreational activities, including all forms of motorsport;*
- b) music and other entertainment;*
- c) shooting grounds;*
- d) construction and demolition;*
- e) domestic animals;*
- f) people;*
- g) public address systems for speech; and*
- h) other sources falling within the scopes of other standards or guidance.*

3.5 BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

Dwelling houses, flats and rooms in residential use

British Standard 8233:2014, *Guidance on Sound Insulation and noise reduction for buildings*, gives guidance on internal noise levels within dwellings, flats and rooms in residential use when unoccupied. The following criteria are for Living and Dining Rooms for daytime use and Bedrooms for night time.

Table 2: BS8233 recommended indoor ambient noise levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	–
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	–
Sleeping (daytime resting)	Bedrooms	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

It should however be stressed that the above criterion relates to steady noise, in this case from road traffic etc., excluding unusual noise events departing from the typical noise character of the area.

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

3.6 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following internal noise levels are applicable within dwellings.

Table 3: WHO Guidelines for Community Noise criteria

Specific Environment	Critical Health Effect(s)	L_{Aeq} dB	Time Base (hours)*
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime & evening	35	16
Inside bedrooms	Sleep disturbance, night time	30	8

* Typically taken to be daytime/evening - 07:00 – 23:00 hours and night time 23:00 – 07:00 hours.

In addition to the above continuous equivalent noise levels, WHO guidelines indicates that exceedances of 45 dB L_{Amax} for single sound events should be limited to no more than 10 – 15 times per night, when measured with a 'fast' time weighting.

4.0 NOISE SURVEY

4.1 Noise Survey Details

An ambient noise survey was carried out between 21:11-23:57 hours, Thursday 10th September 2020. All measurements were conducted in 15-minute samples by Tom Dixon of PDA.

The locations for the measurement position utilised for the noise survey s illustrated in Figure 5 below.

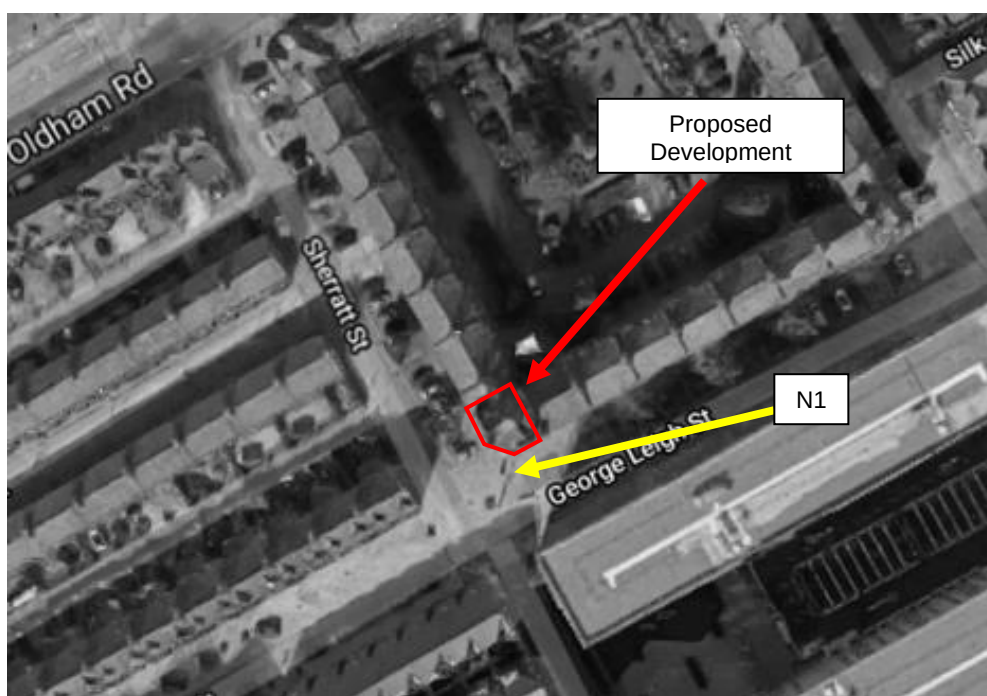


Figure 5: Noise survey monitoring positions

Key

N1- noise measurement adjacent nearest residential receivers and proposed development.

All noise measurements were conducted utilising the following equipment

NTI XL2 (SN- A2A-08665-E0) -Sound Level Meter

In accordance with IEC 61672-1:2002 the sound level meter has a Class 1 frequency response and can operate as an integrating sound level meter with frequency analysis and statistical functions.

The sound level meter was set to measure 'A' weighted, broadband and octave band sound pressure levels and various statistical parameters. All measurements were made at a height of 1.5m utilising a 15-minute sampling period. The meter was field calibrated both before and after each measurement, in addition to this a valid calibration certificate is held for the meter and calibrator. It was ensured that the sound level meter was fitted with a windshield at all times.

Weather

Typical weather conditions throughout the survey were as follows.

Temperature	-	17°C
Wind	-	0.0-0.7 m/s (E)
Cloud	-	90-100%
Rain	-	dry no rain

4.2 Noise Sources

The ambient noise level mainly consisted of traffic from the local roads immediately adjacent site (Sherratt St, George Leigh St etc) and distant traffic sources (A62 & A665). There were also frequent short duration contributions from passing pedestrians to the site.

4.3 Results

The full results of the noise survey are available in the Appendix. An overview of the results is provided below.

Table 4: Summary of noise survey results

Time	L_{Aeq,T} dBA	L_{A90} Range dBA	L_{Amax} Range dBA
21:11-22:54	50	42-44	63-79
22:57-23:57	49	41-43	62-74

5.0 NOISE IMPACT ASSESSMENT

5.1 Residential Properties Structurally Connected To Proposed Development

Assessment Criteria

MCCPNTG 2015 gives the following design criteria for new residential developments that are structurally connected to the entertainment venue (or vice versa).

'Music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (L_{eq}), respectively'

Noise Egress Assessment

Sound insulation noise tests were conducted at site on the 28th September 2020 by Tom Dixon of PDA Ltd. Tests were conducted across the following partitions.

Wall Test

Between proposed Wine Bar Internal Space (GF of proposed development) and Living Room of neighbouring property (GF attached residential property to site on George Leigh Street).

Floor Test

Between Wine Bar Internal Space (GF of proposed development) and Bedroom of neighbouring property (FF first floor, directly above the proposed development).

The testing methods for airborne were in full accordance with: the suggested methods presented in BS EN ISO 140-parts 4 & 7: 1998 "Field Measurements of Airborne Sound Insulation between Rooms". The results of the tests were analysed in accordance with BS EN ISO 717-parts 1, amended 2006.

To calculate the likely noise emissions from the wine bar to the residential flats we have utilised our in-house library of noise source data. The following $L_{eq,T}$ noise level spectrum is from a pub during a busy period with background music playing. We would consider these internal levels to be typical of the ambient noise levels within similar existing venues with reference to the proposed development.

Table 5: Noise through Party Wall, Wine Bar to Residential GF (George Leigh Street)

Noise Source / Attenuation Factor	Overall Level dBA	Octave Band Centre Frequency (Hz), dB						
		63	125	250	500	1000	2000	4000
(A) – Busy pub with background noise level	82.0	72.0	75.0	75.0	80.0	79.0	70.0	65.0
(B) – Measured Sound Insulation of the Wall (dB D_{nT})		45.3	45.1	48.6	53.4	54.0	58.2	67.7
Internal Noise Level A) - B)	28.1	26.7	29.9	26.4	26.6	25.0	11.8	-2.7
Assessment Criteria	30.0*	≤47**	≤41**	-	-	-	-	-
Exceedance Over Criteria	-1.9	-20.3	-11.1	-	-	-	-	-

Notes

*BS 8233 & WHO 1999 criteria for bedrooms during the night-time (23:00-07:00)

** MCCPNTG 2015 criteria for noise from entertainment venues structurally connected to residential properties

From Table 5 it can be noted that the predicted noise egress from the Wine Bar, through the wall partition to the attached residential property has achieved both the design criteria as specified by MCCPNTG 2015 and the recommended internal noise level criteria as given by BS 8233 & WHO 1999 for bedrooms.

Table 6: Noise Through Party Floor, Wine Bar to Residential Bedroom FF (directly above proposed development)

Noise Source / Attenuation Factor	Overall Level dBA	Octave Band Centre Frequency (Hz), dB						
		63	125	250	500	1000	2000	4000
(A) – Busy pub with background noise level	82.0	72.0	75.0	75.0	80.0	79.0	70.0	65.0
(B) – Measured Sound Insulation of the Floor (dB D _{nT})		28.0	35.6	38.6	46.2	53.9	60.4	69.0
Internal Noise Level A) - B)	33.8	44.0	39.4	36.4	33.8	25.1	9.6	-4.0
Assessment Criteria	30.0*	≤47**	≤41**	-	-	-	-	-
Exceedance Over Criteria	3.8	-3.0	-1.6	-	-	-	-	-

Notes

*BS 8233 & WHO 1999 criteria for bedrooms during the night-time (23:00-07:00)

** MCCPNTG 2015 criteria for noise from entertainment venues structurally connected to residential properties

From Table 6 it can be noted that the predicted noise egress from the Wine Bar, through the floor to the attached residential property has achieved the design criteria as specified by MCCPNTG 2015, but has exceeded the BS 8233 & WHO 1999 criteria for bedrooms. Mitigation is discussed in Section 5.1.1 below.

5.1.1 Mitigation To Wine Bar Floor/Ceiling Partition

During the sound insulation noise tests as detailed in Section 5.1 the floor partition was observed to be of concrete slab construction (exposed soffit). In order to achieve the recommended BS 8233 & WHO 1999 internal noise level criteria for bedrooms a suspended ceiling underneath the existing concrete slab will be required.

The following suspended ceiling should meet the following minimum specification.

-2 × Layer of British Gypsum 15mm SoundBloc Plasterboard supported by MF (minimum cavity 85mm)

-50mm Rock/Mineral wool insulation in cavity (minimum density 10kg/m³)

With the inclusion of the suspended ceiling as detailed above, the sound insulation between the ground floor Wine Bar (GF) and the residential flat (FF directly above the site) has been modelled utilising Bastian Sound insulation software. This software models the sound insulation of the system and accounts for the room size, surface area of the separating element and the various flanking elements. The calculation procedure is in accordance with BS EN 12354 "Building acoustics. Estimation of

acoustic performance in buildings from the performance of elements.” The sound insulation of individual elements has been calculated utilising Insul Sound Insulation Prediction Software. The calculation has been based on the following construction details.

-Separating Floor: Concrete slab with suspended plasterboard ceiling as detailed above. (Concrete slab estimated 150mm with a density of 1350kg/m³ based on the results of the sound insulation tests, Section 5.1)

-External Walls: Double Brick

-Internal Walls: Lightweight Stud construction

The results of sound insulation modelling for the floor/ceiling partition are presented below.

Table 7: Noise Through Party Floor, Wine Bar to Residential Bedroom FF (directly above proposed development), with suspended ceiling

Noise Source / Attenuation Factor	Overall Level dBA	Octave Band Centre Frequency (Hz), dB						
		63	125	250	500	1000	2000	4000
(A) – Busy pub with background noise level	82.0	72.0	75.0	75.0	80.0	79.0	70.0	65.0
(B) – Modelled Sound Insulation (BS 12354) of the Floor (dB D _{NT})		37.7	46.4	48.7	48.3	55.9	63.1	69.9
Internal Noise Level A) - B)	30.0	34.3	28.6	26.3	31.7	23.1	6.9	-4.9
Assessment Criteria	30.0*	≤47**	≤41**	-	-	-	-	-
Exceedance Over Criteria	0.0	-12.7	-12.4	-	-	-	-	-

Notes

*BS 8233 & WHO 1999 criteria for bedrooms during the night-time (23:00-07:00)

** MCCPNTG 2015 criteria for noise from entertainment venues structurally connected to residential properties

From Table 7 it can be noted that the predicted noise egress from the Wine Bar to the attached residential property has achieved both the design criteria as specified by MCCPNTG 2015 and the recommended internal noise level criteria as given by BS 8233 & WHO 1999 for bedrooms.

5.1.2 Other Design Considerations

‘Dumb Waiter’ & other Installed equipment/machinery

It will need to be ensured that any equipment such as a ‘Dumb Waiter’, that has potential to introduce structure-borne noise, is suitably isolated from the surrounding structure. Rigid fixing for these installations to the surrounding structures should be avoided. Should a ‘Dumb Waiter’ be installed to the proposed development the manufacturer should be consulted regarding suitable fixings to isolate any potential vibration from the supporting structure.

Existing Separating Wall Between Wine Bar and Residential Property

The results of the sound insulation airborne tests indicate that the existing main party wall construction between the wine bar and neighbouring residential property is adequate to control the egress of noise from the wine bar. However care should be taken that any proposed renovation works to the existing wall are not detrimental to the acoustic performance of the partition.

Small cavities ($\leq 60\text{mm}$) between existing masonry constructions and additional layers to be added to the partition can reduce the overall airborne noise insulation of the party wall. If additional layers to the existing party wall (such as dry-lining) are considered desirable as part of the refurbishment scheme then it is recommended that the details are submitted to PDA for review before being issued for construction.

5.2 Noise Break-out From Wine Bar to Nearest Residential Properties, not structurally connected to development

Assessment Criteria

MCCPNTG 2015 gives the following design criteria for new residential developments that are structurally connected to the entertainment venue (or vice versa).

'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'

Noise Egress Assessment

It is considered that the acoustically weak elements of the external façade to the proposed development will be the glazing elements. It is assumed that all glazing elements to the development facades will meet the following minimum specification.

Table 8: Minimum Specification for façade glazing

Windows/Glazing Noise Insulation								
Typical Product	Minimum Sound Reduction Index R (dB) at Octave Band Centre Frequency (Hz)							R _w
	63	125	250	500	1000	2000	4000	
10/12/6	22	26	27	34	40	38	46	38

To calculate the equivalent Sound Power Levels (L_w 's) for noise breakout through the façades of the Wine Bar, the predicted internal noise levels for the Wine Bar (as detailed in Table 7) have been corrected to account for the window size, the sound insulation properties of the glazing (as presented in Table 8) and a further correction of 6dB (to account for the conversion of the reverberant sound field to free-field). The resultant L_w 's for noise breakout through each glazing element to the façade of the proposed development are presented below.

Table 9: Noise Break-out through Façade Glazed Elements L_w 's

Octave Band L_w 's dB								dBA
63	125	250	500	1000	2000	4000	8000	
55.4	54.4	53.4	51.4	44.4	37.4	24.4	24.4	51.5

The L_w 's for the noise break-out through the glazing elements of the façade have been used to inform a Sound Plan (SP) computer model which predicts the external noise levels at the nearest residential receivers. The Sound Plan software has been set up to model the sources by taking into account for all reflections and shielding around the site. Please note that the calculations follow the methodology detailed within ISO

9613-2 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation.

An overview of the model is depicted below.



Figure 6: Noise Breakout Through Facades, SP Overview

The equivalent noise level at the nearest residential receiver not structurally attached to the proposed development has been calculated as 22.7 dBA. The full results of the assessment presented below.

Table 10: Noise Breakout Through Glazing, Results

	63	125	250	500	1000	2000	4000	8000	dBA
L_p @ Nearest Receiver	26.8	25.7	24.8	22.7	15.6	8.4	-5.0	-6.3	22.7
*Background L₉₀	47.0	42.0	38.0	38.0	38.0	29.0	18.0	15.0	41.0
**Assessment Criteria L₉₀	37.0	32.0	28.0	28.0	28.0	19.0	8.0	5.0	-
Exceedance over criteria	-10.2	-6.3	-3.2	-5.3	-12.4	-10.6	-13.0	-11.3	-

Notes:

*Background based on the lowest L_{A90,15min} measured throughout the survey. Full results in Appendix.

**Assessment criteria, 10dB below background in each equivalent L₉₀ octave band

As can be seen from Table 10, noise breakout from the wine bar to the nearest residential receiver not structurally connected the site has achieved the MCCPNTG 2015 criteria. It can be noted that the assessment assumes that windows to the Wine Bar will remain shut, and that mechanical ventilation provides ventilation to the building.

5.3 Noise From External Seating Area, L_w

Assessment Criteria

MCCPNTG 2015 does not give any specific criteria for the assessment of noise emanating from 'people' or similar noise sources. MCCPNTG 2015 does indicate that BS 4142 should be used to assess noise egress from commercial properties, however further to this BS 4142 specifically excludes the assessment of noise emanating from 'people' from its scope of assessment. We have therefore modelled noise egress from the proposed external seating area to the nearest residential receivers and provided comments on the likely noise impact assessment referring to both the absolute noise levels and noise levels relative to the existing acoustic climate.

Noise Egress Assessment

It is understood that the external seating area will accommodate 8 sets of 4no seat tables. Therefore it is anticipated that a maximum number of 32 patrons will use the external seating area at any given time. It is understood that music will not be played externally.

To calculate noise egress from noise egress from the external seating area we have utilised the following typical noise levels for speech measured at a distance of 1m from the speaker. The data has been taken from "Guidance on computer prediction models to calculate the Speech Transmission Index for BB93 Version 1.0".

Table 11: Typical Sound Pressure Levels for Speech

	Sound Pressure Levels @1m From Speaker (dB), Octave Bands							dBA
	125	250	500	1k	2k	4k	8k	
Normal Voice Effort	51.2	57.2	59.8	53.5	48.8	43.8	38.6	59.5

The equivalent L_w 's for noise emanating from a single table to the external seating area has been calculated by applying corrections to the L_p 's as presented in Table 11 to account for a measurement distance of 1m and then multiplied by a factor of 4 to account for the number of seats per table. The equivalent L_w 's for noise emanating from each table to the external seating area are presented below

Table 12: Noise egress from 1no table to external seating area, L_w 's

Octave Band L_w 's dB							dBA
125	250	500	1000	2000	4000	8000	
65.2	71.2	73.8	67.5	62.8	57.8	52.6	73.5

The L_w 's for noise egress from the external seating tables have been used to inform a Sound Plan (SP) computer model which predicts the external noise levels at the nearest residential receivers.

An overview of the model is depicted below.



Figure 7: Noise egress from external seating area

Notes:

Receivers '4' & '5' (Figure 7) have been set at height of 5m above ground level to be equivalent to the height of the windows to the residential property above the proposed development

Noise egress to the worst affected residential receiver in regards to noise emanating from the external seating area has been calculated as 60 dBA.

With reference to the noise survey results the typical background noise level has been assessed as 42 dBA (modal L_{A90} , recorded during the survey). Noise egress from the external seating area is therefore predicted to exceed this level. However it should be considered that the calculation of noise egress from the external seating area is based on the assumption that all seats to the external seating area are occupied and that all patrons talk simultaneously (considered a worst-case scenario in regards to noise egress from external areas). It can be noted that even if all seats to the external areas are occupied it is considered unlikely that all patrons will frequently speak simultaneously. For the majority of the time noise egress from the seating areas would be expected to be below the levels depicted by Figure 7 at the nearest residential receivers.

Further to this it can be noted that based on a closed window noise egress from the external seating area is not expected to exceed the recommended 35 dBA internal noise level criteria (BS 8233 & WHO 1999) for living rooms or bedrooms during the day time period (07:00-23:00 hours). Additionally it can be noted that the external seating area is to be closed 21:00-10:00 hours (Sunday-Thursday) & 23:00-10:00 hours (Friday-Saturday), therefore sleep disturbance as a result of noise egress from the external seating area is considered unlikely.

With reference to Figure 7, noise egress from the external seating area to the nearest garden has been calculated as 50 dBA. This achieves the lower (50dBA) and upper (55dBA) recommended criteria for external amenity spaces as detailed in BS 8233:2014 and WHO:1999 guidelines.

6.0 PLANT INSTALLATIONS

The new development is to include for a kitchen and toilet extract system.

Assessment Criteria

In regards to fixed plant installations MCCPNTG 2015 gives the following design criteria.

'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'

With reference to the noise survey results the typical background noise level at the nearest residential property has been evaluated as 42 dBA (modal L_{A90} noise level from noise survey results). Therefore noise egress from the proposed plant installations in accordance with the MCCPNTG 2015 criteria is required to not exceed a level rating level 37 dBA at the nearest residential property.

Kitchen Extract

It is understood that the Kitchen Extract system will consist of the following units:

- MUB 042 500D4 Multibox
- LDC-B 400-1200 Silencer baffle (to external ductwork termination side)
- External grille area 0.4m²

The following L_w 's for the fan unit and insertion losses for the silencer are provided by the manufacturers.

Table 13: MUB 042 500D4 Multibox, L_w 's

L_{WA}, Octave Band Levels, dB								dBA
63	125	250	500	1k	2k	4k	8k	
49	68	72	78	82	79	71	65	85

Table 14: LDC-B 400-1200 Silencer, Insertion Losses

Insertion Losses, Octave Band Levels, dB							
63	125	250	500	1k	2k	4k	8k
6	10	18	23	31	36	25	19

Equivalent L_w 's for the noise breaking out of the kitchen extract ductwork has been calculated by applying corrections to the L_w 's for the fan unit to account for the insertion losses of the fan and the end-loss reflection of the ductwork termination. The resultant L_w 's are presented in Table 15 below.

Table 15: Noise Break-out from Kitchen Extract, L_w 's

L_w, Octave Band Levels, dB								dBA
63	125	250	500	1k	2k	4k	8k	
36	55	53	55	51	43	46	46	56

Toilet Extract

It is understood that the Toilet Extract system will consist of the following units:

- Inline Extraction Fan
- External grille area 0.2m²

The exact toilet fan to be utilised for the development has not been selected at this point. However it is understood that the toilet fan will be similar to the following unit.

Table 16: Toilet extract, Microbox 125, L_w's

L _w , Octave Band Levels, dB								dBA
63	125	250	500	1k	2k	4k	8k	
53	58	58	54	53	51	45	47	58

Equivalent L_w's for the noise breaking out of the toilet extract ductwork has been calculated by applying corrections to the L_w's for the fan unit to account for the end-loss reflection of the ductwork termination. The resultant L_w's are presented in Table 17 below.

Table 17: Noise Break-out from Toilet Extract, L_w's

L _w , Octave Band Levels, dB								dBA
63	125	250	500	1k	2k	4k	8k	
36	45	50	51	52	51	45	47	57

Plant Noise Egress

It is understood that both the kitchen and toilet extraction systems will terminate on the façade facing towards Sherratt St as indicated in Figure 8 below.

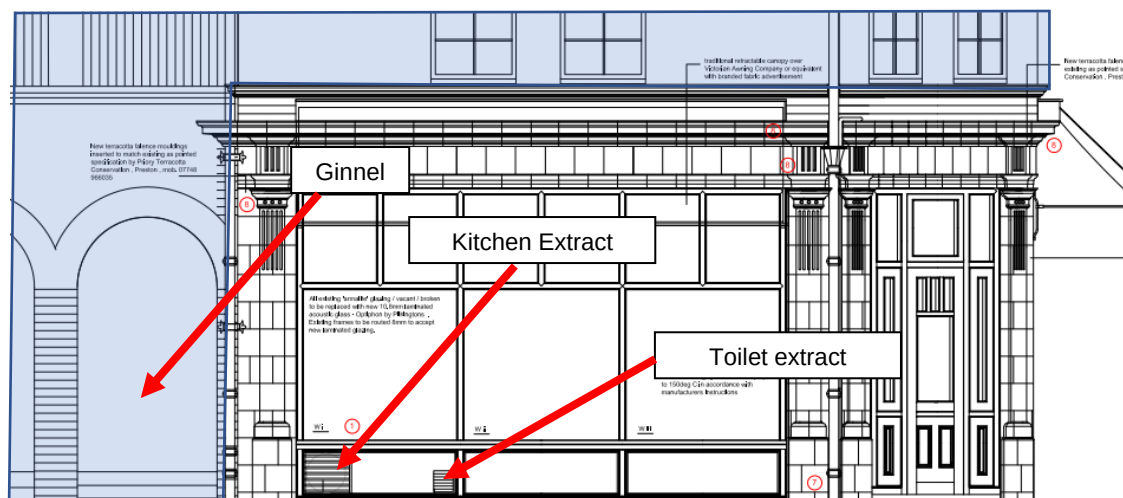


Figure 8: Kitchen & Toilet Extract Locations, View from Sherratt St (Shaded area indicative of façade areas not part of the development)

The L_w's for noise break out from the kitchen and toilet extract systems as presented in Tables 15 & 17 have been used to inform a Sound Plan (SP) computer model which predicts the external noise levels at the nearest residential receivers.

An overview of the model is depicted below.



Figure 8: Noise egress from Kitchen & Toilet Extract

Noise egress to the worst affected residential window in regards to noise emanating from the kitchen and toilet extract systems has been calculated as 38 dBA. This marginally exceeds the strict MCCPNTG 2015 criteria for plant based sources (37 dBA).

To achieve MCCPNTG 2015 criteria the following (or equivalent) silencer should be included the toilet extract external duct work termination.

Table 18: Toilet Extract, Silencer, minimum Insertion Losses (Typical product IAC 200-C2-300)

Insertion Losses, Octave Band Levels, dB							
63	125	250	500	1k	2k	4k	8k
2	3	4	8	10	14	13	10

With the inclusion of the above silencer (or equivalent) to the toilet extract termination noise egress to the nearest residential windows has been re-evaluated within the SP model as follows.



Figure 9: Noise egress from Kitchen & Toilet Extract (including for silencer to Toilet Extraction)

Noise egress to the worst affected residential receiver in regards to noise emanating from the kitchen and toilet extract systems has been calculated as 35 dBA. This achieves the MCCPNTG 2015 criteria for plant based sources (37 dBA).

Further to this it can be noted that based on a open window noise egress from the proposed plant is not expected to exceed the recommended 30 dBA internal noise level criteria (BS 8233 & WHO 1999) for bedrooms. Therefore sleep disturbance as a result of noise egress from the proposed plant is considered unlikely.

7.0 CDM 2015

Under the Construction Design and Management regulations 2015 (CDM) PDA Ltd has certain responsibilities with respect to health and safety matters involved with the design and construction aspects of the project. In this capacity PDA Ltd assists the 'Principal Designer' by undertaking the role of 'Designer'. The Designer's role is to identify and minimise health and safety related risks associated with consulting recommendations and advice it has provided.

The following list, albeit not intended to be exhaustive, identifies potential foreseeable risks associated with acoustic related aspects of the design, along with options for minimising / reducing said risks:

Table 19: Potential Foreseeable Health and Safety Risks - Acoustic Design Aspects

Element	Health and Safety Aspect	Mitigation to Minimise / Reduce Risk
Blocks and Boards	Weight	Follow manual handling guidelines for lifting, moving and installation
Glazed Units	Weight	Follow manual handling guidelines for lifting, moving and installation
Acoustic Baffles / Rafts	Working at Height	Arrange suitable access for installers trained in working at height.
General Construction Activities	Noise Exposure	Provision of requisite training and provision of hearing protection enforcement of use where appropriate under the 2005 Control of Noise at Work Regulations.

While examples of specific manufacturers' products may be provided in the report, there will generally be alternatives that can be used. It is noted that finalised selections of specific construction materials and/or methods must have potential health and safety risks confirmed based on information available including that from the supplier or manufacturer.

8.0 CONCLUSION

At the request of Fish Associates a noise impact assessment has been conducted in relation to the proposed new wine bar, restaurant and shop at Victoria Square, Northern Quarter, Manchester.

A noise survey has been conducted at site to establish the existing ambient and background noise levels at the nearest residential receivers.

Sound Insulation tests have been conducted across the existing separating wall and floor partitions between the proposed development and the neighbouring residential properties.

In regards to the internal noise sources to the proposed development, noise egress has been modelled to the nearest residential properties and compared against the existing noise climate and various guidance noise level criteria as given by Manchester City Council, Planning & Noise, Technical Guidance 2015 (MCCPNTG 2015), BS 8233 and WHO 1999.

The results of the noise modelling indicate that with the mitigation strategies (where appropriate) as outlined in this report, the noise level criteria as given by MCCPNTG 2015, BS 8233 and WHO 1999 will be achieved.

In regard to the egress of noise from the external seating area to the proposed development, noise egress to the nearest residential receivers has been modelled and compared against the existing acoustic climate. It is concluded that based on a worst-case scenario in regards to noise egress from the seating area that the existing background noise level will be exceeded at the nearest residential receiver. However it can be noted that based on a closed window noise egress from the external seating area is not expected to exceed the recommended 35 dBA internal noise level criteria (BS 8233 & WHO 1999) for living rooms or bedrooms during the day time period (07:00-23:00 hours). It can be noted that the external seating area is to be closed 23:00-10:00, therefore sleep disturbance as a result of noise egress from the external seating area is considered unlikely. Additionally noise egress from the external seating area to the nearest garden has been calculated as 50 dBA. This achieves the lower (50dBA) and upper (55dBA) recommended criteria for external amenity spaces as detailed in BS 8233:2014 and WHO:1999 guidelines.

Noise egress from the proposed plant installations (kitchen & toilet extracts) has been modelled to the nearest residential window to the development. With the inclusion of the specified silencers to the kitchen extract and toilet extract external terminations as detailed in Section 6 of this report, noise egress from plant installations is predicted to achieve the MCCPNTG 2015 criteria.

APPENDIX I – DEFINITION OF ACOUSTIC TERMS

The decibel

This is the basic unit of noise, denoted dB.

A-Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB L_{Aeq} . Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous noise level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average noise level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq} . It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB L_{An} . It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) L_{max} , dB L_{Amax} , etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall noise level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the noise level in each band can be expressed in any form e.g. L_{eq} , L_{90} , L_{max} etc. One third octave band analysis uses 30 bands.

Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.

APPENDIX II – NOISE SURVEY FULL RESULTS

N1- $L_{eq,T}$ Results, Adjacent nearest residential receivers and proposed development

Date	Time	L_{Aeq} dBA	L_{eq} Octave Band Centre Frequency								L_{A90} dBA	L_{Amax} dBA
			63	125	250	500	1k	2k	4k	8k		
10/09/2020	21:11:36	55.7	63.9	58.2	53.2	51.2	51.9	47.9	42.8	35.7	43.1	79
10/09/2020	21:26:36	51	58.1	50.5	47.5	46.5	48.2	42.9	33.8	25.8	42.3	73
10/09/2020	21:41:36	52.1	60.1	53.6	49.3	47.3	48.9	44.2	36.2	28.5	44	68
10/09/2020	21:56:36	51.9	59.1	52.9	49.3	46.9	48.2	44.6	39.1	32.4	43	72
10/09/2020	22:11:36	48.2	56.5	49.8	46	45.3	44.5	39.5	32.6	25.1	42.4	63
*10/09/2020	22:26:36	47.1	54.6	47.9	45.7	44	43.3	37.9	33.2	29.3	41.6	67
-	-	-	-	-	-	-	-	-	-	-	-	-
**10/09/2020	22:39:42	49.7	57.2	50.7	47	45.6	46.6	41.4	32.6	25.2	41.9	70
-	-	-	-	-	-	-	-	-	-	-	-	-
10/09/2020	22:57:36	50.6	57.9	50.8	47.8	46.7	47.4	42.4	34.9	30	42.6	74
10/09/2020	23:12:36	50.1	57.4	50.9	47.7	45.6	47.1	41.5	33.8	26.9	42.6	68
10/09/2020	23:27:36	47.2	56	47.6	44.5	44.4	44.2	37.8	28.6	20.9	41.3	63
10/09/2020	23:42:36	47.3	55.9	48.8	44.5	43.4	44.3	38.6	30.4	23.7	41.8	62

*Shorter measurement period (12 minute sample), due to battery change

**Shorter measurement period (5 minute sample), due to pedestrian talking to PDA engineer during measurement

N1- L_{90} Results, Adjacent nearest residential receivers and proposed development

Date	Time	L_{90} Octave Band Centre Frequency								L_{A90} dBA
		63	125	250	500	1k	2k	4k	8k	
10/09/2020	21:11:36	51.2	45.2	41.2	39.2	39.2	33.2	22.2	16.2	43.1
10/09/2020	21:26:36	50.2	44.2	40.2	38.2	38.2	32.2	22.2	16.2	42.3
10/09/2020	21:41:36	51.2	46.2	41.2	39.2	40.2	34.2	24.2	17.2	44
10/09/2020	21:56:36	50.2	45.2	40.2	39.2	39.2	33.2	23.2	16.2	43
10/09/2020	22:11:36	49.2	44.2	40.2	38.2	38.2	31.2	21.2	16.2	42.4
*10/09/2020	22:26:36	47.2	42.2	39.2	37.2	38.2	31.2	20.2	15.2	41.6
-	-	-	-	-	-	-	-	-	-	-
**10/09/2020	22:39:42	48.2	43.2	39.2	38.2	38.2	31.2	20.2	15.2	41.9
-	-	-	-	-	-	-	-	-	-	-
10/09/2020	22:57:36	48.2	43.2	39.2	38.2	39.2	32.2	20.2	16.2	42.6
10/09/2020	23:12:36	48.2	43.2	39.2	39.2	39.2	31.2	19.2	15.2	42.6
10/09/2020	23:27:36	47	42	38	38	38	29	18	15	41.3
10/09/2020	23:42:36	47.2	43.2	39.2	38.2	38.2	30.2	20.2	16.2	41.8

*Shorter measurement period (12 minute sample), due to battery change

*Shorter measurement period (5 minute sample), due to pedestrian talking to PDA engineer during measurement