Noise Impact Assessment of the Change of Use of a Basement into a Cocktail Bar

Client Name:	Hovig Yardim
Site Address:	199 Field End Road, Pinner, HA5 1QZ.
Date:	12/04/2022

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Executive summary

An environmental noise survey and noise impact assessment have been undertaken at 199 Field End Road, Pinner, HA5 1QZ to assess the potential increase in noise levels from the change of use of a Basement into a Cocktail Bar on the surrounding Noise Sensitive Receptors (NSR). The measured background sound levels have allowed a BS4142:2014 noise assessment to be carried out.

Noise Breakthrough Assessment (Communal)

- The noise breaking through assessment shows that provided the proposed details are installed all internal criteria in the adjacent dwellings can be achieved.

BS4142:2014 Noise Impact Assessment

- The BS4142:2014 assessment indicates that provided the external units are installed as specified within this report and recommendations and mitigations proposed in the report are implemented, the Rating Noise Level should be below the background sound level. This indicates low impact in accordance with BS4142:2014 and 'No Observed Effect Level' when assessed in accordance with the NPSE and NPPF.

An overview of the recommendations can be found below:

Recommendations and Mitigation Overview

Noise Breakthrough Assessment

- Automated volume controls capable of limiting noise at specific frequencies to prevent significant bass frequency noise should be implemented at the site. The maximum amplified music limit level should be set as shown in the following table.

A-weighted Octave Band Sound Pressure Level, Hz (dB)							
63	**125**	**250**	**500**	**1K**	**2K**	**4K**	**Overall**
75.0	87.0	93.0	93.0	90.0	87.0	83.0	95.0

- Where possible All doors should remain closed throughout the operational period of the proposed bar.
- In order to avoid the noise travelling through the stairwell to the proposed falt on the first floor, it is paramount that the door set of the basement stairwell (see Figure 6.0) is correctly installed and provides a minimum sound reduction of 30.0 dB R_w. In order for the door to be effective, a double door entry system with a lobby entrance should be implemented. This is intended to limit the amount of noise coming from the cocktail bar during the entrance/exit of the patrons.
- All amplified music should not exceed the noise levels of 95.0 dB within the development. A P.A limiting system should be installed and calibrated to this noise level by a suitably qualified person. The system should be calibrated to the limit above or inaudibility at the NSR.

- A noise management plan can be found in Section 5.0.

BS4142 Assessment

General Mitigations

- The AC Units must operate only between the operational times established by the decision notice given by the London Borough of Hillingdon Council.
- In order to reduce vibration and vibration transmission into the adjoining structure, especially into noise-sensitive spaces, all AC Units should be fitted on appropriate anti-vibrational mounts. It is advised that the AC unit be fitted on mounts providing a minimum 80% isolation. The minimum static deflection required of amounting to provide 80% isolation in relation to speed (RPM) is outlined in Table 8.0.
- The make, model and location of the external unit should not be altered and is identified in Appendix C. If alterations to the specification and location of the units are required further assessment should be undertaken.

Option 1 - Enclosure

- An acoustic enclosure capable of reducing the noise emissions of the unit by at least 17 dBA should be installed around the three units. This will ensure noise emissions fall a minimum of 5 dB below the background sound level.
    - A basic enclosure design is outlined below:
        - 12mm ply Box Enclosure (23 dB R_w)
        - Caice SS300mm Acoustic Louvered section (17 dB R_w)
    - Bespoke acoustic enclosures can also be provided by http://www.acoustic-enclosures.co.uk or any other company provided the minimum attenuation is provided.

Option 2 - Relocation

- The existing three units should be relocated to a minimum distance of 6m from the closest NSR window.
- The line of sight between the units and the NSR needs to be totally shielded by a solid body e.g. close-boarded timber fences with a minimum mass of 10 kg/m².

The findings of this report will require written approval from the Local Authority prior to work commencing.

1. Introduction

Overview

NOVA Acoustics Ltd has been commissioned to prepare a noise assessment for the installation of change of use of a Basement into a Cocktail Bar (the Proposed Development') at 199 Field End Road, Pinner, HA5 1QZ ('the Site').

The applicant has received conditional planning approval, 2698/APP/2021/2355 – 'Change of use from a financial and professional services, retail and cafe (Use Class E) to a mixed-use comprising retail, restaurant and cafe and a drinking establishment (Sui Generis) and retention of awnings and air conditioning units' from London Borough of Hillingdon. The following planning application requires discharging the conditions 6, 7 and 9.

The following technical noise assessment has been prepared to support the planning application to London Borough of Hillingdon. This report details the existing background sound climate at the nearest receptors, as well as the sound emissions associated with the Proposed Development.

This noise assessment is necessarily technical in nature; therefore, a glossary of terms is included in Appendix A to assist the reader.

Scope & Objectives

The scope of the noise assessment can be summarized as follows:

- Baseline sound monitoring survey to evaluate the prevailing background sound levels at the nearest sensitive receptor ('NSR') to Site;
- Detailed sound modelling, acoustic calculation and analysis in accordance with; ISO9613 – 1 ISO 9613-2 - Attenuation of sound during propagation outdoors prediction methodology, to predict sound levels at the NSR;
- A detailed assessment of the suitability of the Site, in accordance with relevant standards in respect of sound from the proposed sources; and
- Recommendation of mitigation measures, where necessary, to comply with the requirements of the National Planning Policy Framework (2020), Noise Policy Statement for England (2010) and British Standard BS 4142:2014+A1:2019 - Methods for rating and assessing industrial and commercial sound. Further information on the legislation can be found in Appendix B.

Local Policy Guidance & Discussions with the Local Authority

The following conditions are proposed with the case officer regarding noise issues.

<u>Condition 6:</u>

Within one month of the date of this decision notice:

a) Details shall be submitted to the local planning authority for approval to demonstrate that the rating noise level emitted from the air conditioning units at the site, as assessed under BS4142:2014, will be lower than the existing background noise level by at least 5 dBA as measured one metre from the nearest first floor noise sensitive facade during the relevant periods of operation.

b) Details shall be submitted to the local planning authority for approval of the anti-vibration isolators and wall mounts.

c) The air conditioning units shall not be operational outside the approved opening hours. The development shall be carried out strictly in accordance with the approved details and hours of operation and maintained as such for the life of the development.'

Condition 7:

"The drinking establishment use permitted shall not commence until a noise impact assessment on the potential for noise from the development affecting residential properties in the area has been submitted to and been approved in writing by the Local Planning Authority. If the assessment indicates that noise from the development is likely to affect neighbouring residential properties, then a detailed scheme of noise mitigation measures shall be submitted to and approved in writing by the Local Planning

Authority prior to the commencement of the development. The noise mitigation measures shall be designed so that nuisance will not be caused to the occupiers of neighbouring noise sensitive premises by noise from the development.

The noise assessment shall be carried out by a suitably qualified acoustic consultant/engineer and shall take into account the provisions of BS 8233: 2014 Guidance on sound insulation and noise reduction for buildings. The approved scheme shall be implemented prior to the commencement of the drinking establishment use hereby permitted and be permanently maintained thereafter.

Condition 9:

There shall be no amplified sound including music or speech until, a scheme of noise control is submitted to and approved in writing by the Local Planning Authority. The scheme shall be written by a suitably qualified person and shall specify but not be limited to;

a) the noise level at which amplified music will be played;

b) the frequency with which live music shall be played, including a sound limiter;

c) the control measures that will be used; and

d) details of the complaint recording and management plan.

The approved plan shall thereafter be maintained and adhered to for the duration of the use.'

2. Environmental Noise Survey

Measurement Methodology

In order to characterise the sound profile of the area at the closest sensitive receptor (NSR), an environmental sound survey has been carried out from the 11th to the 12th of March 2022. The microphone was located on a lamppost at a height of 3.5m on the ground floor. The monitoring position was chosen in order to collect representative sound levels at the NSR during the typical operational periods of the proposed development. The monitoring location is shown in Figure 1.0.

Figure 1.0 - Indicative Site Layout

The following image shows the lamppost which the sound level meter was attached to.

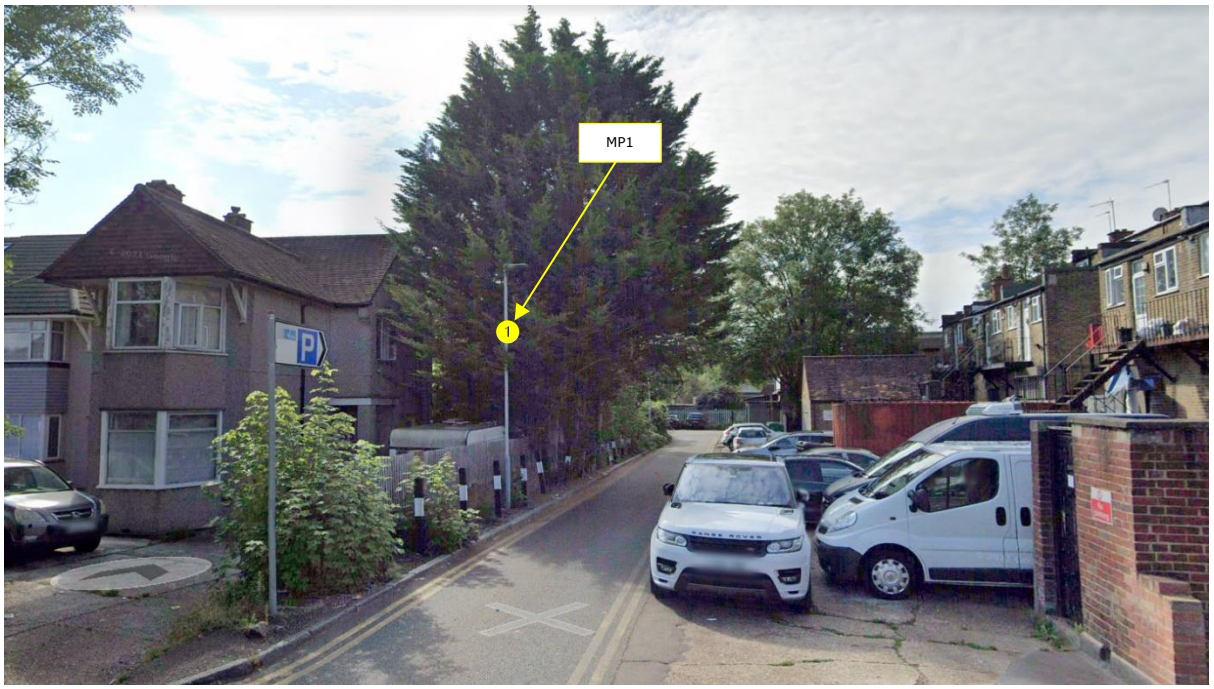


Figure 2.0 – MP Location

Context & Subjective Impression

The area surrounding the site is a mixture of residential and commercial developments. To the west of the proposed site runs Field End Road, which facilitates high traffic flow levels. To the north runs North View, which facilitates medium traffic flow levels. Along Field End Road are numerous commercial premises such as restaurants (Yaprak Express, Just Pizza Plus, Village Pizza, etc.), shops (Sainsbury's Local, Crispe Opticians, Young's Newsagents, etc.) among other commercial types. On North View, right in front of the proposed site, is Melisa Food Center, although, it is mainly a residential street. To the rear of the site is an access road for the back of the commercial and residential premises located to the south of the site. This road provides also access to the Hillingdon Council North View Car Pack.

During the site visits, the noise profile of the area is dominated by the road noise coming from North View and Field End Road with high levels of traffic flow during the daytime.

Background

It is proposed to convert the storage room located in the basement from the café 'TAG Drinks' into a cocktail bar. The following figures show the proposed cocktail bar located in the basement of the existing café.

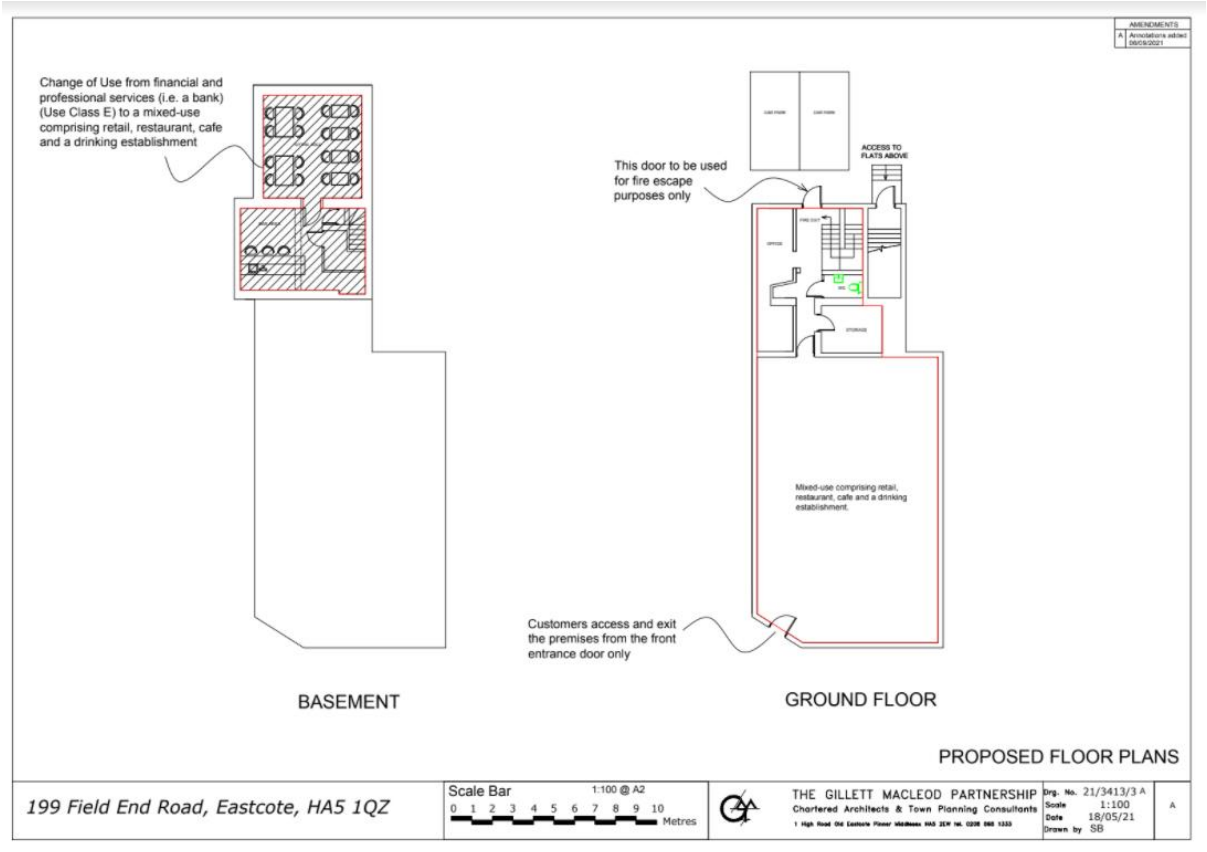


Figure 3.0 – Proposed change of use of the basement to a Cocktail Bar

NOVA Acoustics Ltd has been informed that the ground floor will keep its usage as a café and that the first floor of the proposed site is an associated residential dwelling. Therefore, the first floor is

considered the closest noise sensitive receptor (NSR) and it will be analyzed in the subsequent assessment.

Environmental Noise Survey Results

NOVA Acoustics Ltd has been informed that the plant will only work during the operational times of the café and the cocktail bar which are Sundays to Thursdays from 11:30 to 23:00 and Fridays to Saturdays from 11:30 to 00:00 midnight. The table below outlines the background sound levels, during the operational period of the plant, that will be used as the baseline for the noise assessment. Further summary results for the entire measurement period can be found in Appendix D.

Measurement Position MP1				
Measurement Period ('t')	**$L_{A90,15min}$**	***SMR $L_{A90,15min}$**	**Min. $L_{A90,15min}$**	**Max. $L_{A90,15min}$**
Day 1 – 11/03/2022 – 17:30 – 23:00	53.0	54.0	49.0	55.0
Night 1 – 11/03/2022 – 23:00 – 00:00	47.0	47.0	**47.0**	48.0

Table 1.0 – Background Sound Level Summary Results

**Statistically Most Repeated*

As can be seen in the table above the lowest measured and statistically most repeated $L_{A90,15min}$ value is **47.0 dB.** The range of measured background sound levels is relatively low and as such, the lowest measured $L_{A90,15min}$ value is deemed 'Typical' and will be used in the following assessment.

3. Airborne Noise Break Through Assessment

The following section will assess the noise breaking through the cocktail to the nearest sensitive developments located on the first floor.

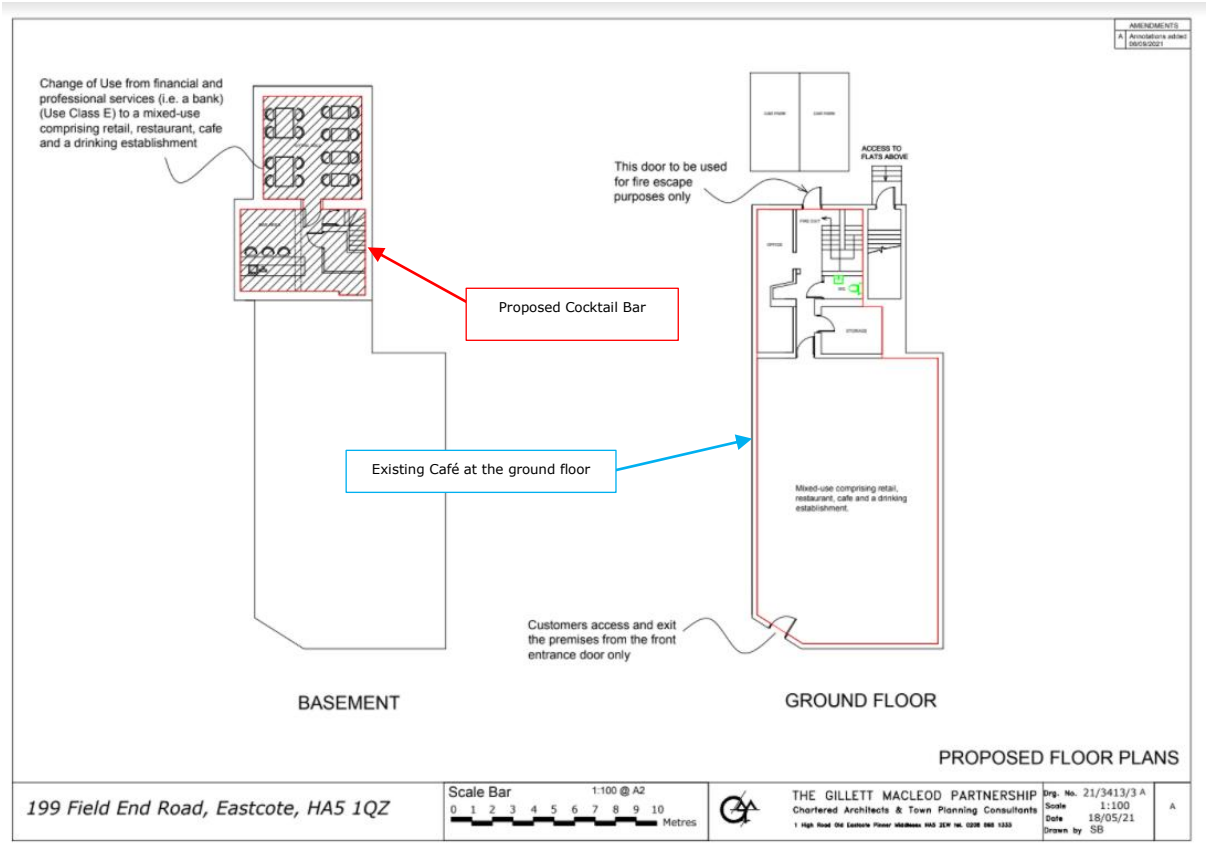


Figure 4.0 – Indicative Layout of the Social Club and Surrounding Flats

It is proposed to change the use of a storage room in the basement into a cocktail bar. Consequently, there may be a potential for noise breaking through the adjoining floor to adversely impact the tenants of the flat on the first floor. It is important to mention that the cocktail bar is not adjacent to the residential apartments above as the proposed site is within the basement and the flats are on the first floor. However, the stairwell going to the basement is adjoined with the corridor/stairwell of the residential apartments. Therefore the noise may travel from the basement through to proposed developments stairwell to the flats stairwell/corridor.

Figure 5.0 – Staircase going to the basement

Therefore, the following section analyses the level of noise breakthrough from the proposed development compared with the internal noise level criteria presented within BS8233:2014. Where octave band sound levels have been assessed these have been compared to the appropriate Noise Rating Curve (NR Curve). To ensure 'virtual inaudibility' can be achieved it is important to ensure stringent criteria are applied to the low-frequency bands. The music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{eq}) will be assessed so as not to exceed (in habitable rooms) 47dB and 41dB (L_{eq}), respectively (Moorhouse Curve), further details of the legislation are shown in Appendix B4.

As such the following table presents an example of unweighted sound pressure levels, associated with the proposed development. These are based on a previous sound survey undertaken by NOVA Acoustics Ltd; the internal sound data was measured in the centre of the dance floor with a maximum capacity of 100 patrons dancing, and a band playing amplified music through a 4kW P.A. system. Therefore, providing a conservative and robust assessment of the proposed development.

Music Limit Level	**Octave Band $L_{eq,t}$ Hz**							
	63	**125**	**250**	**500**	**1K**	**2K**	**4K**	**Overall**
Internal Amplified Music Level	91.0	92.0	93.0	93.0	90.0	87.0	83.0	95.0

Table 2.0 – Amplified Music Level

The following construction build-ups of the partition floor and the partition wall between the flat's corridor and the commercial have been obtained from conversations with the client. Some assumptions have been made where the information was not available, therefore, the below construction build-ups need to be checked as further assessment may be required if any deviation is found.

Partition Wall between Corridor and Commercial:

- Assumed Twin 50mm Timber studs
- Lather and Plaster

Partition Floor between Corridor and Commercial:

- Concrete Floor (Assumed thickness of 150mm)
- Suspended Ceiling with 200mm of cavity space.
- 25mm Fiberglass Insulation (min. 10 kg/m^3)
- Fireline plasterboard on the ceiling

As can be seen in the figure below, the cocktail bar area in the basement will be separated from the staircase leading to the ground floor by a door. It is assumed to be a standard rebated 44mm thick solid core timber door set (29 kg/m²) capable of achieving 30 dB Rw is installed.

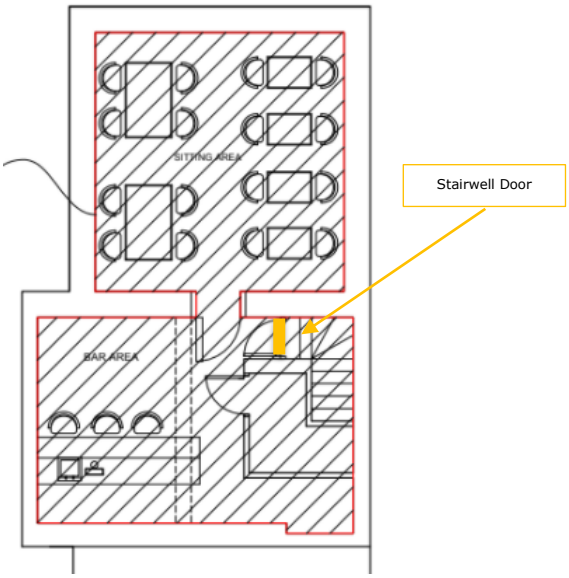


Figure 6.0 – Indicative Layout of the Social Club and Flat 4

The following table shows the internal amplified music levels are assessed against the predicted partition detailed above which has been assumed and predicted with INSUL 9.0 – and uncertainty of 3 dB has been applied to the modelled partition. The result will be compared against the internal noise level criteria stated in the BS8233:2014 for corridors and lobbies in table H.4.

Measurement Period ('t')	Octave Band $L_{eq,t}$							R_w
	63	125	250	500	1K	2K	4K	
Internal Amplified Music Level	91.0	92.0	93.0	93.0	90.0	87.0	83.0	95.0
Sound Reduction of Stairwell Door	18.0	22.0	26.0	26.0	27.0	36.0	45.0	30.0
Sound Reduction of Partition Wall between Corridor and Commercial	10.0	24.0	39.0	52.0	63.0	70.0	60.0	49.0
Resulting Internal Noise Levels	63.0	46.0	28.0	15.0	0.0	-19.0	-22.0	16.0
NR40 Curve **(dB) + Moorhouse Curve	47.0	41.0	45.0	39.0	35.0	32.0	30.0	40.0
Exceedances	16.0	5.0	-17.0	-24.0	-35.0	-38.0	-30.0	-9.0

Table 3.0 - Noise Breakthrough Assessment - Partition Wall Between Residential Corridor

*** It is noted that there are no habitable rooms adjacent to the wall sep[erasting the site with the residential NSR. on the adjacent side within the residential dwelling there is a corridor. This isn't typically considered a habitable room and as such the criteria of 40 dBA LAeq,t (NR35) will be used which represents noise criteria for dining rooms. To allow for any uncertainty the low frequencies will have been assessed against the more house curve which is specifically devised for assessing low-frequency noise.*

Measurement Period ('t')	Octave Band $L_{eq,t}$							R_w
	63	125	250	500	1K	2K	4K	
Internal Amplified Music Level	91.0	92.0	93.0	93.0	90.0	87.0	83.0	95.0
Stairwell Door	18.0	22.0	26.0	26.0	27.0	36.0	45.0	30.0
Partition Floor between Corridor and Commercial	48.0	60.0	55.0	61.0	68.0	73.0	90.0	63.0
Resulting Internal Noise Levels	27.0	10.0	12.0	6.0	-5.0	-22.0	-52.0	2.0
NR40 Curve (dB) + Moorhouse Curve	47.0	41.0	49.0	44.0	40.0	37.0	35.0	45.0
Exceedances	-20.0	-31.0	-37.0	-38.0	-45.0	-59.0	-87.0	-43.0

Table 4.0 - Noise Breakthrough Assessment - Partition Floor between Corridor and Commercial

Discussion

As can be seen in the assessment above, the noise breaking through the stairwell to the stairwell/corridor of the flat on the first floor may exceed the criteria set out at BS8233:2014 for the

low end of the frequency bands (63 and 125 Hz). However, the noise levels breaking through fall in line with the relevant criteria for the rest of the bands and the overall. In order to avoid any exceedance on low frequencies, a Music Limit Noise Level will be required.

4. BS4142:2014 Noise Assessment

The following section of the report analyses the expected impact of the noise emissions associated with the proposed cocktail bar.

Figure 7.0 – Existing External AC Units and First Floor Apartments

The following equipment (AC Units) is already installed at the back of the proposed development:

Plant Equipment	Specific Noise Level @ 1m	Distance to NSR	Specific Noise Level at NSR*[1]	Acoustic Feature Correction *[2]
Mitsubishi SRC71ZR-W	53.0	1.5	49.0	Tonality +2 Intermittency +3
No.2 Mitsubishi - FDC71VNP	57.0	1.5	53.0	
Cumulative Rating Noise Level $L_{AR,TR}$ @ NSR				59.0

Table 5.0 – Plant Noise Emissions

**[1] The noise level at the NSR has been calculated using the following equation 20log(r1/r2).*

**[2] Penalty for tonal component and intermittency applied*

The BS4142 Assessment of the existing AC units at the rear is outlined in the table below.

Results	Sound Level (dB)	Notes
Rating Sound Level	59.0	Acoustic feature corrections as shown in Table 5.0.
Background Sound Level	47.0	As shown in Table 1.0
Excess of Rating over Background Sound Level	+12.0	The assessment indicates; Significant Adverse Impact Dependant on Context

Table 6.0 – BS4142:2014 Noise Assessment

Discussion

The assessment above indicates that the rating level is above the background sound level at the noise sensitive receptor by 12.0 dB. This indicates the potential for Significant Adverse Impact Dependant on Context impact on the surrounding residential Noise Sensitive Receptors.

Therefore, the existing external plant located at the rear of the development will not satisfy the requirements established by the London Borough of Hillingdon – rating level to be below 5.0 dB of the existing background sound level.

In order to ensure the noise emissions from the proposed plant units do not cause a significant adverse impact and are compliant with the London Borough of Hillingdon, it is advised that noise emissions of the existing wall-mounted external plants are reduced by 17.0 dBA.

5. Recommendations & Mitigation

Airborne Noise Break Through Assessment

A potential flanking transmission path has been identified and can result in potential noise impact on the tenants located on the first floor if not considered correctly. Therefore, some recommendations are given in order to mitigate the noise from the proposed development.

a) Amplified Music Limiting Device

Automated volume controls capable of limiting noise at specific frequencies to prevent significant low-frequency music should be implemented in the Cocktail Bar. The following maximum amplified music limit level should be set as shown in the following table.

Description	Octave Band Sound Pressure Level, Hz (dB)							Overall (A)
	63	125	250	500	1K	2K	4K	
Limit Music Level	75.0	87.0	93.0	93.0	90.0	87.0	83.0	95.0

Table 7.0 – Maximum Amplified Music Limit Level

b) Sealed Door

In order to avoid the noise travelling through the stairwell to the proposed falt on the first floor, it is paramount that the door set of the basement stairwell (see Figure 6.0) is correctly installed and provides a minimum sound reduction of 30.0 dB R_w. In order to de door be effective, a double door entry system with a lobby entrance should be implemented. This is intended to limit the amount of noise coming from the cocktail bar during the entrances/exits.

All doors should remain closed throughout the operational period of the proposed bar.

c) Distributed PA System

To minimize the internal sound level required to achieve a uniform and distributed noise level within the development, a distributed and zonal PA system should be installed. This will allow the development to have full control of the maximum noise level. The speakers should be mounted as low as feasible to bring the speakers closer to the users and thus allow the overall noise level to be reduced, whilst retaining a feeling of loudness. A distributed sound system involves installing a higher quantity of speakers all emitting a lower level, this method takes advantage of the proximity of the listener to the speaker thus reducing the noise emissions of the development site. The speakers should be focused on the main operational area of the development and note located near to and directed away from entrances and exits. All speakers should be installed on appropriate anti-vibrational mounts.

d) Noise Management Plan

The following recommendations are measures that should be implemented on the operation of the site to ensure a low likelihood of impact at the NSR.

- The development should have a designated member of staff to deal with all noise complaints should they arise.
- An Incident Management System or IMS should be implemented to deal with and log such instances.
- Amplified music should not be played outside of the operational hours of the site.
- The site should have a dedicated phone line for complaints.
- The site should purchase a class 2 sound level meter and provide a log of noise data from the site. This should include a minimum of 1 monitoring session carried out at each NSR, during an event. The noise data should be logged, as well as the subjective impression of the noise from the events space.
- Should a noise complaint be received the person responsible for all complaints should undertake noise measurements at the NSR and log the measured noise levels within the IMS. Appropriate actions should then be undertaken to reduce noise levels where possible.
- The in-house PA systems and noise limiters should be appropriately calibrated to the noise levels outlined in the section above or audibility at the closest NSR.
- All staff including that of external entertainment should be made aware of the impact excessive noise can have on the surrounding NSRs.
- All staff should be trained in noise reductive work practices where possible.

BS4142:2014 Mitigation & Recommendations

The following section outlines the mitigation measures that are necessary to reduce the impact of the existing AC Units located at the rear of the development.

General Mitigations

- The AC Units must operate only between the operational times established by the decision notice given by the London Borough of Hillingdon Council.
- In order to reduce vibration and vibration transmission into the adjoining structure, especially into noise-sensitive spaces, all AC Units should be fitted on appropriate anti- vibrational mounts.

  The specification from the mount is largely based on the following factors:

  - The number of feet or mounting points
  - The weight of the plant/machinery
  - The speed of any associated pumps or motors in RPM.

  It is advised that the AC unit be fitted on mounts providing a minimum 80% isolation. The minimum static deflection required of amounting to provide 80% isolation in relation to speed (RPM) is outlined below.

Motor/pump Speed (RPM)	Minimum Static deflection required for 80% Isolation per mount
500	22mm
750	10mm

1000	5.5mm
1250	3.5mm
1500	3mm
1750	1.7mm
2000	1.3mm

Table 8.0 – Anti Vibrational Mounts Static Deflection

- The make, model and location of the external unit should not be altered and is identified in Appendix C. If alterations to the specification and location of the units are required further assessment should be undertaken.

Option 1 - Enclosure

- An acoustic enclosure capable of reducing the noise emissions of the unit by at least 17 dBA should be installed around the three units. This will ensure noise emissions fall a minimum of 5 dB below the background sound level.
    - A basic enclosure design is outlined below:
        - 12mm ply Box Enclosure (23 dB R_w)
        - Caice SS300mm Acoustic Louvered section (17 dB R_w)
    - Bespoke acoustic enclosures can also be provided by http://www.acoustic-enclosures.co.uk or any other company provided the minimum attenuation is provided.

Option 2 - Relocation

- The existing three units should be relocated to a minimum distance of 6m from the closest NSR window.
- The line of sight between the units and the NSR needs to be totally shielded by a solid body e.g. close-boarded timber fences with a minimum mass of 10 kg/m².

Appendix A – Acoustic Terminology

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa (20x10-6 Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L90 can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided. The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

In accordance with logarithmic addition, combining two sources with equal noise levels would result in an increase of 3 dB(A) in the noise level from a single source. A change of 3 dB(A) is generally regarded as the smallest change in broadband continuous noise which the human ear can detect (although in certain controlled circumstances a change of 1 dB(A) is just perceptible). Therefore, a 2 dB(A) increase would not be normally be perceptible. A 10 dB(A) increase in noise represents a subjective doubling of loudness.

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs.

For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest. In the UK, traffic noise is measured as the L_{A10}, the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the

time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq}.

This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound. To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3 dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1 dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS4142:2014 specifies background noise measurement periods of 1 hour during the day and 15 minutes during the night. The noise levels are commonly symbolised as $L_{A90,1hour}$ dB and $L_{A90,15mins}$ dB. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125ms

Appendix B – Legislation, Policy and Guidance

This report is to be primarily based on the following legislation, policy and guidance.

B.1 - National Planning Policy Framework (2021)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2021. This replaced all earlier guidance on noise and places an emphasis on sustainability. In section 15, Conserving and enhancing the natural and local environment, paragraph 174e, it states:

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. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

Paragraph 180 states:

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:

a) *Mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
b) *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
c) *Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

B.2 - Noise Policy Statement for England (2010)

Paragraph 184 of the NPPF also refers to advice on adverse effects of noise given in the Noise Policy Statement for England (NPSE). This document sets out a policy vision to:

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

To achieve this vision the Statement identifies the following three aims:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life;*
- *Where possible, contribute to the improvement of health and quality of life.*

In achieving these aims the document introduces significance criteria as follows:

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur. It is stated that "significant adverse effects on health and quality of life should be avoided while also considering the guiding principles of sustainable development".

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. It is stated that the second aim above lies somewhere between LOAEL and SOAEL and requires that: "all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur."

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. This can be related to the third aim above, which seeks: "where possible, positively to improve health and quality of life through the pro-active management of noise while also considering the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim."

The NPSE recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations and provides no guidance as to how these criteria should be interpreted. It is clear, however, that there is no requirement to achieve noise levels where there are no observable adverse impacts but that reasonable and practicable steps to reduce adverse noise impacts should be taken in the context of sustainable development and ensure a balance between noise sensitive and the need for noise generating developments.

Any scheme of noise mitigation outlined in this report will, therefore, aim to abide by the above principles of the NPPF and NPSE whilst recognizing the constraints of the site.

B.3 - British Standard BS 4142:2014+A1:2019 - Methods for rating and assessing industrial and commercial sound

Overview

BS4142:2014 sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people who might be inside or outside a dwelling or premises used for residential purposes in the vicinity.

The procedure contained in BS4142:2014 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ 'specific sound level', immediately outside the dwelling with the $L_{A90,T}$ background sound level.

Where the sound contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific sound level to obtain the $L_{Ar,Tr}$ 'rating sound level'. A correction to include the consideration of a level of uncertainty in sound measurements, data and calculations can also be applied when necessary.

Rating Penalty

Section 9 of BS4142:2014 describes how the rating sound level should be derived from the specific sound level, by deriving a rating penalty.

BS4142:2014 states:

"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level. This can be approached in three ways:

a) subjective method;
b) objective method for tonality;
c) reference method."

Due to the nature of the development the subjective method has been adopted to derive the rating sound level from the specific sound level. This is discussed in Section 9.2 of BS4142:2014, which states:

"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 characteristics occurs, or is expected to be present, for new or modified sound sources."

BS4142:2014 defines four characteristics that should be considered when deriving a rating penalty, namely; tonality; impulsivity; intermittency; and other sound characteristics, which are defined as:

a) Tonality

A rating penalty of +2 dB is applicable for a tone which is "just perceptible", +4 dB where a tone is "clearly perceptible", and +6 dB where a tone is "highly perceptible".

b) Impulsivity

A rating penalty of +3 dB is applicable for impulsivity which is "just perceptible", +6 dB where it is "clearly perceptible", and +9 dB where it is "highly perceptible".

c) Other Sound Characteristics

BS4142:2014 states that where "the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distance against the residual acoustic environment, a penalty of +3 dB can be applied."

d) Intermittency

BS4142:2014 states that 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 … if the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied."

Background Sound Level

The background sound level is the underlying level of sound over a period, T, and is indicative of the relative quietness at a given location. It does not reflect the occurrence of transient and/or higher sound level events and is generally governed by continuous or semi-continuous sounds.

To ensure the background sound level values used within the assessment are reliable and suitably represent both the particular circumstance and periods of interest, efforts have been made to quantify a 'typical' background sound level for a given period. The purpose has not been to simply select the lowest measured value. Diurnal patterns have also been considered as they can have a major influence on background sound levels, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night time period for sleep purposes.

Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.

Assessment of Impact

BS4142:2014 states: "The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs". An estimation of the impact of the specific sound can be obtained by the difference of the rating sound level and the background sound level and considering the following:

- "Typically, the greater this difference, the greater the magnitude of the impact."
- "A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."
- "A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context."
- "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 negligible impact, depending on the context."

Interpreting the guidance given in BS4142:2014, with consideration of the guidance given in the NPSE and NPPG Noise, an estimation of the impact of the rating sound is summarised in the following text:

- A rating sound level that is +10 dB above the background sound level is likely to be an indication of a Significant Observed Adverse Effect Level;
- A rating sound level that is +5 dB above the background sound level is likely to be an indication of a Lowest Observed Adverse Effect Level;
- The lower the rating sound 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 sound level does not exceed the background sound level, this is an indication of the specific sound source having a negligible impact and would therefore classified as a No Observed Adverse Effect Level.

During the daytime, the assessment is carried out over a reference time period of 1-hour. The periods associated with day or night, for the purposes of the Standard, are 07.00 to 23.00 and 23.00 to 07.00, respectively.

B.5 Entertainment & Leisure Noise Legislation

Noise from entertainment and leisure venues, e.g. noise from recorded music, live bands, gyms or karaoke, can be particularly annoying for residents and businesses if it is not adequately contained within the venue. When considering the potential impact of a proposal for a entertainment premises or residential near to entertainment premises a consideration for the overall noise level (L_{Aeq}) and the 63Hz and 125Hz octave band noise levels. Music noise in the 63Hz and 125Hz octave bands, which is described as 'bass noise' is particularly difficult to contain and the impulsive and non-steady character of low frequency music noise is particularly disturbing for residents exposed to it.

A lively city centre bar can operate around 95 dB L_{Aeq} and nightclubs can be even higher at 105 dB L_{Aeq}. The range of level of 63Hz and 125Hz octave bands is wider than the a-weighted levels and can be up to 115 dB L_{eq} and 110 dB L_{eq} respectively (Davies et al 2005).

There is a lack of consensus on an assessment method for noise levels within habitable rooms regarding entertainment noise. The design aim should be to design to 'inaudible'*. The building structure is therefore key, and will usually involve a high performing solution in either the music venue or residential premises. Existing noise standards/criteria are not appropriate for evaluating low frequency noise; in almost all other situations the established noise descriptors are based on the A-weighted sound level (dBA) which effectively filters out low frequency sound (Moorhouse et al 2011).

**Noise is considered to be inaudible when it is at a sufficiently low level such that it is not recognizable as emanating from the source in question and it does not alter the perception of the ambient noise environment that would prevail in the absence of the source in question. The DEFRA report 'Noise from Pubs and Clubs – Phase 1', which, on page 17 reproduces the Institute of Acoustics (IOA) working group guidance to achieve music noise levels which are 'virtually inaudible' inside a residential property.*

When dealing with noise control, especially at the lower frequencies it is usual to look at the octave band data as a Z-weighting (linear) and not the A-weighting, due in main to the amount you have to 'take off', resulting in meaningless data (-26.2dB at 63Hz) and also with respect to the sound

insulation performance of various constructions materials. Rather than just A-weighted levels being assessed e.g. internal noise levels as per BS8233:2014; a low frequency band analysis should be carried out (McCullough *et al* 2004).

In the 'Procedure for the assessment of low frequency noise complaints – Revision 1', Moorhouse *et al* (2011**)** use limits for low frequency noise levels in 1/3 octave bands between 10Hz and 160Hz. For the assessment of low frequency music noise, it is more practical to consider the 63Hz and 125 Hz octave bands. The Noise Council's Code of Practice on 'Environmental Noise Control at Concerts' suggests limits on both these octave bands. The DEFRA report 'Noise from Pubs and Clubs – Phase 1' suggests limits on 1/3 octave bands. However, the problem with this suggestion, and one of the reasons it is not widely used, is due to the difficulty in obtaining 1/3 octave band sound insulation performance data for various construction materials. With regards to assessing music noise at the 63 Hz and 125 Hz octave band levels a good correlation is shown between the NR 15 curve and Moorhouse curve at low frequencies. See Figure 8.0.

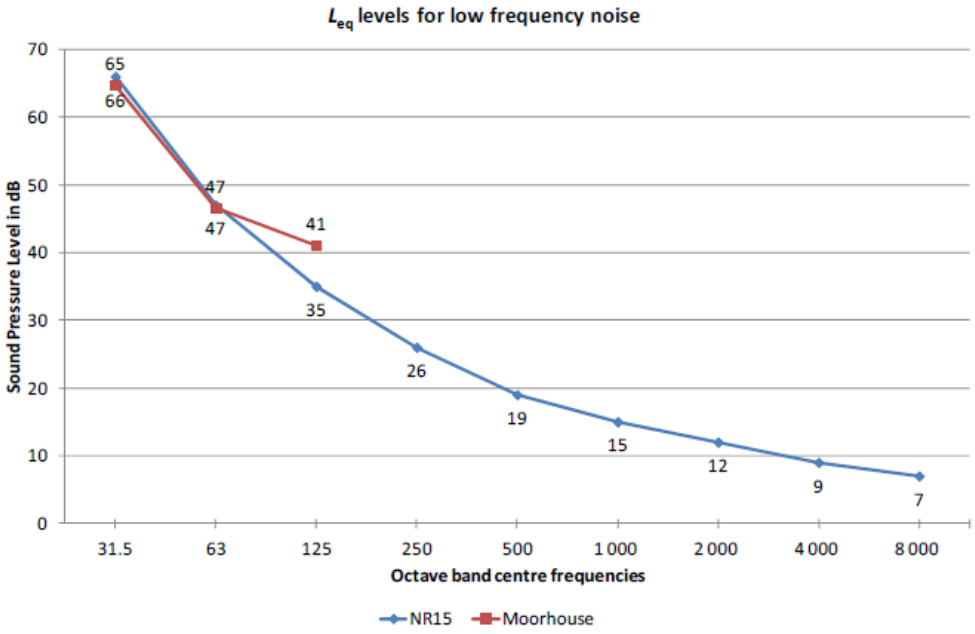


Figure 8.0 – Moorhouse Low Frequency Noise Rating Curve

However, The NR curve may be too stringent at mid and higher frequencies and may be lower than background noise levels in habitable spaces. Further, the NR curve is most commonly used to set limits for mechanical services noise in buildings i.e. steady, continuous noise sources. Music noise has distinctive characteristics and as such can be described as unsteady and non-continuous in comparison. Even though the Moorhouse curve does not specifically relate to entertainment noise (as per the caveat in the revised edition) these levels provide a good practical basis to assess low frequency music noise. They also provide a workable prediction for planning applications and a measurement method and assessment for in-situ low frequency issues in existing habitable spaces. Therefore, a criterion that would achieve a condition of 'inaudible' / 'virtually inaudible' which is applicable for new residential developments that are structurally connected to entertainment venues (or vice versa) would be: *'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'. This criterion may also be applicable for new residential developments that are structurally separate from an existing entertainment venue.

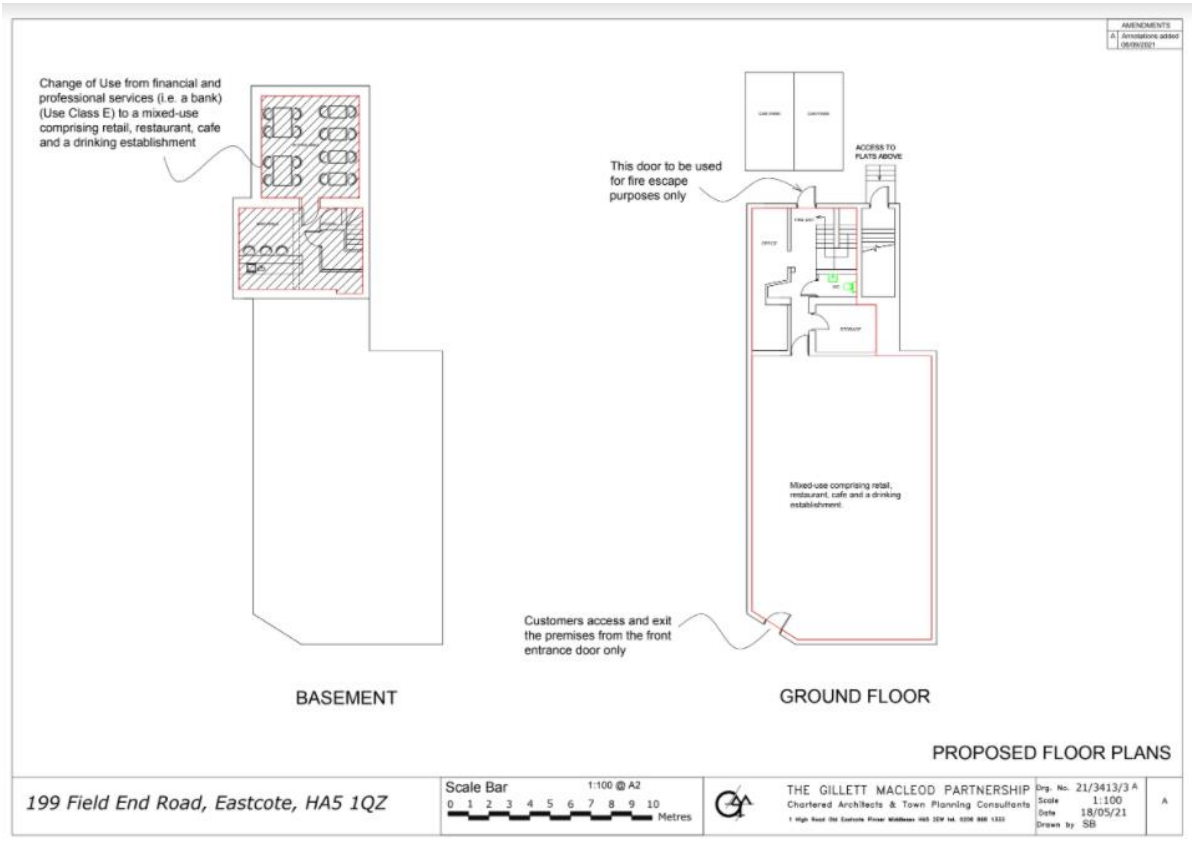
References:

i) Institute of Acoustics (2002) – Good practice guide on the control of noise from pubs and clubs – Draft Annex 2.

ii) McCullough et al (2004) A practical evaluation of objective noise criteria used for the assessment of disturbance due to entertainment music

iii) Moorhouse et al (2005) Proposed criteria for the assessment of low frequency noise disturbance, Defra (updated in 2008 and 2011)

Appendix C – Site Plans



Appendix D – Environmental Survey

D.1 Tabulated Summary Noise Data

Measurement Position MP1				
Measurement Time Period ('t')	**$L_{Aeq,t}$**	**$L_{Amax,t}$**	**$L_{A90,t}$**	**$L_{A10,t}$**
Day 1 – 11/03/2022 – 17:30 – 23:00	62.0	89.0	59.0	63.0
Night 1 – 11/03/2022 – 23:00 – 07:00	56.0	85.0	50.0	59.0
Day 2 – 12/03/2022 – 07:00 – 11:00	63.0	94.0	59.0	65.0
LA90 Analysis				
Measurement Period ('t')	**$L_{A90,t}$**	**SMR $L_{A90,t}$**	**Min. $L_{A90,t}$**	**Max. $L_{A90,t}$**
Day 1 – 11/03/2022 – 17:30 – 23:00	53.0	54.0	49.0	55.0
Night 1 – 11/03/2022 – 23:00 – 07:00	45.0	47.0	39.0	48.0
Day 2 – 12/03/2022 – 07:00 – 11:00	53.0	52.0	49.0	56.0
Noise Survey Time History				

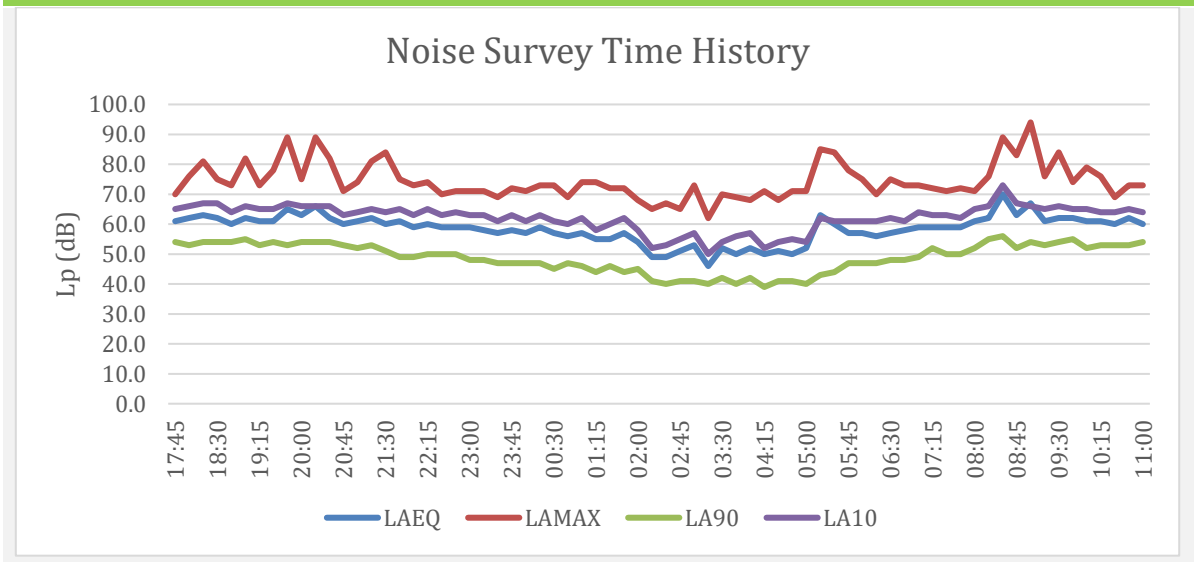


Table 9.0 – Sound Survey Summary Results

D.2 Surveying Equipment

Piece of Equipment	Serial No	Calibration Deviation
CESVA SC310 Class 1 Sound level meter	T221722	≤0.5
CESVA CB005 Class 1 Calibrator	037771	

Table 10.0 – Measurement Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation of ≤0.5 dB. All sound level meters are calibrated every 24 months and all calibrators are calibrated every 12 months, by a third-party calibration laboratory. All microphones were fitted with a protective windshield for the entire measurements period. Calibration certificates can be provided upon request.

D.3 Meteorological Conditions

As the environmental noise survey was carried out over a long un-manned period no localized records of weather conditions were taken. However, during the set up and collection of the monitoring equipment the weather conditions have been documented in the following table. All measurements have been compared with met office weather data of the area, specifically the closest weather station, the data from the weather station is outlined in the table below. When reviewing the time history of the noise measurements, any scenarios that were considered potentially to be affected by the local weather conditions have been omitted. The analysis of the noise data includes statistical and percentile analysis and review of minimum and maximum values, which aids in the preclusion of any periods of undesirable weather conditions. The weather conditions were deemed suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise. The table below presents the average temperature, wind speed and rainfall range for each 24-hour period during the entire measurement.

Weather conditions – Cave Weather, 15km				
Time period	**Air temp (^{0}C)**	**Rainfall mm/h**	**Prevailing Wind Direction**	**Wind Speed (m/s)**
Day 1 – 11/03/2022 – 17:30 – 23:59	12.4 – 8.6	0.0	SSW	5.0 – 0.0
Day 2 – 12/03/2022 – 00:00 – 11:00	12.2 - 7.8	0.0	SW	3.0 – 0.0

Table 11.0 – Weather Summary

Appendix E – Manufacturers' Datahseets

(3) Duct connected-Low / Middle static pressure type (FDUM)

Item			Model	FDUM71VNPWVH	
				Indoor unit FDUM71VH	Outdoor unit FDC71VNP-W
Power source				1 Phase 220-240V 50Hz / 220V 60Hz	
Operation data	Nominal cooling capacity (range)		kW	7.1 [1.5(Min.) ~ 7.3(Max.)]	
	Nominal heating capacity (range)		kW	7.1 [1.1(Min.) ~ 7.3(Max.)]	
	Power consumption	Cooling	kW	2.60	
		Heating		1.89	
	Max power consumption			3.58	
	Running current	Cooling	A	11.5 / 12.1	
		Heating		8.5 / 8.9	
	Inrush current, max current			5 , 15.8	
	Power factor	Cooling	%	98 / 98	
		Heating		97 / 97	
	EER	Cooling		2.73	
	COP	Heating		3.76	
	Sound power level	Cooling	dB(A)	65	67
		Heating			
	Sound pressure level	Cooling		P-Hi : 38 Hi : 33 Me : 29 Lo : 25	54
		Heating			
	Silent mode sound pressure level			—	49
Exterior dimensions (Height x Width x Depth)			mm	280 × 950 × 635	640 × 800(+71) × 290
Exterior appearance (Munsell color) (RAL color)				—	Stucco white (4.2Y7.5/1.1) near equivalent (RAL 7044) near equivalent
Net weight			kg	34	45
Compressor type & Q'ty				—	RMT5113SWE11 (Twin rotary type)×1
Compressor motor (Starting method)			kW	—	Direct line start
Refrigerant oil (Amount, type)			L	—	0.45 (DIAMOND FREEZE MB75)
Refrigerant (Type, amount, pre-charge length			kg	R32 1.3 in outdoor unit (Incl. the amount for the piping of 15m)	
Heat exchanger				Louver fin & inner grooved tubing	M shape fin & inner grooved tubing
Refrigerant control				Electronic expansion valve	
Fan type & Q'ty				Centrifugal fan ×2	Propeller fan ×1
Fan motor (Stating method)			W	130 < Direct line start >	34 < Direct line start >
Air flow		Cooling	m^3/min	P-Hi : 24 Hi : 19 Me : 15 Lo : 10	42
		Heating			
Available external static pressure			Pa	Standard : 35 Max : 100	—
Outside air intake				Possible	—
Air filter, Quality / Quantity				Procure locally	—
Shock & vibration absorber				Rubber sleeve (for fan motor)	Rubber sleeve (for fan motor & compressor)
Electric heater			W	—	—
Operation control	Remote control			(Option) Wired : RC-EX3A,RC-E5,RCH-E3 Wireless : RCN-KIT4-E2	
	Room temperature control			Thermostat by electronics	
	Operation display			—	
Safety equipments				Compressor overheat protection, Overcurrent protection Frost protection, Serial signal error protection, Indoor fan motor error protection Heating overload protection(High pressure control), Cooling overload protection	
Installation data	Refrigerant piping size (O.D.)	Liquid line	mm	I/U ϕ9.52 (3/8") Pipe ϕ6.35(1/4")x0.8	O/U ϕ6.35 (1/4")
		Gas line		ϕ15.88 (5/8") ϕ12.7(1/2")x0.8	ϕ12.7 (1/2")
	Connecting method			Flare piping	Flare piping
	Insulation for piping			Necessary (both Liquid & Gas lines)	
	Refrigerant line (one way) length		m	Max.30	
	Vertical height diff. between O/U and I/U		m	Max.20 (Outdoor unit is higher)	Max.20 (Outdoor unit is lower)
	Drain hose			Hose connectable VP25 (I.D.25, O.D.32)	Hole size ϕ20 x 5 pcs
Drain pump, max lift height			mm	Built-in drain pump , 600	—
Recommended breaker size			A	—	
L.R.A. (Locked rotor ampere)			A	5.0	
Interconnecting wires	Size x Core number			1.5mm² x 4 cores (Including earth cable) / Terminal block (Screw fixing type)	
IP number				IPX0	IPX4
Standard accessories				Mounting kit, Drain hose	Drain elbow, Drain hole grommet
Option parts				Filter set : UM-FL2EF , Motion sensor : LB-KIT	

Notes (1) The data are measured at the following conditions. The pipe length is 7.5m.

Item / Operation	Indoor air temperature DB	Indoor air temperature WB	Outdoor air temperature DB	Outdoor air temperature WB	External static pressure of indoor unit	Standards
Cooling	27°C	19°C	35°C	24°C	35Pa	ISO5151-T1
Heating	20°C	—	7°C	6°C		ISO5151-H1

(2) This air-conditioner is manufactured and tested in conformity with the ISO.
(3) Sound level indicates the value in an anechoic chamber. During operation these values are somewhat higher due to ambient conditions.
(4) Select the breaker size according to the own national standard.
(5) The operation data indicate when the air-conditioner is operated at 230V 50Hz or 220V 60Hz.
(6) Static pressure of option air filter "UM-FL2EF" is 5Pa initially.
(7) The external static pressure setting can be changed to 10-100Pa. (For RC-EX3A and RC-E5 only)

Product Data sheet for SRK71ZR-W / SRC71ZR-W — Single Split RAC - Wall Mounted

MITSUBISHI HEAVY INDUSTRIES AIR CONDITIONING EUROPE

SRK71ZR-W / SRC71ZR-W

7.1 (2.3~7.8)

Indoor Unit : SRK71ZR-W

Outdoor Unit : SRC71ZR-W

R32

Specifications

Indoor unit				SRK71ZR-W
Outdoor unit				SRC71ZR-W
Power source				1Phase, 220 - 240, 50Hz
Nominal cooling capacity (Min~Max)			kW	7.1 (2.3~7.8)
Nominal heating capacity (Min~Max)			kW	8.0 (2.0~10.8)
Power consumption		Cooling/Heating	kW	1.93 / 1.95
EER/COP		Cooling/Heating		3.68 / 4.10
Max. running current			A	17
Sound power level	Indoor	Cooling/Heating	dB(A)	57 / 60
	Outdoor	Cooling/Heating		63 / 63
Sound pressure level	Indoor	Cooling (Hi/Me/Lo/Ulo)		44 / 41 / 37 / 25
		Heating (Hi/Me/Lo/Ulo)		46 / 39 / 35 / 28
	Outdoor	Cooling/Heating		53 / 51
Air flow	Indoor	Cooling (Hi/Me/Lo/Ulo)	m3/min	20.5 / 18.6 / 16.2 / 10.4
		Heating (Hi/Me/Lo/Ulo)		25.0 / 19.8 / 17.3 / 13.3
	Outdoor	Cooling/Heating		55 / 43.5
Exterior Dimensions	Indoor	Height x Width x Depth	mm	339 x 1197 x 262
	Outdoor			750 x 880(+88) x 340
Net weight	Indoor / Outdoor		kg	15.5 / 56.0
Refrigerant		Type/GWP		R32 / 675
Refrigerant		Charge	kg/TCO2Eq	1.5 / 1.013
Refrigerant piping size		Liquid/Gas	ø mm	6.35(1/4") / 15.88(5/8")
Refrigerant line (one way) length			m	Max. 30
Vertical height differences		Outdoor is higher/lower	m	Max. 20 / Max. 20
Outdoor operating temperature range		Cooling	°C	-15~46
		Heating		-15~24
Clean filter				Allergen Clear Filter x 1, Photocatalytic Washable Deodorizing Filter x 1
Energy Class (Cooling/Heating)				A++/A+
SEER				7.40
SCOP (Average climate)				4.50
Pdesign (cooling/heating(@-10°C))			kW	7.10/6.60
Annual Electricity Consumption (cooling/heating)			kWh/a	337/2055
Designated Heating Season				Average

• The data is measured under the following conditions(ISO-T1, H1). Cooling: Indoor temp. of 27°CDB, 19°CWB, and outdoor temp. of 35°CDB. Heating: Indoor temp. of 20°CDB, and outdoor temp. of 7°CDB, 6°CWB.
• Sound level indicates the value in an anechoic chamber. During operation these values are somewhat higher due to ambient conditions.
• 'tonne(s) of CO2 equivalent' means a quantity of greenhouse gases- expressed as the product of the weight of the greenhouse gases in metric tonnes and of their global warming potential.
*SEER/SCOP are based on EN14825:2016 and Commission regulation (EU) No.2016/2281