



Entertainment Noise Impact Assessment for a Café/Wine Bar Development

Client: GBV Construction Ltd

Client Address: Archers Keep, 12 Lane Head Lane, Kirkburton, Huddersfield, HD8 0SQ

Site Address: 141, North Road, Kirkburton, Huddersfield, HD8 0RR

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Authorisation and Version Control

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Executive Summary

An environmental noise survey and noise impact assessment have been undertaken to assess the suitability of the proposed Café/Wine Bar ('the Proposed Development') at 141, North Road, Kirkburton, Huddersfield, HD8 0RR. A summary of the assessment results can be seen below.

Noise Breakout Assessment

- Provided the internal noise levels are limited to those provided in Table 5.0, the noise levels (L_{eq}) at the closest NSRs (Noise Sensitive Receptors) are predicted to not exceed the measured background sound levels (L_{90}) in all octave frequency bands. This therefore indicates 'No Observed Effect Level' (NOEL) when assessed in accordance with the NPSE and NPPF.

Patron Noise Assessment

- The increase in ambient noise level at the surrounding NSRs (Noise Sensitive Receptors) associated with patrons using the outdoor seating area is predicted to be above the measured existing ambient noise level.
- It is recommended that any hit-and-miss fencing along the south and eastern boundaries is replaced with, or supplemented by, close-boarded fencing and extended to a height whereby the outside seating area not in "line-of-sight" from the windows associated with NSR1 and NSR2.
- In addition, good management of the outside seating area will also be required to reduce the likelihood of any adverse impacts.

BS4142:2014 Fixed Plant Noise Assessment

- If any external plant units are specified in the future, the cumulative noise rating noise emissions from the plant units should not exceed 42 dBA during the daytime and 22 dBA during the night-time period.
- Once the plant units have been specified the noise emissions should be calculated by an appropriately qualified person to ensure that the limit levels are achieved.
- All plant should be installed on appropriate antivibration mountings.

This report has presented acoustic design proposals that should achieve compliance with the proposed acoustic criteria, subject to the implementation of the advice provided within and a high standard of workmanship. It is important to note that, as with any construction project, the ability to meet the specification will rely upon the quality of the built structure.

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 impact assessment for a Café/Wine Bar development ('the Proposed Development') at 141, North Road, Kirkburton, Huddersfield, HD8 0RR ('the Site').

The applicant has submitted an approved planning application, '2020/62/92986/E- Change of use from class C3 (dwellinghouses) to Sui Generis and associated works to create a cafe/wine bar (within a Conservation Area)' ('the Application') to Kirklees Council. The following conditions relating to noise require discharging:

"6. Before the change of use commences a noise assessment report by a suitably competent person shall be submitted to and approved in writing by the Local Planning Authority. The report shall include: -

a) an assessment of all the noise emissions from the proposed development

b) details of existing background and predicted future noise levels at the boundary of 139 and 143 North Road, Kirkburton, Huddersfield, HD8 0RR.

c) a written scheme of how the occupants of the above-mentioned noise sensitive premises will be protected from noise from the proposed development including details of all necessary noise attenuation

The development shall not be brought into use until all works comprised within the measures specified in the approved report have been carried out in full and such works shall be thereafter retained.

Reason: In the interest of the amenity of the adjacent properties and to accord with Policies LP24 and LP52 of the Kirklees Local Plan as well as the aims of the National Planning Policy Framework.

7. The use hereby permitted shall not begin until details of the installation and/or erection of any extract ventilation system, including details of the methods of treatments of emissions and filters to remove odours and control noise emissions have been submitted to and approved in writing by the Local Planning Authority and the works specified in the approved scheme have been installed. Such works shall thereafter be retained, operated at all times when the café/wine bar is in use and maintained in accordance with the manufacturer's instructions.

Reason: To ensure that the proposed use does not give rise to the loss of amenity to nearby residential properties, by reason of noise and odours, in accordance with Policies LP24 and LP52 of the Kirklees Local Plan and Chapters 12 and 15 of the National Planning Policy Framework."

The following technical noise assessment has been prepared in support of the Application. This report details the existing background sound climate at the closest Noise Sensitive Receptors (NSRs), as well as an assessment of the following:

- Background music and entertainment noise breaking out of the proposed development.
- Patrons using the external seating area.

- Fixed external plant noise.

Based on the level of noise impact expected, a series of sound insulation and noise control measures are outlined within the report to reduce the likelihood of impact and to protect the amenity of the closest Noise Sensitive Receptors (where required).

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 summarised as follows:

- Baseline sound monitoring survey to evaluate the prevailing ambient and background sound levels at the closest noise sensitive receptor to the proposed development.
- A detailed assessment of the suitability of the Proposed Development, in accordance with relevant standards in respect of sound from the surrounding noise sources; and
- Recommendation of mitigation measures, where necessary, to comply with the requirements of the National Planning Policy Framework (2021), Noise Policy Statement for England (2010), Entertainment Noise Legislation, British Standard BS4142:2014+A1:2019 – ‘Methods for rating and assessing industrial and commercial sound’ and British Standard BS8233:2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’. Further information on the legislation can be found in Appendix B.

Background and Proposed Operational Hours

- The Proposed Development has an internal capacity of 25 No. people and 35 No. people in the outside seating area.
- It is stated in Condition 3 of the decision notice that the Proposed Development shall not be open to customers outside the hours of 10:00 to 23:00 Monday to Saturday and 14:00 to 22:00 Sundays.
- In addition, Condition 4 of the decision notice states that use of the outdoor seating area to the rear of the building shall only operate between the hours of 10:00 to 21:00 on Monday to Saturday and 14:00 to 21:00 on Sundays.
- It is understood that the license allows for recorded amplified music until 23:00 and live music until 21:00. Due to the capacity of the venue, it is assumed that recorded music will generally be used for ambience only and will be set to a level to allow for ‘normal’ conversations. The use of amplified music will be limited to internal use only.
- It is currently not intended for any additional mechanical plant items to be installed for the development.

2. Environmental Noise Survey

Measurement Methodology

In order to characterise the sound profile of the area at the proposed development, an environmental sound survey was carried out from 16/09/22 to 19/09/22. For the long-term sound survey, a sound level meter was attached to a drainpipe to the south of the site, overlooking the outdoor area associated with the Proposed Development. The microphone was positioned approximately 3.5m from the ground and approximately 0.3m from the building façade. The monitoring position was chosen in order to collect representative sound levels at the closest NSR during the proposed operational periods. The monitoring location is shown below in Figure 1.0.



Figure 1.0 – Indicative Site Layout

Context & Subjective Impression

The area surrounding the site is mixed-use in nature, with residential dwellings and commercial premises in close proximity to the Proposed Development. The noise profile is typical for this type of area and is dominated by road traffic, particularly along North Road (B6116).

The site is adjoined to the south by Kosmetiko, a beauty clinic, that is believed to operate at both ground floor and first-floor level. To the north of the Proposed Development, the site is adjoined by a hair salon at ground floor level and a beauty clinic at first-floor level. Directly opposite the site, along North Road, is another beauty clinic and a supermarket.

It was noted that these commercial premises have operating plant, but these were shielded from the measurement position (MP1).

Condition 6 of the decision notice specifies that the assessment should consider the predicted noise levels at the boundary of the properties adjacent to the Proposed Development, 139 and 143 North Road. However, both adjacencies are used for commercial purposes only and are therefore considered less sensitive to potential noise impacts than the nearby residential receptors (NSR1 and NSR2).

To the south of the site, at first floor level and at a distance of approximately 10m from the site boundary, is a residential dwelling flat (NSR1) overlooking the outdoor seating area associated with the Proposed Development.

Additionally, there is a residential receptor window to the east of the site (NSR2) again at first-floor level and approximately 10m north-east from the site boundary, overlooking the outdoor seating area associated with the Proposed Development. Any external amenity space associated with NSR2 is considered to be sufficiently shielded from the site by the existing brick wall along the eastern site boundary.

These properties are considered the nearest and most affected residential receptors to the Proposed Development. It is assumed that if 'Low Impact' can be achieved at these receptor locations, then 'Low Impact' will also be achieved at receptors located further from the site.

The outside seating area is partially covered along the north boundary with an existing outbuilding. There is a 2.0m brick wall along the eastern boundary of the outside seating area and hit-and-miss fencing along the southern boundary at a height of approximately 1.8m.

Environmental Noise Survey Results

The following table outlines the measured sound levels during the survey period. A full summary of all results can be found in Appendix D.

Measurement Time Period ('t')	L _{Aeq,t}	L _{Amax,t}	L _{A90,t}	L _{A10,t}
Day 1: 12:45 – 23:00	51.0	91.0	41.0	54.0
Night 1: 23:00 – 07:00	38.0	73.0	32.0	41.0
Day 2: 07:00 – 23:00	45.0	72.0	40.0	46.0
Night 2: 23:00 – 07:00	37.0	74.0	32.0	39.0
Day 3: 07:00 – 23:00	44.0	75.0	40.0	47.0
Night 3: 23:00 – 07:00	36.0	68.0	28.0	40.0
Day 4: 07:00 – 23:00	42.0	73.0	39.0	45.0

Table 1.0 – Summary of Measured Sound Levels

The table below outlines the background sound levels during the daytime and night-time reference periods.

Measurement Period ('t')	L _{A90,15min}	*SMR L _{A90,15min}	Min. L _{A90,15min}	Max. L _{A90,15min}
Day 1: 12:45 – 23:00	41.0	42.0	27.0	53.0
Night 1: 23:00 – 07:00	32.0	22.0	20.0	36.0
Day 2: 07:00 – 23:00	40.0	41.0	26.0	42.0
Night 2: 23:00 – 07:00	32.0	22.0	20.0	32.0
Day 3: 07:00 – 23:00	40.0	42.0	17.0	44.0
Night 3: 23:00 – 07:00	28.0	13.0	13.0	36.0
Day 4: 07:00 – 23:00	39.0	30.0	20.0	41.0

Table 2.0 – Background Sound Level Summary Results

**Statistically Most Repeated*

It is seen from the above table that there is strong correlation between the statistically most repeated L_{A90,15min} values during the daytime, 42.0 dB, and night-time, 22.0 dB. These values will be used should any additional plant be later required to service the Proposed Development.

The measured L_{Aeq,15min} levels during Night 3 and Day 4 (Monday 19th September 2022) were significantly lower and is presumed to be a result of reduced commercial activity during the day of the Queen's funeral. Therefore, these values are considered atypical and are not used in the subsequent assessments.

The background sound levels measured during the last hour of operation at the site, and therefore the most sensitive operational hours of the Proposed Development, are presented in the below table. These values will be used to assess potential impacts associated with noise breakout of the Proposed Development.

Measurement Period ('t')	Octave Band L ₉₀ (Hz, dB)							L _{A90} (dB)
	63	125	250	500	1k	2k	4k	
Day 1: 22:00 – 23:00	35.0	32.0	29.0	27.0	25.0	15.0	16.0	29.0
Day 2: 22:00 – 23:00	38.0	34.0	29.0	24.0	22.0	15.0	16.0	27.0
Day 3: 21:00 – 22:00	33.0	31.0	27.0	22.0	21.0	15.0	16.0	27.0
Day 4: 22:00 – 23:00	28.0	28.0	23.0	19.0	16.0	13.0	16.0	21.0

Table 3.0 – Background Sound Levels during Most Sensitive Operational Hours

As can be seen in the table above, the measured L_{A90,1hr} values for the most sensitive operational period is typically 27.0 dB.

As previously mentioned, measured noise levels during Day 4 (Monday 19th September 2022) were significantly lower and is presumed to be a result of reduced commercial activity during the day of the Queen's funeral. Therefore, these values are considered atypical and are not used in the subsequent assessments.

Therefore, a value of 27.0 dB will be used in the subsequent noise breakout assessment.

The following table outlines the measured ambient noise levels recorded during the most sensitive operational periods of the outside seating area.

Measurement Period ('t')	18:00 – 19:00 L _{Aeq,t} (dB)	19:00 – 20:00 L _{Aeq,t} (dB)	20:00 – 21:00 L _{Aeq,t} (dB)
Day 1: 16/09/22 – Friday	53.0	53.0	52.0
Day 2: 17/09/22 – Saturday	43.0	43.0	41.0
Day 3: 18/09/22 – Sunday	44.0	43.0	43.0
Day 4: 19/09/22 – Monday	41.0	42.0	44.0

Table 4.0 – Ambient Noise Level during Operation of Outside Seating Area

It is seen from the above that the ambient noise levels during Friday were considerably louder than those measured during the other days. The measured ambient noise levels during the other days show little variation between 18:00 to 21:00 hours and are approximately 43.0 dB. Therefore, an existing ambient noise level of 43.0 dB will be used in the assessment of patron noise within the outside seating area.

3. Noise Breakout Assessment

In the following section, the noise breaking out of the proposed development is assessed.

Typical Internal Noise Levels

Based on previous internal measurement data for bars and restaurants, the following noise limits are recommended for the Proposed Development.

Sound Source	Octave Band L_{eq} (Hz, dB)							Overall (dBA)
	63	125	250	500	1k	2k	4k	
Busy Pub/Bar	75.0	75.0	74.0	76.0	83.0	80.0	80.0	87.0

Table 5.0 –Internal Noise Limit

These internal noise limits, equivalent to 87.0 dBA, are deemed robust for the breakout assessment and are likely slightly higher than those from typical operation of the café/wine bar. These limiting levels account for background music in addition to internal patron noise. These levels would also be suitable for small-scale live acoustic music performances, without the use of a drum kit.

For context, the proposed noise limit level is equivalent to 90 No. patrons talking simultaneously in a raised voice (far greater than the internal capacity of the Proposed Development). Therefore, these limiting levels are not believed to unduly restrict the operations of the Proposed Development.

Proposed Criteria

'The Good Practice guide on the Control of Noise from Pubs and Clubs' comments that where entertainment noise takes place on a regular basis, music and associated sources should be inaudible within noise-sensitive properties at any time. For the purpose of this assessment, low impact is indicated if the predicted noise breakout level (L_{eq}) does not exceed the measured background sound level (L_{90}) in any octave band during the most sensitive operational period, 22:00 to 23:00 hours.

Noise Breakout Assessment

The following table shows the predicted levels of noise breakout at the closest NSRs. The closest NSRs are located approximately 13m south of the Proposed Development's rear façade.

The breakout noise levels have been calculated assuming the following:

- The internal noise limit level shown in Table 5.0.
- The glazing is the weakest element of the façade in terms of sound reduction.
- The glazing installed at the venue is a standard double glazing (4mm glass/6-16mm air cavity/6mm glass).
- A -6.0 dB correction has been applied to account for the difference between internal reverberant conditions and external non-reverberant conditions.
- Following Rathes approximation on planar source propagation behaviour, it has been calculated that the glazing is behaving as a point source within 1m, therefore, the distance correction has been calculated assuming the formula $20 \cdot \log(r_1/r_2)$, rounded to the nearest integer.

Description	Octave Band L_{eq} (Hz, dB)							Overall (dBA)
	63	125	250	500	1k	2k	4k	
Internal Noise Limit Level (L_1)	75.0	75.0	74.0	76.0	83.0	80.0	80.0	87.0
Sound Reduction of 6mm Glazing (R)	18.0	21.0	20.0	26.0	38.0	37.0	39.0	32.0
Façade Noise Level ($L_1 - R_w - 6$)	51.0	48.0	48.0	44.0	39.0	37.0	39.0	49.0
Distance Correction (13m)	-22.0	-22.0	-22.0	-22.0	-22.0	-22.0	-22.0	-22.0
Predicted Noise Level at NSR1	29.0	26.0	26.0	22.0	17.0	15.0	13.0	27.0
Background Sound Level	33.0	31.0	27.0	23.0	21.0	16.0	16.0	27.0
Exceedance of Background Noise Level	-4.0	-5.0	-1.0	-1.0	-4.0	-1.0	-3.0	0.0

Table 6.0 – Bar Area Noise Breakout Assessment

Discussion

As can be seen in the assessment above, the predicted octave band sound levels associated with the Proposed Development do not exceed the measured background sound levels in all octave frequency bands during the most sensitive operational period. This indicates low impact, when the limiting noise levels presented in Table 5.0 are adhered to.

It should be noted that the assessment has been conducted considering the time periods when noise impact is expected to be highest, and that for all other time periods impact is expected to be lower.

Further Recommendations

Distributed PA System:

To minimise the internal sound level required to achieve a uniform and distributed noise level within the café/wine bar, a distributed sound system should be installed. A distributed sound system involves installing a higher quantity of speakers all emitting at a lower level. This takes advantage of the proximity of the listener to the speaker, thus reducing the overall noise emissions whilst maintaining a feeling of 'loudness'. The speakers should be focused on the main operational area and not located near to entrances and exits. All speakers should be installed on appropriate anti-vibrational mounts where required.

4. Patron Noise Impact Assessment

In the following section, the noise impact of the patron noise in the external rear section of the development is assessed.

Specific Noise Level

The following table presents sound pressure levels for 'normal' and 'raised' voice levels.

Description	L _{Aeq,t} (dB)
Normal Voice at 1m	60.0
Raised Voice at 1m	67.0

Table 7.0 – Specific Sound Levels of Patron Noise

It is thought that the external area will have a maximum capacity of approximately 35 patrons. It is also anticipated that patrons will generally be within the external seated areas, where possible.

To present a typical, and suitably robust, scenario during the most sensitive open hours for the outside seating area, 20:00 to 21:00 hours, it is assumed that there will be 8 No. voices at 'normal' level, and 8 No. at a 'raised' level talking simultaneously. The predicted noise level in the external area is shown in the table below.

Description	Number of Voices	L _{Aeq,t} (dB)	Total L _{Aeq,t} (dB)
Normal Voice at 1m	8	60.0	69.0
Raised Voice at 1m	8	67.0	76.0
Total External Noise Level	16	--	77.0

Table 8.0 – Predicted External Noise Level

The closest residential windows are located approximately 13m from the centre of the outside seating area. The predicted noise level at the NSRs is shown in the table below.

Description	Noise Level (dB)
External Noise Level (L _{Aeq,t} , dB)	77.0
Distance to NSR (m)	13
Predicted Noise Level at NSRs (L _{Aeq,t} , dB)	55.0

Table 9.0 – Predicted Noise Levels at NSR

IEMA Increase in Ambient Noise Level Assessment

In the following section, the increase in ambient noise level due to patron noise in the external area is analysed. This is calculated by logarithmically adding the predicted patron noise to the ambient noise levels measured during the environmental noise survey. The higher the increase in noise level, the higher the impact.

Description	20:00 – 21:00 (dBA)
Measured Ambient Noise Level (Table 4.0)	43.0
Predicted External Noise Level at NSRs	55.0
Cumulative Noise Level	55.3
Increase in Noise Ambient Noise Level	+12.3
IEMA Impact Rating	'Very Substantial'

Table 10.0 – Increase in Ambient Noise Level Assessment

Discussion

As can be seen in the table above, the increase in ambient noise level at the surrounding NSRs is predicted to be 'Very Substantial'. Although the absolute noise level from patrons within the outside seating area is not excessively high, 55.0 dBA, the level at which it is above the existing noise environment would likely impact on resident's amenity.

It is therefore proposed that any hit-and-miss fencing along the south and eastern boundaries is replaced with, or supplemented by, close-boarded fencing and extended to a height whereby the outside seating area is not in "line-of-sight" from the windows associated with NSR1 or NSR2. This is anticipated to provide a minimum of 5.0 dB attenuation from the outside seating area.

The predicted noise levels at the nearby NSRs, after implementation of the close-boarded fencing, is provided below. Additionally, the internal noise level within the residential receptors is displayed to provide further context, assuming 15dB attenuation for a partially opened window.

Description	Noise Level (dB)
External Noise Level ($L_{Aeq,t}$ dB)	77.0
Distance to NSR (m)	13
Screening Correction (dB)	-5.0
Predicted External Noise Level at NSRs ($L_{Aeq,t}$ dB)	50.0
Predicted Internal Noise Level at NSRs ($L_{Aeq,t}$ dB)	35.0

Table 11.0 – Predicted Noise Levels at NSR, with Close-boarded Fencing

It is considered that although the predicted noise level is above the existing ambient noise level, the attenuation provided by the close-boarded fencing will result in more favourable internal noise levels at the residential receptors.

It is anticipated that the noise level at the higher-level windows will be much higher than those within any ground floor external amenity areas due to the reduced screening effects from the Proposed Development. The predicted internal levels, assuming a partially open window, are within

the BS8233:2014 recommended internal levels for bedroom and living rooms, therefore indicating a low likelihood for adverse impact.

With regard to the Noise Policy Statement for England (NPSE), the first aim is to avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The second aim of the NPSE is to mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The third aim of the NPSE, where possible, is to contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

Therefore, with good management of the outside seating area, we believe the requirements of the NPPF and NPSE can be met. Whilst some patron noise is likely to be heard at neighbouring properties, it is not necessarily a reason for refusal. An example Noise Management Plan is presented in Section 6.0 of this report which should be enforced to reduce the likelihood of adverse impact at nearby residential dwellings.

It should also be noted that the outside seating area will only be open to patrons until 21:00 hours and therefore will not be occupied during any particularly sensitive periods, further reducing the likelihood of any adverse impact.

5. BS4142:2014 Fixed Plant Noise Assessment

At this stage of development, it is thought that no additional external plant units will be installed. However, in the event that this changes in the future, plant limit levels have been defined to ensure that the noise emissions do not exceed the background sound levels at the closest NSRs. The limit levels are inclusive of any rating penalties that should be applied to account for audible characteristics of the noise which could be deemed to cause increased annoyance, such as intermittency or tonality. It is thought that it is possible that kitchen extract or chiller plant may be installed in the future. As such, limit levels have been calculated for the daytime and night-time periods, depending on when future plant will be operational.

The calculated plant limit levels are shown in the table below.

Description	Daytime Period (dBA)	Night-time Period (dBA)
Background Sound Level	42.0	22.0
Cumulative Plant Noise Limit Level at NSR	42.0	22.0

Table 12.0 – External Plant Limit Levels

Discussion:

As can be seen in the assessment above, provided the plant limit levels are adhered to all noise emissions from the external plant units does not exceed the existing background sound levels. When assessed in accordance with BS4142:2014 this indicates 'Low Impact', and when assessed with the NPPF and NPSE this is classed as 'No Observed Effect Level' (NOEL).

Recommendations & Mitigation

- The cumulative noise rating noise emissions from the plant units should not exceed 42 dB L_{A90} during the operational periods, and 22 dB L_{A90} during the night-time period.
- Once the plant units are specified the noise emissions should be calculated by an appropriately qualified person to ensure that the limit levels are achieved.

All plant should be installed on appropriate antivibration mountings.

6. Noise Management Plan

The following section outlines the required noise control measures that are necessary to protect the amenity of the closest Noise Sensitive Receptors.

Noise Control Measures

The management measures are outlined in the following section.

Noise Control Measures:

- A noise limiting device should be installed and the Noise limit Levels specified in Table 5.0 should be adhered to.
- All doors and windows should be kept closed during operational hours, except when access is required, therefore, mechanical door closers should be installed and an alternative means of ventilation during hot days may be required.
- It is advised that the number of patrons allowed within the Proposed Development is limited to 60 at any one time (25 internal and 35 external).
- Operational hours should not exceed the proposed operational hours as shown in Section 1.0.
- Shouting should be discouraged in the external patron area. If patrons consistently do not abide by this, they should be asked to move inside.

Premises Management Responsibility:

The Designated Premises Supervisor 'DPS' will have the responsibility for ensuring that nuisances and hazards arising from the premises due to noise are minimised.

Management Control Measures:

The following range of management control methods should be implemented at the premises, including but not limited to:

- Site staff should be made aware that they are working in the vicinity of noise-sensitive receptors and avoid all unnecessary noise due to elevated music levels, opening of doors/windows or excessive noise from patrons. The DPS will be required to implement strict staff rules to ensure that the staff immediately respond to unnecessary elevated noise levels.
- Staff training should involve reviewing the Noise Management Plan and Operational Noise Management Guide.
- All operational staff will be responsible for reporting any noise problems immediately to the DPS.

No annual quantitative noise monitoring is proposed; however, qualitative monitoring of noise levels will be included as a factor to be considered by the DPS as part of daily operations of the premises.

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 log ₁₀ (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. L _{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L _{eq} 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. L ₉₀ 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. L ₁₀ 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 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 2019. 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 185 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 185 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 – BS8233:2014 ‘Guidance on sound insulation and noise reduction for buildings’

The British Standard BS 8233: 2014, Guidance on Sound insulation and noise reduction for buildings provides additional guidance on noise levels from sources without specific character in the built environment, based on the recommendations of the World Health Organization; specifically, WHO Guidelines on Community Noise, 1999. The criteria desirable levels of steady state, “anonymous” noise in unoccupied spaces within dwellings, from sources such as road traffic, mechanical services and other continuously running plant, are tabulated below:

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	--
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	--
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Table 13.0 – BS8233:2014 Internal Noise Level Criteria

It is noted, however that where development is considered necessary or desirable, despite external noise level above WHO guidelines, the above target levels may be relaxed by up to 5 dB.

The standard also recommends that for traditional external amenity areas, such as gardens, it is desirable that external noise levels do not exceed 50 dB $L_{Aeq,T}$, and that 55 dB $L_{Aeq,T}$ would be acceptable in noisier environments. However, it is recognised that these values may not be achievable in all areas where development is desirable and in such locations, development should be designed to achieve the lowest practicable levels.

General recommendations for mitigation to enable these targets to be achieved are provided, including the use of bunds and barriers to reduce external noise and space planning and sound insulation for the control of internal noise levels.

For this assessment, the above criteria are considered to be the LOAEL as defined in the NPSE above.

B.4 – British Standard BS4142:2014+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 be 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 business if it is not adequately contained within the venue. When considering the potential impact of a proposal for an 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 construction 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 2.0.

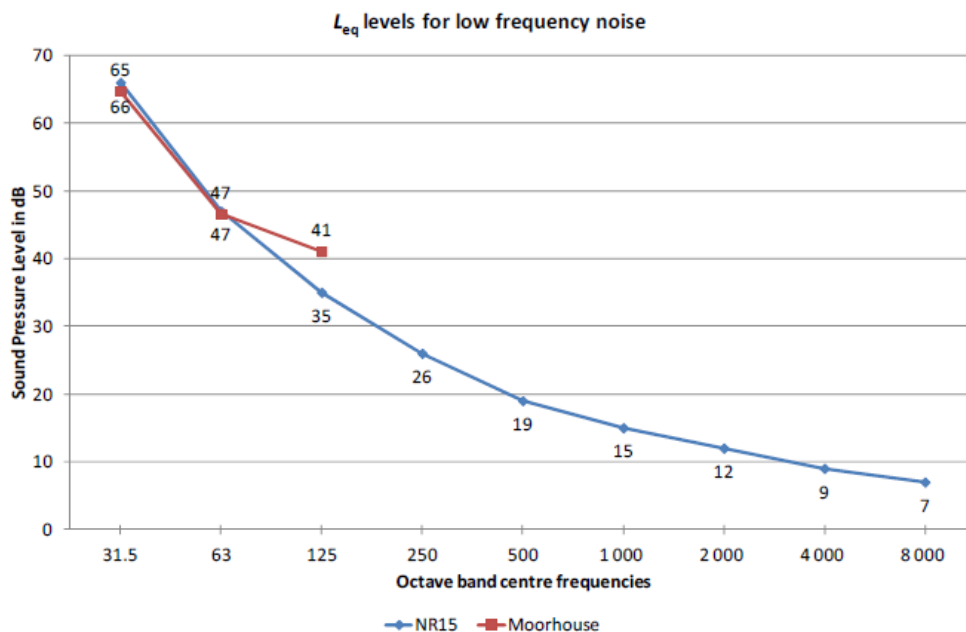


Figure 2.0 – Moorhouse Low Frequency Noise Rating Curve

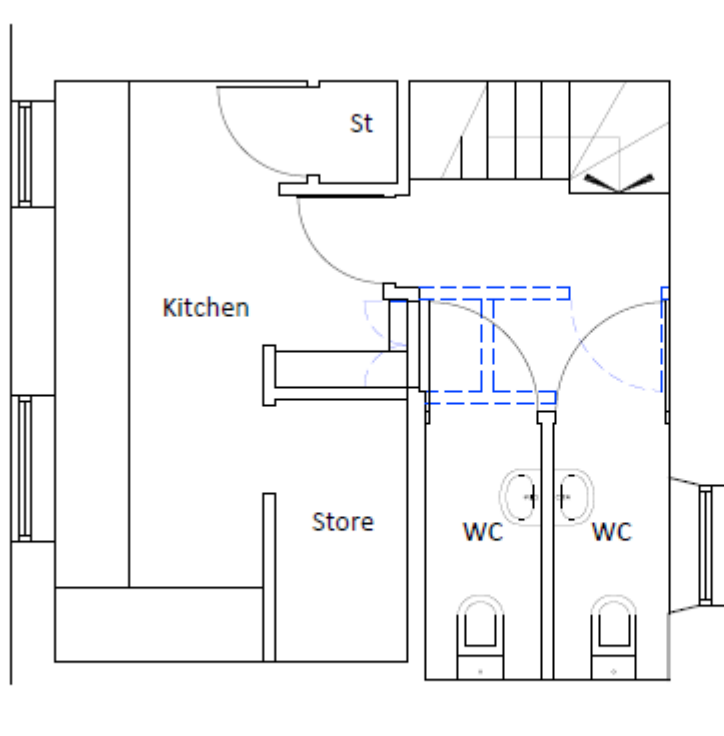
However, The NR curve may be too stringent at mid and higher frequencies and may be lower than background noise levels in habitable spaces. Further, the NR curve is most commonly used to set limits for mechanical services noise in buildings i.e. steady, continuous noise sources. Music noise has distinctive 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:

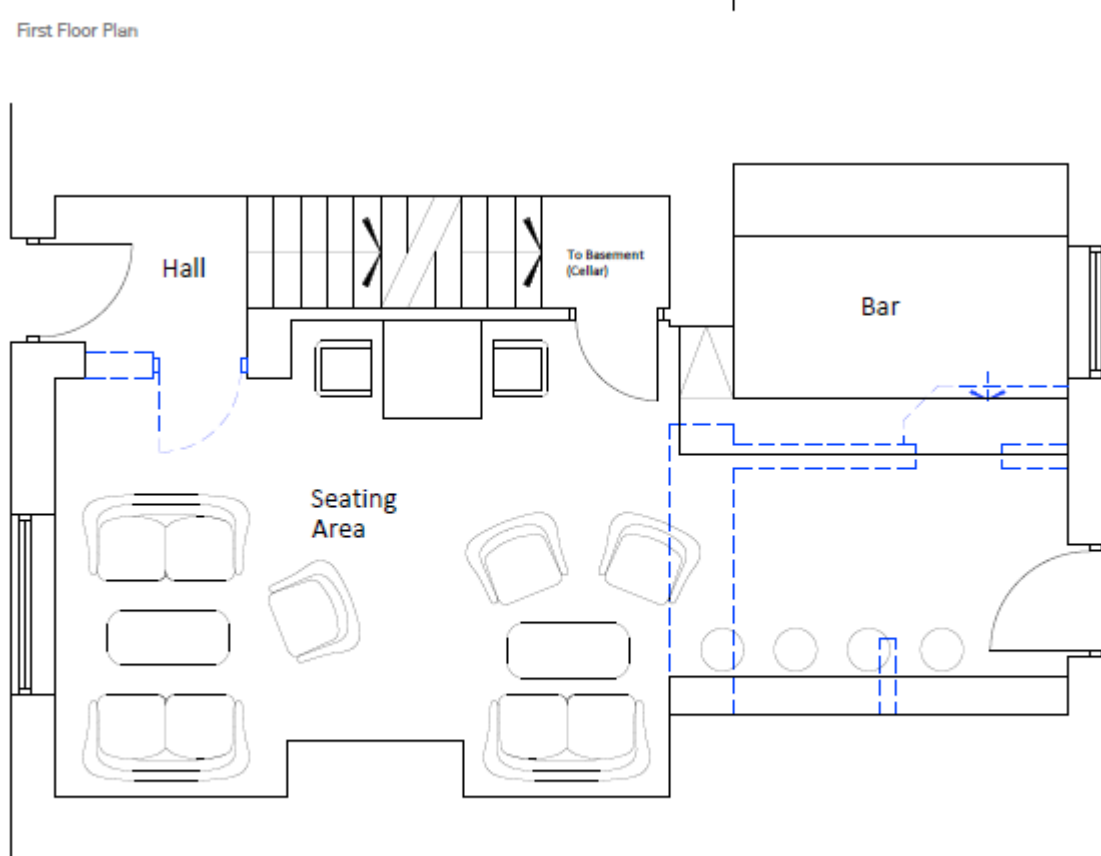
- i) Institute of Acoustics (2002) – Good practice guide on the control of noise from pubs and clubs – Draft Annex 2.
- ii) McCullough et al (2004) A practical evaluation of objective noise criteria used for the assessment of disturbance due to entertainment music
- iii) Moorhouse et al (2005) Proposed criteria for the assessment of low frequency noise disturbance, Defra (updated in 2008 and 2011)

Appendix C – Location and Site Plans





First Floor Plan



Ground Floor Plan

Appendix D – Environmental Survey

D.1 – Tabulated Summary Noise Data

Background Sound Level Summary – Full Measurement Period							
Measurement Period ('t')	Octave Band L _{90,t} (Hz, dB)						
	63	125	250	500	1k	2k	4k
Day 1 – 16/09/22: 12:45 – 23:00	50.0	48.0	48.0	45.0	41.0	39.0	50.0
Night 1 – 16/09/22: 23:00 – 07:00	41.0	40.0	35.0	33.0	28.0	23.0	41.0
Day 2 – 17/09/22: 07:00 – 23:00	48.0	45.0	41.0	40.0	35.0	34.0	48.0
Night 2 – 17/09/22: 23:00 – 07:00	38.0	36.0	33.0	32.0	30.0	23.0	38.0
Day 3 – 18/09/22: 07:00 – 23:00	48.0	46.0	42.0	40.0	34.0	30.0	48.0
Night 3 – 18/09/22: 23:00 – 07:00	40.0	37.0	34.0	31.0	27.0	23.0	40.0
Day 4 – 19/09/22: 07:00 – 23:00	45.0	43.0	39.0	37.0	32.0	27.0	45.0
Measurement Time Period ('t')	LA _{90,15min}	SMR LA _{90,15min}		Min LA _{90,15min}		Max LA _{90,15min}	
Day 1 – 16/09/22: 12:45 – 23:00	41.0	42.0		27.0		53.0	
Night 1 – 16/09/22: 23:00 – 07:00	32.0	22.0		20.0		36.0	
Day 2 – 17/09/22: 07:00 – 23:00	40.0	41.0		26.0		42.0	
Night 2 – 17/09/22: 23:00 – 07:00	32.0	22.0		20.0		32.0	
Day 3 – 18/09/22: 07:00 – 23:00	40.0	42.0		17.0		44.0	
Night 3 – 18/09/22: 23:00 – 07:00	28.0	13.0		13.0		36.0	
Day 4 – 19/09/22: 07:00 – 23:00	39.0	30.0		20.0		41.0	

Table 14.0 – Sound Survey Summary Results

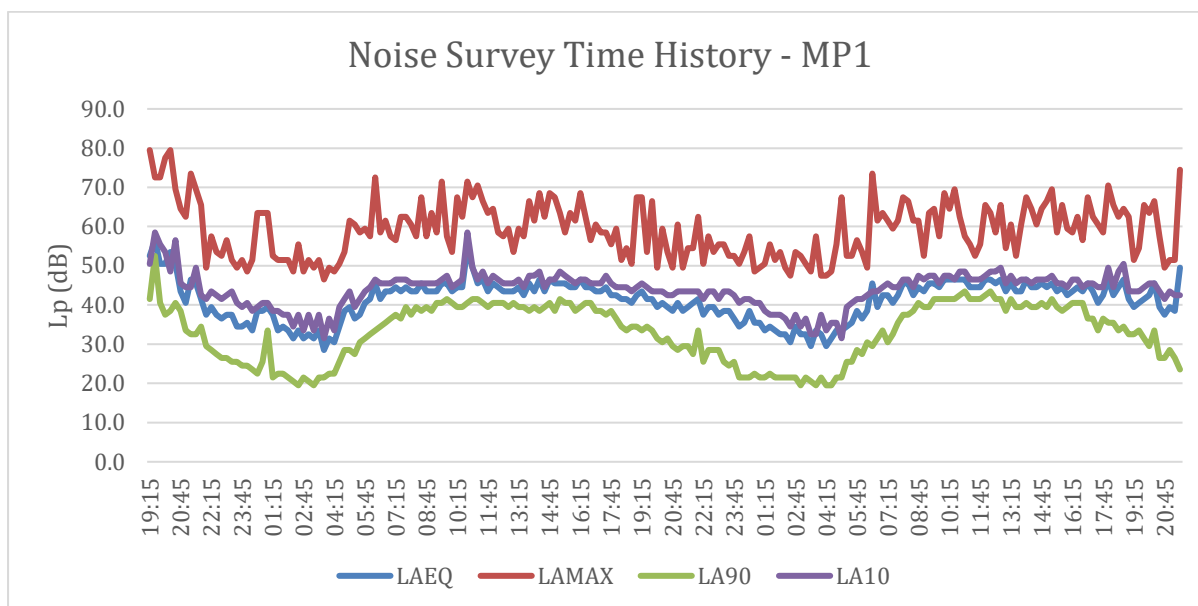


Figure 3.0 – MP1 Noise Survey Time History

D.2 – Surveying Equipment

Piece of Equipment	Serial No.	Calibration Deviation
Svantek SV307 Class 1 Sound Level Meter	87871	≤0.5
Svantek SV36 Class 1 Calibrator	106876	

Table 15.0 – 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 localised records of weather conditions were taken. However, all measurements have been compared with met office weather data of the area, specifically the closest weather station, and 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 – Almondy (Approx. 2.5km North-west of Site)				
Time Period	Air Temp (°C)	Rainfall (mm/h)	Prevailing Wind Direction	Wind Speed (m/s)
16/09/22: 00:00 – 23:59	3.2 – 15.5	0.0	SSE	0.0 – 5.4
17/09/22: 00:00 – 23:59	0.8 – 17.2	0.0	S	0.0 – 4.9
18/09/22: 00:00 – 23:59	7.9 – 18.1	0.0	SSW	0.0 – 6.7
19/09/22: 00:00 – 23:59	10.6 – 16.6	0.0	NE	0.0 – 2.2

Table 16.0 – Weather Summary