



Noise Impact Assessment of Proposed Family Art Cafe

Client: Bisque & Beyond

Address: No. 745,
Wilmslow Road,
Manchester,
M20 6RN

Date: 26/03/2018



Version	1	2	3
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Executive summary

An environmental noise survey and noise impact assessment has been undertaken to assess the potential increase in noise levels from the development of a Family Art Café, on the surrounding noise sensitive receptors. The measured background sound levels have allowed an entertainment noise assessment to be undertaken. No BS4142:2014 assessment was carried out as no new external plant is to be installed.

The entertainment noise assessment, in section 5.2, shows that there is a low likelihood of adverse impact provided the music limit level and sound insulation scheme, shown in section 5.2.6, is adhered to, when considering the context of the assessment, the time of day the development will be in operation and the existing commercial activity in the surrounding area any impact is expected to be reduced. Further mitigation in, section 5.2.6, has been recommended to minimise uncertainty in the predictions presented and ensure the amenity of the NSR's is protected.

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



1. Introduction

1.1 Overview

NOVA Acoustics Ltd has been commissioned to prepare a noise assessment for a proposed Family Art Cafe ('the Proposed Development') at 745 Wilmslow Road, Manchester, M20 6RN ('the Site').

The Applicant has submitted a full planning application no. 118083/FO/2017 ('the Application') to Manchester City Council.

Accordingly, the following technical noise assessment has been produced to accompany the Application to the Local Authority.

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.

1.2 Scope & Objectives

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

- Baseline sound monitoring survey to evaluate the prevailing sound levels at the nearest sensitive receptor ('NSR') to Site;
- Detailed sound modelling, acoustic calculation and analysis in accordance with ISO9613 – 1 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 Practice Guidance in England and Wales, BS4142:2014 and other relevant standards.



2. Legislation, Policy and Guidance

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

2.1 National Planning Policy Framework (2012)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2012. This replaced all earlier guidance on noise and places an emphasis on sustainability. In section 11, Conserving and enhancing the natural environment, paragraph 109, it states:

The planning system should contribute to and enhance the natural and local environment by: preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability;

Paragraph 123 states and Planning policies and decisions should aim to:

- *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *Mitigate and reduce to a minimum other adverse impact on health and quality of life arising from noise from new development, including using conditions;*
- *Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established.*

2.2 Noise Policy Statement for England

Paragraph 123 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.

2.3 BS 4142:2014

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 $L_{A,T,r}$ '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.

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.

2.4 BS EN 12354-4 Building Acoustics

Estimation of acoustic performance of buildings from the performance of elements – Transmission of indoor sound to the outside

This European Standard describes a calculation model for the sound power level radiated by the envelope of a building due to airborne sound inside that building, primarily by means of measured sound pressure levels inside the building and measured data which characterize the sound transmission by the relevant elements and openings in the building envelope. These sound power levels, together with those of other sound sources in or in front of the building envelope, form the basis for the calculation of the sound pressure level at a chosen distance from a building as a measure for the acoustic performance of buildings.

2.5 Entertainment Noise Legislation

Noise from entertainment venues, e.g. noise from recorded music, live bands 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 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 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 1.0.

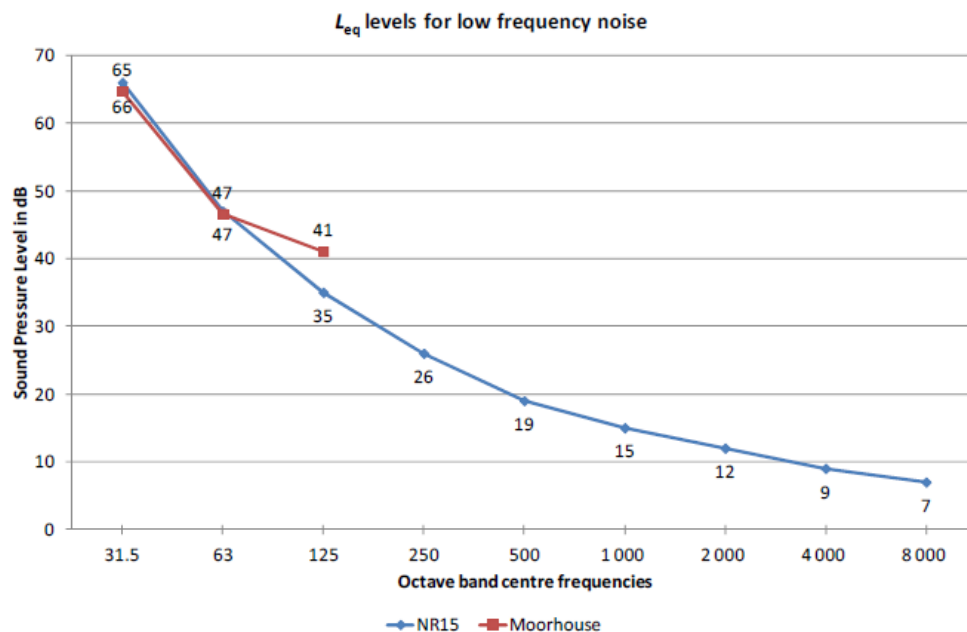


Figure 1.0 – Moorhouse Low Frequency Noise Rating Curve

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)

2.6 Local Policy Guidance & Discussions with the Local Authority

The client has submitted a planning application to the local authority. The application was subsequently conditionally approved. The planning decision notice states two conditions that relate to noise, they are as follows:

'6) Before any use hereby approved commences, the premises shall be acoustically insulated and treated to limit the break out of noise in accordance with a noise study of the premises and a scheme of acoustic treatment that has been submitted to and approved in writing by the City Council as local planning authority.'

'7) Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location. The scheme shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site.'



3. Site Description & Background Information

3.1 Site & Surroundings

The proposed site is located at 745 Wilmslow Road, Manchester, M20 6RN. The surrounding area is comprised of predominantly commercial units with some residential properties, typical of central urban location. To the west of the proposed development runs Wilmslow Road with moderate to high levels of road traffic throughout the day and night time periods. Along Wilmslow Road, in close proximity to the site there are multiple commercial retail units including 'Oxfam', 'Holland and Barrett' and 'Barclays' all of which operate between 09:00 – 17:30. There are also multiple eating establishments and cafes including 'East and Bar', 'Bosu Body Bar' and the 'Expo Lounge' all of which operate into the night time period closing at 23:00- 00:00. To the north of the proposed site runs Elm Grove, again with moderate to high levels of road traffic. To the east of the proposed site is 'Didsbury C of E Primary School' with assumed operating hours of 08:00 – 16:00. Directly above the proposed site there is a residential flat. Due to its close proximity to site this flat will be considered the closets noise sensitive receptor (NSR) in the subsequent assessment.

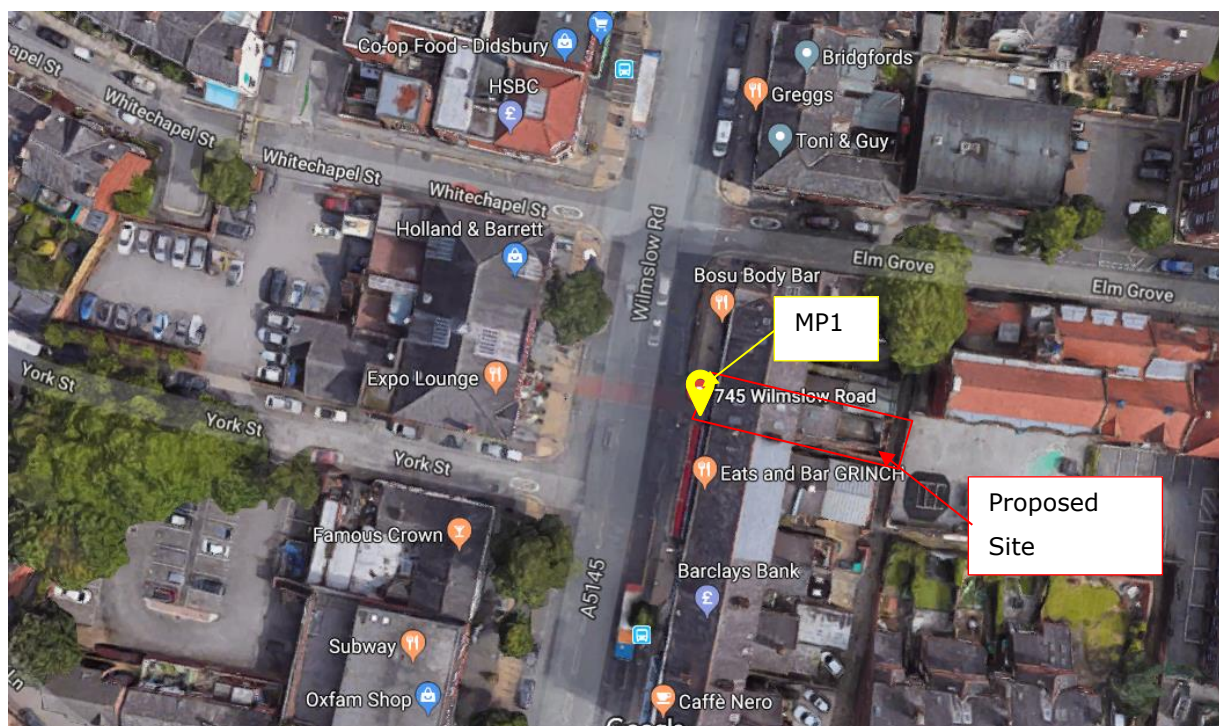


Figure 2.0 - Site and Surroundings

3.2 Background

It is proposed that the existing shop, planning classification A1, on site be converted into a Family Art Café and Shop, planning classification Sui Generis. The proposed site will operate between 10:00 – 17:30 on week days 10:00 – 18:00 on Saturdays and 11:00 – 18:00 Sunday. The proposed Family Art Café and Shop will be split over two floors ground and basement. The site plans in appendix C show that the basement level will be used for painting pottery. The ground floor level will be used as a café with associated small children's soft play area. It is also proposed that the front elevation of the site be upgraded to an aluminum frame shop front with standard double

glazing. There is potential for both entertainment noise i.e background music and general activities to breakout of the building as well as break through the separating partition in to the flat above. There is also potential for any new external mechanical plant to adversely impact on surrounding NSRs however NOVA Acoustics Ltd has been assured by the client that no new mechanical plant will be installed at the proposed site. Thus, negating any increased impact.



4. Environmental Noise Survey

In order to characterise the sound profile of the area of the proposed development, a short term 3-hour environmental sound survey was carried out on the 16th March 2018.

4.1 Measurement Methodology

For the sound monitoring, the sound level meter was placed at 1st floor level, protruding from a window of the proposed site. The microphone was positioned approximately 1m away from the building's façade. The monitoring position was chosen in order to collect representative sound levels of the area during the week day time periods. This position was also representative of the sound levels at the NSR. The measurement position can be found in Figure 1.0.

4.2 Measurement Equipment

Piece of Equipment	Serial No	Calibration Deviation
CESVA SC420 Class 1 Sound level meter	T246458	≤0.5
CESVA CB006 Class 1 Calibrator	901927	

Table 1.0 – Measurement Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with 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 wind shield for the entire measurements period. Calibration certificates can be provided upon request.

4.3 Weather Summary

As the environmental noise survey was carried out over a short term 3-hour period no records of weather conditions were taken. However, during the monitoring the weather was calm with wind speeds of less than 5m/s and no precipitation. The weather conditions were suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise.

4.4 Results

4.4.1 Summary Results

The following table shows a summary of the sound survey results; L_{Aeq} , L_{Amax} , L_{A90} and the L_{A10} for the measurement period.

Measurement Position MP1				
Measurement Time Period ('t')	$L_{Aeq,t}$	$L_{Amax,t}$	$L_{A90,t}$	$L_{A10,t}$
Day 1 – 16/03/18 – 10:15 – 13:15	67.0	91.9	65.8	67.7
Hour 1 – 16/03/18 – 10:15 – 11:15	67.0	91.9	61.7	69.9
Hour 2 – 16/03/18 – 11:15 – 12:15	66.9	87.0	61.4	69.4

Hour 3 – 16/03/18 – 12:15 – 13:15	67.1	90.6	61.3	69.3
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Table 2.0 – Sound Survey Summary Results

4.4.2 Background Sound Level Summary Results

The following table shows a summary of the background sound level results during the measurement period.

Measurement Position MP1				
Measurement Period ('t')	L _{A90,t}	Statistically most Repeated L _{A90,t}	Min. L _{A90,t}	Max. L _{A90,t}
Day 1 – 16/03/18 - 10:15 – 13:15	65.8	63.0	59.0	64.3

Table 3.0 – Background Sound Level Summary Results

The following table shows a summary of the octave band L90 sound levels measure during the measurement period.

Measurement Position MP1							
Frequency Analysis	Z-weighted Octave Band Sound Pressure Level, Hz (dB)						
	63	125	250	500	1K	2K	4K
L _{90,t} during the day	71.7	61.9	60.1	59.5	61.1	59.3	55.5

Table 4.0 – Background Sound (L90) Octave Band Leq,t during day

4.5 Subjective Impression & Context

The acoustic environment surrounding the site was typical of a busy urban location with the dominant noise sources in the area being that of road noise and commercial noise from the surrounding commercial and retail units. In general, the acoustic environment could be considered moderate to high, this is further corroborated by the measurements shown above.

4.6 Uncertainty

BS4142:2014 section 10.0 states that uncertainty in the calculation of sound levels during the assessment process can arise from both the measured values and calculation methods.

To ensure the accuracy of the assessment consideration has been taken for the level of uncertainty in the measured data and associated calculations in the proposed methodology used to undertake the assessment. Where the level of uncertainty could affect the conclusion, reasonably practicable steps have been taken to minimise the level of uncertainty. Where the level of uncertainty is excessive, additional measurements and site visits have been conducted to increase the confidence in the results. In all instances the following steps have been taken to address the uncertainty;

- 1) Measured Values; A detailed understanding of the source of noise under investigation has been conducted including consideration for the complexity, variability over time and location, the character and effect of the residual sound level in comparison with the source, the

measurement location, quantity of measurements and distance/intervening ground conditions, measurement time interval and the range of times measurement were taken, the suitability of weather conditions, the level of rounding and the classification of the instrumentation used to conduct the assessment.

- 2) Calculation Methods; Consideration has been taken for the accuracy of the measured sound levels, the character of the sound emissions in question, the calculation method and the simplification of the real situation to “fit” the modelled situation. Recognised standards and validated methods and processes have been used to establish accurate values during the calculation process.

For the avoidance of doubt, the level of uncertainty will not be quantified. If appropriate consideration is taken for points 1 and 2 during the collection of data and analysis thereof, then the influence of uncertainty in the final result is at its lowest practical value.



5. Noise Assessment

5.1 BS4142:2014 Noise Assessment

Condition 7 on the decision notice states that all noise emissions from any proposed externally mounted plant should be assessed in order to reduce the impact on the closest NSR.

The client has stated that no new plant will be installed at the proposed site. Consequently, plant noise will not be assessed.

However, a plant limit level has been defined to ensure that if any **future** external plant is installed that all noise emissions fall a minimum 10 dB below the lowest measured background sound level.

5.1.1 Cumulative Plant Noise Limit Level

The table below shows the defined Cumulative Plant Noise Limit Level that should not be exceeded at the NSR.

Description	Value (dB)
Cumulative plant noise limit level at the NSR	45

Table 5.0 – Cumulative Plant Limit Level

5.2 Background Music Noise Assessment

The following section analyses:

- The background music breaking out of the Cafe
- The structure borne background music transferring through the adjoining building to the neighboring dwelling

5.2.1 Background Music Limit Level

The following table presents the unweighted sound pressure levels, associated with the proposed development. These background music limit levels have been calculated to ensure all noise breaking out of the development falls a minimum 10 dB below the background sound level.

Description	Octave Band Sound Pressure Level, Hz (dB)							
	63	125	250	500	1K	2K	4K	Overall (A)
Music Limit Level	67.3	71.9	66.1	73.6	85.1	85.3	75.5	77.0

Table 6.0 – Music Limit Level

Due to the characteristics of music and to account for the uncertainty within the analysis of the behavior of low frequency sound, an uncertainty of +3 dB will be applied to the music levels.

5.2.2 Background Music Breakout Analysis

The music level breaking out of the proposed Cafe has been calculated considering the weakest element of the façade the glazed shop front which is assumed to be standard double glazing 4mm glass / 16mm air cavity / 4mm glass.

Description	Octave Band Sound Pressure Level, Hz (dB)							
	63	125	250	500	1K	2K	4K	Overall (A)
Internal Noise Level	67.3	71.9	66.1	73.6	85.1	85.3	75.5	77.0
R Glazing 4/16/4	19	21	17	25	35	37	31	29
External Level _{L1-R-6}	42.3	44.9	43.1	42.6	44.1	42.3	38.5	42.0
Distance to NSR 2m	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uncertainty	+3.0	+3.0	+3.0	+3.0	+3.0	+3.0	+3.0	+3.0
Level at NSR	39.3	41.9	40.1	39.5	41.1	39.3	35.5	39.0

Table 7.0 – Music Level at NSR Summary

5.2.3 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. Due to the inherent uncertainty in analyzing the impact of amplified music due to the distinctive nature and characteristics of it, the lowest values have also been considered within the assessment.

Table 8.0 outlines a summary of the octave band background sound level for the measurement period.

Measurement Position MP1							
Frequency Analysis	Z-weighted Octave Band Sound Power Level, Hz (dB)						
	63	125	250	500	1K	2K	4K
L _{90,t} during the day	71.7	61.9	60.1	59.5	61.1	59.3	55.5

Table 8.0 – Summary of Background Sound Levels

5.2.4 Music Breakout Assessment

The calculated music level at the NSR is compared with the 'typical' background sound level during the operational period of the proposed site. The analysis is shown in the following table.

NSR 1								
Amplified Music Breakout Assessment	Octave Band Sound Pressure Level, Hz (dB)							
	63	125	250	500	1K	2K	4K	Overall (A)
Music Level at NSR	39.3	41.9	40.1	39.5	41.1	39.3	35.5	39.0
Background Sound Level (L90)	71.7	61.9	60.1	59.5	61.1	59.3	55.5	59.0
Exceedance over Background Sound Level	-32.4	-20	-20	-20	-20	-20	-20	-20

Table 9.0 – Amplified Music Breakout Assessment

Discussion

As can be seen in the assessment above provided the Music Limit Level is adhered to all music at the NSR falls a minimum of 20 dB below the prevailing background sound level, indicating 'Low Impact'. Furthermore, due to the nature of the proposed development i.e a family café it is likely that the background music will be lower than the limit level provided. As well as this we note that the global limit level is 77.0 dB, it is highly unlikely that the total internal noise levels due to both patrons and background music will exceed this level. To provided context the Noise at Work Regulations 2005 state a lower action value as 80.0 dB cumulative internal noise from cafes including patrons and music rarely exceeds this lower limit level. Consequently, designing to the limit levels defined above will provided a robust and conservative assessment.

5.2.5 Assessment of Structure Borne Noise Transference

The Proposed Development adjoins a dwelling which is directly above and thus there is a high likelihood that the dwelling will be impacted by structure borne noise transferring through the adjoining partition, as well as flanking sound. The neighboring properties to the side are both commercial and will not be adversely affected due to structure borne noise transferring through the walls. The following analysis shows the required sound insulation of the adjoining floor, it must be noted that NR 15 curve is too stringent at mid and higher frequencies and will be likely significantly lower than background noise levels in habitable spaces. The partition will be designed to achieve the NR15 criteria within the 63Hz and 125Hz octave bands and NR25 for the remaining bands.

Frequency Analysis	Z-weighted Octave Band Sound Pressure Level, Hz (dB)							
	63	125	250	500	1K	2K	4K	Overall (A)
Music Limit Level	67.3	71.9	66.1	73.6	85.1	85.3	75.5	77
NR15/25 Curve (dB)	47.3	35	35.2	29.2	25	21.9	19.5	30
Required Octave Band SRI (R _w)	20.0	36.9	30.9	44.4	60.1	63.4	56.0	47

Table 10.0 – Music Transfer Analysis

Flanking sound within an existing building cannot be objectively analysed and thus the above performance is based on all potential flanking routes being treated. Any comment building elements that adjoin separate areas of the building, such as common internal wall and floors, steelwork, risers or lift shafts should be acoustically treated to minimise flanking sound.

5.2.6 Recommendations & Mitigation

Building Envelope

a) Glazing

Windows can be considered the weakest point of a façade in terms of noise reduction. All glazed elements installed in the development including doors and screens require a minimum sound reduction index value of 29.0 dB R_w. The glazing unit shown in Table 11.0 would provide a suitable sound reduction. Any other window capable of providing an attenuation of 29.0 dB R_w will be suitable. The performance is specified for the whole window unit, including frame and other design features.

Glazing Configuration	Attenuation (dB)
Double Glazing 4mm Glass – 16mm Air Cavity – 4mm Glass	29.0 R _w

Table 11.0 – Glazing SRI

Any other configuration of roof that would achieve at least these insulation figures will be suitable for the development.

b) Doors

All doors that are not glazed, leading to external areas including fire exits installed in the proposed development require a minimum sound reduction index of 29.0 dB R_w the unit suggested below provides the required amount of sound reduction however any door with a sound reduction index could be installed.

Door Type	Attenuation (dB)
Huet Doors Scholar 35	35.0 dB R _w

Table 12.0 – Door SRI

Background Music Limit Levels

The following maximum music limit level should be set and not exceeded as shown in the following table.

Octave Band Sound Pressure Level, Hz (dB)							
63	125	250	500	1K	2K	4K	Overall (A)
67.3	71.9	66.1	73.6	85.1	85.3	75.5	77

Table 13.0 – Maximum Music Limit Level

Sound Insulation of Adjoining Floor

The acoustic performance of the partition floor is calculated using INSUL software, the required buildup is shown below:

- Existing Floor Boards
- Existing 200mm Timber Joists with 100mm Rockwool RW3 60kg/m³
- Suspended MF Ceiling on Acoustic Hangers (min. void 125mm) and 50mm Rockwool RW3 60kg/m³
- 2 No. 15mm SoundBloc Plasterboard

The predicted acoustic performance of this floor detail is shown in Table 14.0 below.

Frequency Analysis	Z-weighted Octave Band Sound Pressure Level, Hz (dB)							
	63	125	250	500	1K	2K	4K	Overall (A)
Predicted Octave Band SRI (R _w)	20.0	36.0	42.0	47.0	49.0	53.0	64.0	50.0
Required Octave Band SRI (R _w)	20.0	36.9	30.9	44.4	60.1	63.4	56.0	47.0

Table 14.0 – SRI of Partition Floor

Noise Management Plan

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

- The operational hours should be as stated in the decision notice 10:00 – 17:30 Monday to Friday, 10:00 – 18:00 Saturday and 11:00 – 18:00.
- No deliveries should occur between the hours of 07:30 – 20:00.
- All doors and windows should remain fully closed throughout periods of operation.
- All staff should be trained in noise reductive work practices where possible.

6. Conclusion

An environmental noise survey and noise impact assessment has been undertaken to assess the potential increase in noise levels from development of a Family Art Café, on the surrounding noise sensitive receptors. The measured noise background sound levels have allowed a noise assessment to be undertaken. No BS4142:2014 assessment was carried out as no new external plant is to be installed.

The entertainment noise assessment shows that there is a low likelihood of adverse impact provided the music limit level and sound insulation scheme is adhered to, when considering the context of the assessment, the time of day the development will be in operation and the existing commercial activity in the surrounding area that impact is expected to be reduced. Further mitigation has been recommended to minimise uncertainty in the predictions presented and ensure the amenity of the NSR's is protected.

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



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 s ₁ and s ₂ is given by 20 log ₁₀ (s ₁ / s ₂). 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.

A

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.

The less	Sound Level	Location	ear is
	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	

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 $L_{A90,1\text{hour}}$ dB and $L_{A90,15\text{mins}}$ dB. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125ms.

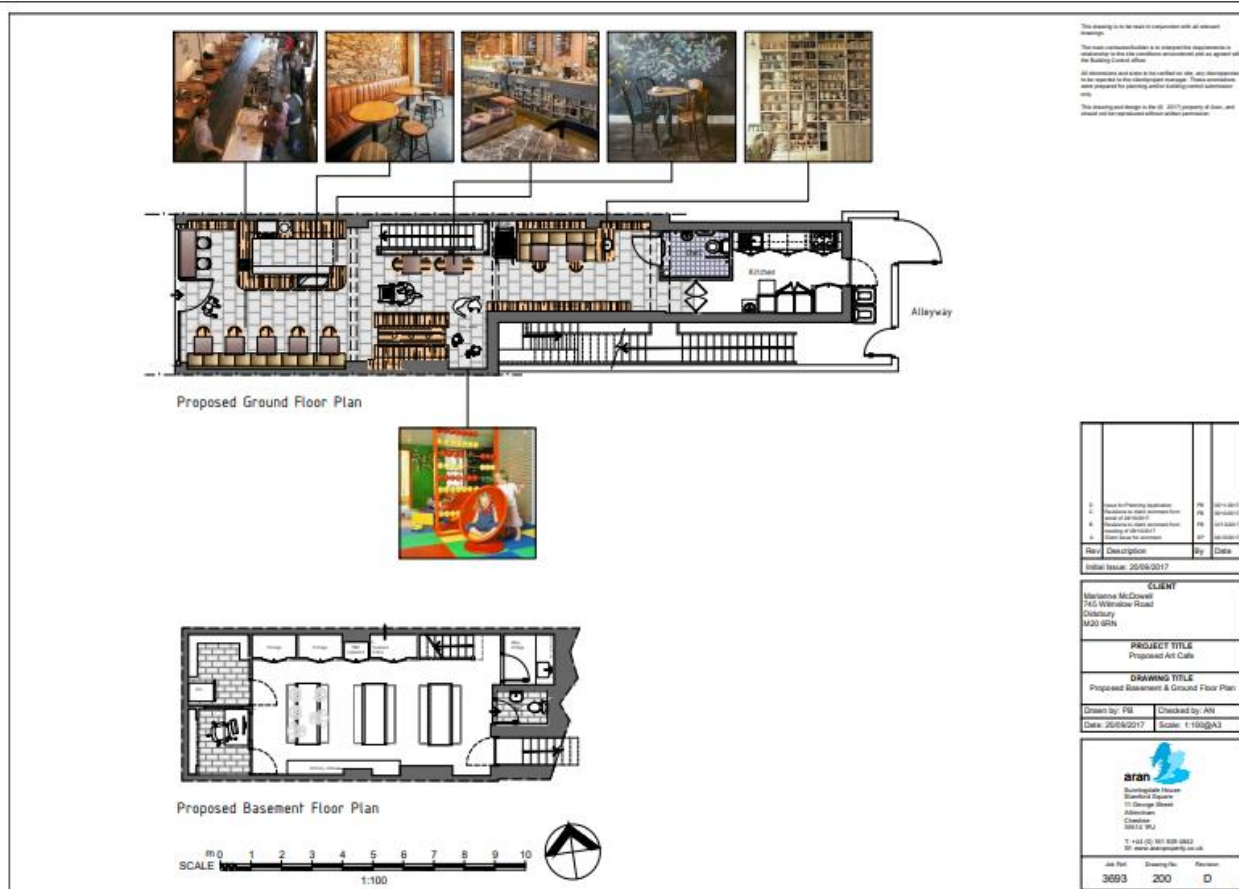


Appendix B – Location Plan



NOVA

Appendix C – Site Plans



NOVA

Appendix D – Environmental Sound Survey

