



Lowry House, Manchester

Acoustic Planning Report

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Client: Bruntwood

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Introduction

dBx Acoustics Ltd has been appointed by Bruntwood to provide acoustic consultancy services for the refurbishment of their office and commercial development at Lowry House, Manchester.

This report is presented with the intent of supporting a planning application relating to use of the ground floor as a café/bar, co-working and events space. The report also considers the continued use of the upper floor offices and associated building services plant.

A glossary of acoustic terminology has been supplied in Appendix A in order to assist the reader.

The Development

The proposed development comprises a café/bar with direct access from Marble Street for members of the public. There is also a proposed event space that is likely to host talks/lectures for building tenants. Adjacent to the reception area will be an open plan co-working area, and various offices and meeting rooms are proposed to be developed in the existing annex. The basement will house a number of leisure facilities for tenants including a wellness studio and screening room. The basement is entirely underground and as such there will be no noise emissions from this area.

The café/bar operator has not yet been determined. This assessment therefore assumes that the café/bar space could potentially be used for amplified music as a 'worst case' scenario for noise impact on the surrounding properties.

The café/bar will have a façade overlooking Marble Street, which will comprise a mixture of the existing columns, glazing and glazed doors.

The proposed opening hours for the proposed café/bar as follows;

- Monday-Thursday 7am-8pm;
- Friday 7am-7pm;
- Saturday 9am-10pm;
- Sunday 9am-8pm.

There are residential properties at 86 Market Street approximately 30m to the northeast. The other noise sensitive buildings that surround the site are office buildings with the nearest being the office building on the opposite side of Marble Street, approximately 10m away.

There are also office buildings to the north and west. These buildings are unlikely to be affected by the noise egress from the café/bar, however, they may be affected by any proposed external plant, especially if the plant will be roof mounted. These offices are therefore considered in the plant noise assessment.

Assessment Criteria – Noise Emissions

Manchester City Council – Planning & Noise Technical Guidance (December 2015)

This document sets out Manchester City Council's requirements with regard to current guidance and policy, with the aspiration that new developments achieve the highest standards without compromising the health and wellbeing of residents. The guidance refers to the NPPF and NPSE as described below.

The following requirements are considered relevant to this project;

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 BS 4142 rating level (see below) of 5 dB L_{Aeq} below the typical background L_{A90} level at the nearest noise sensitive location.

Where entertainment noise is proposed the L_{Aeq} (entertainment noise) shall be controlled to 10 dB below the L_{A90} (without entertainment noise) in each octave band at the façade of the nearest noise sensitive location, and internal noise levels at structurally adjoined residential properties in the 63 Hz and 125 Hz octave frequency bands shall be controlled so as not to exceed (in habitable rooms) 47 dB and 41 dB respectively.

Noise Policy Statement for England (NPSE)

NPPF affirms that National Policy Statements form part of the overall framework of national planning policy, and should be a material consideration in decisions on planning applications. The Noise Policy Statement for England came into force in 2010 and states:

This Noise Policy Statement for England (NPSE) should apply to all forms of noise including environmental noise, neighbour noise and neighbourhood noise. The NPSE does not apply to noise in the workplace (occupational noise).

Noise Policy Vision

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

Noise Policy 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; and*
- *where possible, contribute to the improvement of health and quality of life.*

The NPPF noise aims widely reflect those in NPSE. The NPSE does however include some context within the explanatory note to assessing noise impact and uses established concepts from toxicology currently being applied to noise impacts, these include:

- **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.
- **SOAEL** – *Significant Observed Adverse Effect Level*. This is the level above which significant adverse effects on health and quality of life occur.
- **LOAEL** – *Lowest Observed Adverse Effect Level*. This is the level above which adverse effects on health and quality of life can be detected.
- However, it is clear that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times.

The table on the following page is extracted from the Government's Planning Practice Guidance on noise¹. It summarises the noise exposure hierarchy, based on the likely average response.

¹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf

Perception	Examples of outcomes	Increasing effect level	Action
Not noticeable	No effect	No observed effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life	No observed adverse effect	No specific measures required
		Lowest observed adverse effect level (LOAEL)	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude. E.g. turning up the volume of the television; speaking more loudly; where there is no alternative ventilation, having to close windows are some of the time because of the noise. Potential for some reportedly disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
		Significant observed adverse effect level (SOAEL)	
Noticeable and disruptive	The noise causes material change in behaviour and/or attitude e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep the windows closed most of the time because of the noise. Potential for sleep disturbance result in difficulty in getting to sleep. Premature awakening and difficulty getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed adverse effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise leading to psychological stress or psychological effects e.g. regular sleep deprivation/awakening; loss of appetite; significant, medically definable harm e.g. auditoria and non-auditory	Unacceptable adverse effect	Prevent

Table 1: Noise Exposure Hierarchy

BS 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound'

BS 4142:2014 sets out a procedure for assessing noise impact whereby a Noise Rating is determined and compared with the existing local Background Sound Level.

The Rating Level ($\text{dBL}_{\text{Ar,Tr}}$) is evaluated from the Specific Noise Level by including several, cumulative corrections to account for factors such as distinguishable tone, impulse, intermittency or other readily distinguishable sound characteristics.

The assessment of the impact depends upon the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level. An initial estimate of the impact of the specific sound is made by subtracting the Background Sound Level from the Rating Level, while considering the following points:

- a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Noise Emissions – Café/Bar Unit

The acoustic design of the retail unit at ground floor is based on an acoustically 'worst case' use as a busy cafe, with live or amplified music. Any potential noisier use would be dealt with by Employers' Requirements for the tenant to enhance sound insulation to meet MCC requirements regarding noise emissions and Client requirements for noise transfer to the first-floor offices.

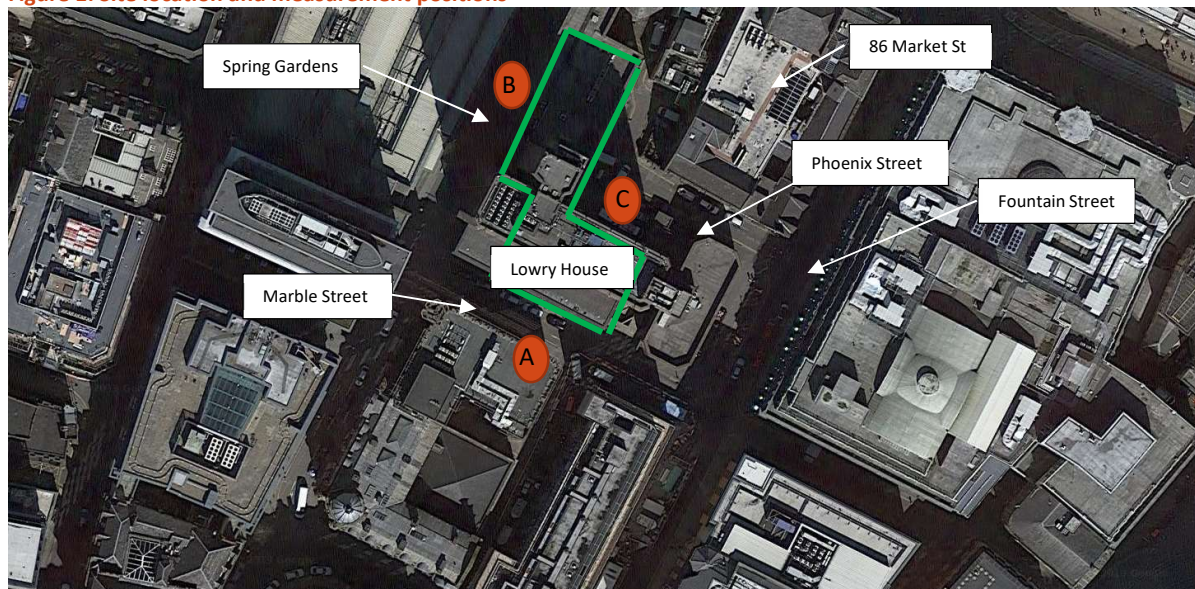
MCC requirements are that *"where entertainment noise is proposed the L_{Aeq} (entertainment noise) shall be controlled to 10 dB below the L_{A90} (without entertainment noise) in each octave band at the façade of the nearest noise sensitive location."*

The nearest noise sensitive location during the daytime is the office building on the opposite side of Marble Street, approximately 10m away from Lowry House. During the evening and night time period consideration is given to the residential premises at 86 Market Street. These receptors are shown on Figure 1, below.

Noise Survey

A noise survey was carried out at the site by dBx Acoustics on Friday 2nd and Tuesday 6th August 2019 in order to undertake daytime measurements. Following the confirmation of opening hours for the retail unit and the decision that plant associated with the offices may operate 24/7, additional measurements were made during the evening and overnight period on Sunday 1st/Monday 2nd December 2019 in order to establish the typical weekend and lowest background sound levels occurring at the site and in the surrounding area. Measurements were taken at three locations, as identified in Figure 1, below;

Figure 1: Site location and measurement positions



Location A was on the carriageway of Marble Street, approximately 10m from the junction with Spring Gardens. The dominant source of noise was road traffic on Fountain Street as well as Pedestrians on Marble Street. Background noise from pedestrian traffic on Market Street, and general building services plant from the surrounding office buildings were audible. Maximum noise events measured were caused by vehicle movements on Marble Street.

Location B was 3m from the site boundary on Spring Gardens, approximately 15m from the junction with Marble Street and 30m from the junction with Market Street. Sources of ambient noise at this location were pedestrians and buskers on Market Street, with background noise being caused by distant road traffic. Maximum noise events measured were caused by pedestrians talking as they passed the microphone location.

Location C was at the corner of Phoenix Street, approximately 5m from the site boundary and 20m from the junction with Fountain Street. Ambient noise at this location was caused by market street pedestrians and buskers, with background noise being caused by distant road traffic. The maximum noise events measured were caused by vehicles turning around in Phoenix Street and HGVs on Market Street passing by the measurement location.

Measurements were 15 minutes in duration.

The noise monitoring equipment used was a Cirrus 171c Type 1 Sound Level Meter with serial number G300656. On site calibration checks were performed before and after the measurements using a Cirrus 515 sound calibrator, serial number 87921, and were found to be within the permitted tolerance of BS EN 61672-1:2013. All equipment had a valid calibration certificate at the time of the survey and the microphone was fitted with a windshield to prevent wind noise from affecting the measurements.

For all measurements the microphone was located 1.3m above ground / floor level.

Measurements were undertaken in accordance with BS 7445-1:2003 *Description and Measurement of Environmental Noise*. The figures below identify the site in relation to the major noise generating infrastructure in the area, as well as the noise survey locations.

The weather during the August measurements was warm, still and dry, with around 30% cloud cover. The temperature was 17°C and there was little to no wind was present during the surveys. Occasional gusts were measured at speeds of up to 3m/s. Similar conditions were experienced on both days of measurement. During December measurements the overnight temperature was 1°C with clear skies and no wind.

The measured noise levels are presented in

Table 2, below;



Table 2: Measured Noise Levels

Location	Date and Time	L _{Aeq} (dB)	L _{A90} (dB)	L _{Amax} (dB)	L _{A10} (dB)
A	02/08/19 14:32	57	54	72	58
	02/08/19 14:48	62	56	80	63
	02/08/19 15:03	62	56	82	64
	02/08/19 15:21	59	55	78	60
	02/08/19 15:37	58	54	84	60
	01/12/19 09:01	61	53	74	65
	01/12/19 10:09	70	60	100	71
	01/12/19 18:43	61	54	82	65
	01/12/19 19:34	61	54	78	65
	02/12/19 01:02	55	47	76	54
	02/12/19 02:00	51	42	70	48
B	06/08/19 11:48	67	59	83	69
	06/08/19 12:22	65	60	80	68
	01/12/19 09:50	56	51	77	57
	01/12/19 19:00	61	54	75	65
	01/12/19 19:52	60	53	74	64
	02/12/19 01:21	52	50	59	54
	02/12/19 02:22	47	45	61	49
C	06/08/19 12:42	64	56	82	67
	06/08/19 12:57	65	56	87	62
	01/12/19 09:20	56	51	81	58
	01/12/19 10:25	56	55	71	58
	01/12/19 19:16	54	51	70	55
	01/12/19 20:13	59	53	80	60
	02/12/19 01:41	48	46	61	50
	02/12/19 02:40	50	47	69	52

A review of the survey data indicates that;

- There is little variation in the daytime noise climate between a typical weekday and a Sunday at Locations A and B although Location C (most representative of the residential properties) is somewhat quieter.
- Night-time noise levels are similar at all locations.

Noise Levels Used In Assessment

The noise levels measured at Location C are considered most representative of the residential receptor at 86 Market Street. Given their proximity to retail and commercial units, it is likely that the levels measured at Location C are lower than those arising at the residential facades –the acoustic assessment can be considered a ‘worst case’ for noise impact and the actual impact is likely to be lower than that predicted here.

Assessments have therefore been carried out as follows;

- Daytime noise impact on Marble Street offices due to Café/Bar (Location A).
- Daytime noise impact on Marble Street offices due to plant (Location A).
- Weekend daytime/evening noise impact on residential due to Café/Bar (Location C).
- Weekend night time noise impact on residential due to plant (Location C).

The lowest measured background noise levels in octave bands used in these assessments are shown in Table 3 below.

Table 3: External background sound Levels at nearest noise sensitive locations L90

Location and Period	Background sound levels in octave bands, L90 (dB)								
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Weekday daytime – offices on Marble Street	61	56	53	52	49	45	39	28	51
Weekday evenings and Sunday 9am-8pm – Residential receptor at Market Street	52	50	47	46	45	43	31	17	51
Overnight – Residential receptor at Market Street	52	46	39	41	44	35	16	13	46

Noise Impact Assessment

Calculation Information

The proposed façade specifications have been provided by Bruntwood, and comprise glazing, doors and columns. The column details are unknown at this design stage, and so a construction with a sound insulation performance of 55dBR_w was used.

It is likely that the doors to the proposed development will be opened frequently, and so a door with relatively low sound insulation performance was used to reflect this. In the calculation, a door with a sound insulation performance of 26dBR_w was used.

The glazing used in the calculation was 10mm/thermal cavity/6mm, which has a sound insulation performance of 38dBR_w.

A composite sound reduction index for the overall façade has been calculated based on the performance and areas of each individual element. This has then been used in subsequent calculations in which the maximum octave band sound pressure level within the café/bar which would still allow MCC requirements for noise breakout to be met is determined.

Noise Emission Calculations – Café/Bar

Calculations of noise impact on the Marble Street offices during the daytime period, and the Market Street residential receptor during the evening period, are presented in Appendix B. In order to establish the maximum allowable noise levels within the café/bar, in each case the 'Room L_p' has been adjusted until the difference between the calculated sound pressure level at the receiver is at least 10dB below the measured L₉₀ background sound level in accordance with MCC requirements.

Calculations of noise impact on the Market Street residential receptor also include a 10dB allowance for screening, as there is no direct line of sight between the source and receptor.

Limiting Noise Levels in Café/Bar

The resultant limiting sound pressure level within the café/bar for the daytime period is confirmed in Table 3 below.

Table 3: Maximum internal noise level limits – octave bands

Period	Ambient Noise Level Limits (dB)								
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Weekday daytime 0700 – 2000h	81	81	79	83	87	81	77	71	89
Weekend opening (Saturday 0900-2200h, Sunday 0900-2000h)	92	85	82	88	93	89	79	70	95

Due to the increased distance and screening to the residential receptor when compared to the office, it can be seen that the allowable limits for weekend opening are higher than those permissible during the week.

The maximum allowable internal noise level is unlikely to be exceeded during normal café/bar operations. However, should amplified music be used the Tenant will be required to ensure that these limits are not exceeded, particularly at 63Hz and 125Hz, in order to ensure continued compliance with MCC requirements.



Plant Noise Assessment

Manchester City Council requires that 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 $L_{A,T,r}$ of 5 dB below the typical background L_{A90} level at the nearest noise sensitive location.

Café/Bar Unit

It is proposed that the units associated with the café/bar are mounted on the roof of the annex of Lowry House. The plant would not be expected to run beyond the typical opening hours of the café/bar.

The nearest noise sensitive receptors are the residential development at 86 Market Street, the office building on Marble Street opposite the entrance to Lowry House to the southwest of the proposed site, the office building on the opposite side of Spring Gardens to Lowry House to the northwest of the site and the office building overlooking Phoenix Street to the east of the proposed site. These locations are referred to as R1, R2, R3 and R4 respectively.

The measurements taken at locations A, B and C can be considered as representative of the noise levels at the noise sensitive receptors.

The model of the externally mounted air conditioning units for the retail area is unknown at this design stage and so the BS4142 Rating Level limits for each noise sensitive location are provided in Table 4, below. When determining the Rating Level Limits at each receptor, the lowest measured background level during the weekday daytime period was used for assessment at offices (R2, R3, R3) with the lowest measured background level during the weekend opening hours used at the residential receptor (R1).

Rating level limits have been set at 5dB below the measured background level.

Table 4: Rating Level Limits at each noise sensitive receptor

Receptor	Daytime (07:00 – 23:00hrs) Rating Level Limit ($dB_{L_{A,T,r}}$)
R1 86 Market Street	46
R2 Marble Street	49
R3 Spring Gardens	54
R4 Phoenix Street	51

Offices

Additional plant may be added in the future to support the 24/7 operation of the offices. This is not the subject of the current planning application, however, in order to meet the requirements of MCC with regard to noise emissions affecting the residential properties, the rating level limit for such plant would be $41dB_{L_{A,T,r}}$ when assessed at the residential receptors.

Conclusions

This report presents an assessment of potential noise emissions from the A3 use at ground floor at Lowry House, Manchester.

A noise survey has been carried out at the site which informs the noise impact assessment. Given the orientation of the building and proximity, the office building opposite the proposed site on Marble Street, to the southwest of the site has been identified as the nearest noise sensitive location during the weekday daytime period, with the residential property at 86 Market Street being the nearest noise sensitive location during the weekend period.

The internal noise level limits have calculated in order to control noise emissions to the surrounding properties to at least 10dB below the existing background sound level in all octave bands. The sound insulation performance of the glazing used in the calculations has also been specified. The Tenant will be required to comply with these limits.

A BS4142 Rating Level has been set for each noise sensitive receptor. When plant has been selected, a BS4142:2017 assessment will be carried out to confirm compliance with MCC requirements.

Noise should therefore not be a limiting factor in any planning application.

Appendix A – Glossary of Acoustic Terminology

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (L_p) the reference quantity is 2×10^{-5} N/m ² . The sound pressure level existing when microphone measured pressure is 2×10^{-5} N/m ² is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w).
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
A weighting	Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured.
$L_{n,T}$	L_p which was exceeded for n% of time, T.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during time, T.
$L_{Amax,T}$	The instantaneous maximum A weighted sound pressure level which occurred during time, T.

Appendix B: Café Noise Break Out Calculations

Calculation 1: Noise Break-Out Calculation – Daytime (to offices)

Room to Exterior

Date: 6-Aug-19
Job No: 18103
Project: Lowry House
Title: Noise Break Out

Frequency	63	125	250	500	1k	2k	4k	8k	A	NR
Room Lp	81	81	79	83	87	81	77	71	89	87
Wall SRI	21	26	26	33	38	36	39	44	47	From comp sri sheet

Wall dimensions length: 31.33 m
height: 6.30 m

Distance from wall to receive: 10.0 m

Directivity index of location (0, 3, 6 or 9): 3

0 = free space
3 = junction with surface
5 = junction of two surfaces
6 = junction of three surfaces

Frequency	63	125	250	500	1k	2k	4k	8k	A	NR
Receive Lp	50.5	45.5	42.9	40.2	38.5	34.5	28.0	17.0	43.1	38.5
Limit	60.6	56.4	53	51	49.3	45	38.6	27.8	Measured L90	
Difference	-10.1	-10.9	-10.1	-10.8	-10.8	-10.5	-10.6	-10.8		

Calculation 2: Noise Break-Out Calculation – Evening (to residential)

Room to Exterior

Date: 4-Dec-19
 Job No: 18103
 Project: Lowry House
 Title: Noise Break Out

Frequency	63	125	250	500	1k	2k	4k	8k	A	NR
Room Lp	92	85	82	88	93	89	79	70	95	93
Wall SRI	21	26	26	33	38	36	39	44	47	From comp sri sheet

Wall dimensions length: 31.33 m
 height: 6.30 m

Distance from wall to receive: 30.0 m

Directivity index of location (0, 3, 6 or 9): 3

0 = free space
 3 = junction with surface
 5 = junction of two surfaces
 6 = junction of three surfaces

Frequency	63	125	250	500	1k	2k	4k	8k	A	NR
Receive Lp	51.9	39.9	36.4	35.7	35.0	33.0	20.5	6.5	39.5	36.0
	52	50	47	46	45	43	31	17	Measured L90	
Limit	62	60	57	56	55	53	41	27	10dB allowance for full screening	
Difference	-10.1	-10.1	-10.6	-10.3	-10.0	-10.0	-10.5	-10.5		