
Our Reference: NIA/1233/24/294/v1.0/701 Wilmslow Road

26th March 2024

Mr David Cook
Director
CRL Architects Ltd
Maple Lodge
Woodhouse Cliff
Leeds
LS6 2HF



Dear Sirs,

NOISE IMPACT ASSESSMENT FOR ERECTION OF A SINGLE STOREY SIDE EXTENSION TO PROVIDE ADDITIONAL SEATING AREA AT 701 WILMSLOW ROAD, MANCHESTER, M20 6RE

MANCHESTER CITY COUNCIL PLANNING APPLICATION 137497/FO/2023 (RESUBMISSION)

1.00 INTRODUCTION

1.01 RP Acoustics Limited has been commissioned by Mr Housam Issa to carry out a noise impact assessment for the erection of a single storey side extension to provide additional seating area at 701 Wilmslow Road, Manchester, M20 6RE (hereafter referred to as the site).

1.02 Planning Permission 137497/FO/2023 was refused planning permission by Manchester City Council on 26th January 2024. Reason 1 was stated as:

The proposal would have a detrimental impact on the residential amenity and living conditions of the nearest residential occupiers on King's Lynn Close as a result of the unacceptable levels of noise, disturbance and activity associated with the nature of the use. The proposed development is therefore contrary to saved policy DC26 of the Unitary Development Plan for the City of Manchester, policies DM1 and SP1 of the Manchester Core Strategy and the National Planning Policy Framework.

1.03 It is noteworthy that the original planning application was not accompanied by a noise impact assessment.

1.04 The Delegated Officer Report for the Planning Application comments:

Environmental Health

'suggests the imposition of an "hours" condition to limit the use of the extension.'

Residential Amenity

'It is acknowledged that the dwellings on King's Lynn Close and Stephens Terrace are situated in close proximity to Didsbury District Centre and while this would afford a different level of residential amenity when compared to a wholly residential area, it is recognised that there is still a need to protect the amenities of the occupants of these dwellings.'

It is considered that the erection of this extension, which would introduce an overtly commercial activity to this residential street, would have a detrimental impact on the levels of residential amenity enjoyed by the residents of those dwellings nearest to 701 Wilmslow Road due to the noise and activity that would be associated with a food and drink seating area.'

1.05 The objectives of the noise assessment were to:

- Determine the ambient and background noise levels at the application site and the surrounding residential uses (dwelling houses on King's Lynn Close and first floor accommodation above the ground floor food and drink use)
- Determine the noise levels associated with the proposed outdoor seating area at the surrounding residential uses
- Assess the impact of the proposed outdoor seating area in accordance with the relevant planning policies and the relevant technical standards and guidelines.

1.06 This report sets out the methodology and findings of the noise impact assessment. It has been prepared on behalf of Mr Housam Issa for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult Mr Housam Issa (applicant), CRL Architects Limited (applicant's agent) and RP Acoustics Limited as to the extent to which the findings may be appropriate for their use.

1.07 A glossary of acoustic terms is contained in Appendix 1 for reference.

2.00 APPLICATION SITE SETTING AND PROPOSED DEVELOPMENT

2.01 701 Wilmslow Road is a 2 storey end-terraced property located south of the Wilmslow Road and King's Lynn Close junction. The property is located within the Didsbury District Centre. The property is currently in use as a food and drink use on the ground floor with residential accommodation above. King's Lynn Close is a short residential cul-de-sac consisting of seven terraced dwellings and it leads to Stephens Terrace which consists of ten 2 storey dwellings. The application site location plan is reproduced in Appendix 2 for reference.

2.02 The proposed development consist of the erection a single storey side extension to form an additional seating area for the existing food and drink use operating out of 701 Wilmslow Road. The proposed layout and elevations are reproduced in Appendix 3 for reference. The single storey extension is to have a glazed mono-pitch roof with (retractable) glazing fronting onto King's Lynn Close and Wilmslow Road.

2.03 The proposed hours of use are 0800 to 1800, 7 days a week.

2.04 No alcohol is to be served on the premises.

3.00 BASELINE NOISE SURVEY

3.01 A baseline noise survey was undertaken on the afternoon of Monday 4th March 2024 and the morning of Tuesday 5th March 2024. For the purpose of the survey, the following free field noise monitoring positions were adopted (reproduced in Appendix 4 for reference):

- NMP1 was located at ground floor level outside No. 1 King's Lynn Close
- NMP2 and NMP2A was located at first floor level outside the windows to the first floor accommodation overlooking King's Lynn Close

3.02 Baseline noise measurements were undertaken using NTi Audio XL2 Type 1 integrating sound level meters. A 90 mm windshield was fitted for all measurements. The measurement system calibration was verified immediately before and after measurement sessions and no drift in calibration level was noted (calibration certificates reproduced in Appendix 5 for reference).

- 3.03 Baseline noise measurements consisted of A-weighted broadband parameters, together with linear one-third octave band L_{eq} levels, with a logging interval of 1 second. The following tables contain a summary of the data rounded to the nearest decibel.

Table 3.1 – Baseline Noise Measurement Data

NMP	Date	Time	L _{Aeq} (dB)	L _{A90} (dB)	L _{A10} (dB)	L _{A1} (dB)	Comments
NMP1	Tuesday 05/03	0945–1045	60	51	63	72	Wilmslow Road traffic including regular buses dominates, pedestrians, intermittent aircraft in locality (up to 79 dB L _{AFMax})
		1045–1145	57	51	61	66	
	Monday 04/03	1600–1700	57	51	60	67	
		1700–1800	57	51	59	66	
Daytime ambient noise level 57 to 60 dB L _{Aeq}							
Daytime background noise level 51 dB L _{A90}							
Maximum noise level up to 79 dB L _{AFMax} due to aircraft							
NMP2	Tuesday 05/03	1200–1300	63	54	66	71	As above (nearer to road)
NMP2A	Tuesday 05/03	1300–1400	64	54	68	73	As above (nearer still to road)
Daytime background noise level 54 dB L _{A90}							

- 3.04 The ambient and background noise levels at the noise monitoring positions were wholly commensurate with the application site setting with levels increasing with proximity to Wilmslow Road, which was continually trafficked.

4.00 NOISE LEVELS ASSOCIATED WITH THE PROPOSED DEVELOPMENT

- 4.01 As illustrated by the noise monitoring positions, there are two distinct receptors to consider, namely: a) No 1 Kings Lynn Close, and b) the first floor accommodation above the ground floor food and drink use.
- 4.02 For reference, speech levels are typically expressed as sound pressure levels at a distance of 1 metre in front of the speaker's lips in the free field. For the purpose of STI modelling for BB93, suitable values for the seven octave bands 125 to 8,000 Hertz are defined in ANSI 3.5:1997 'Methods for Calculation of the Speech Intelligibility Index'.
- 4.03 Table 4.1 contains the sound pressure levels at 1 metre in free field that should be used for vocal effort. These values have been averaged from data for male and female speakers and hence should be used in the model to represent either male or female speakers.

Table 4.1 – Speech Spectra in terms of the Sound Pressure Level at a Distance of 1 metre in Front of the Speaker's Lips in the Free Field

SPL	Octave Band Centre Frequency							dB(A)
	125	250	500	1000	2000	4000	8000	
Vocal Effort	51.2	57.2	59.8	53.5	48.4	42.8	38.6	59

- 4.04 In terms of A-weighting (the response of the human ear to sound), the principal speech frequency's fall in the range 500 to 2,000 hertz. With the A-weighting correction applied (shown in brackets below), the source levels at 1 metre are as follows:

Frequency	500	1000	2000	A (500 to 2000)
A-weighting	(-3.2)	(0.0)	(+1.2)	
Vocal Effort	56.6	53.5	50.0	59

- 4.05 The human voice does not radiate sound equally in all directions. Typically, most of the energy is radiated to the front of a speaker, particularly at higher frequencies. The source directivity should be modelled by means of a three-dimensional directivity pattern. Suitable directivity data is contained in the appendix of IRC Research Report 104 "Detailed Directivity of Sound Fields around Human Talkers" (<http://www.nrc.ca/irc/ircpubs>). Horizontal and vertical polar plots should be derived from these data, with a resolution in azimuth and elevation of 30° or better. Any missing elevation data can be derived by linear interpolation from the IRC report. From these two-dimensional polar plots a suitable three-dimensional directivity pattern can be obtained using elliptical interpolation. For every octave band, a separate directivity pattern should be created.

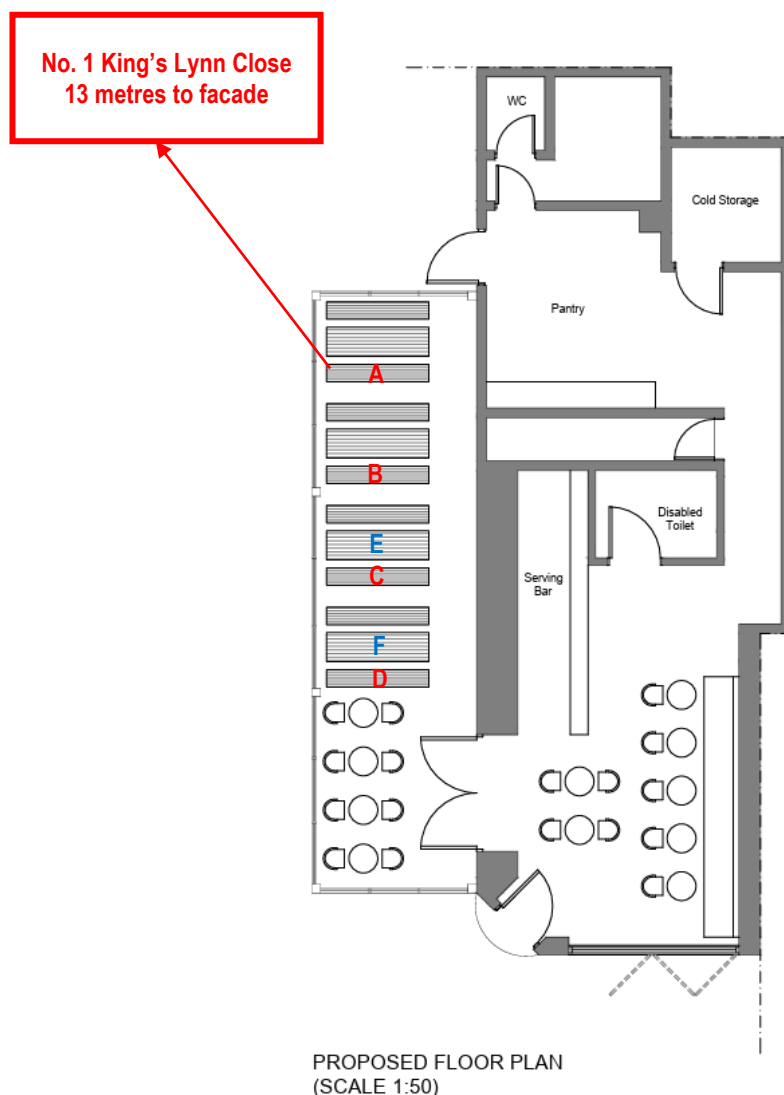
Table 4.2 – Directivity Levels in dB, relative to the zero axis, in the Horizontal Plane

Azimuth (°)	Octave band centre frequency (Hz)						
	125	250	500	1k	2k	4k	8k
0 (front)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	-0.2	-0.3	0.3	-0.7	0.3	-0.6	-1.1
60	-0.7	-1.2	0.2	-0.5	-1.8	-2.0	-4.4
90 (left/right)	-1.5	-2.8	-1.8	-0.3	-5.6	-5.5	-8.9
120	-2.3	-4.2	-3.8	-3.0	-6.3	-10.0	-13.3
150	-2.8	-5.3	-5.3	-7.1	-10.4	-14.4	-16.8
180 (back)	-3.0	-5.9	-6.1	-5.0	-10.9	-16.6	-18.9

Table 4.3 – Directivity Levels in dB, relative to the zero axis, in the Vertical Plane

Elevation (°)	Octave band centre frequency (Hz)						
	125	250	500	1k	2k	4k	8k
0 (front)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.3	-1.0	-0.2	2.4	0.3	-2.1	0.5
60	-0.3	-2.3	-1.7	1.6	-0.1	-2.3	-1.1
90 (up)	-1.7	-3.3	-3.7	-0.2	-3.4	-5.8	-4.6
120	-2.2	-3.8	-3.4	-3.6	-4.7	-8.1	-9.4
150	-2.5	-4.8	-3.9	-1.2	-7.8	-13.3	-16.6
180 (back)	-3.0	-5.9	-6.1	-5.0	-10.9	-16.6	-18.9
210	-3.3	-6.6	-7.6	-8.9	-13.0	-18.6	-18.5
240	-3.0	-4.7	-6.3	-7.5	-15.4	-17.6	-16.9
270 (down)	-2.2	-4.0	-2.8	-3.7	-10.7	-11.0	-9.5
300	-1.3	-3.2	0.7	0.1	-6.0	-4.4	-2.1
330	-0.4	-1.6	3.2	-2.6	-1.2	-0.5	2.2

- 4.06 With reference to Tables 4.2 and 4.3, it can be seen that at 0° azimuth and 0° elevation (i.e. looking directly at the receptor), the correction is 0 dB.
- 4.07 The 'worst-case' seating layout (most condensed, greatest capacity) is shown in the figure overleaf.

Figure 4.1 – Worst-Case Seating Layout

- 4.08 With reference to Figure 4.1, Seats A, B, C and D (3 person picnic benches) face directly towards No 1. King's Lynn Close. For reference, 3 simultaneous voices is 64 dB at 1 metre (logarithmic addition of 59 + 59 + 59 dB). The cumulative noise level from Seats A, B, C and D (assuming full occupancy, patrons all talking at the same time for a continuous 1-hour duration to give a comparison to the background noise level, windows onto King's Lynn Close wide open; clearly an overly robust extreme worst case modelling scenario) is calculated in the following table.

Table 4.4 – Worse Case Noise Levels at No 1. King's Lynn Close (LAeq, 1 hour)

Seat	Vocal Effort	Distance to Receptor (d)	Distance Attenuation (- 20*log(d))	Resultant
A	64 dB(A) at 1 metre	13 metres	- 22 dB	42 dB
B	64 dB(A) at 1 metre	15 metres	- 24 dB	40 dB
C	64 dB(A) at 1 metre	17 metres	- 25 dB	39 dB
D	64 dB(A) at 1 metre	19 metres	- 26 dB	38 dB
Cumulative 46 dB LAeq (1 hour)				
Note: Background Noise Level 51 dB LA90 (1 hour)				

- 4.09 The overly robust extreme worst case noise levels at No. 1 King's Lynn Close (LAeq, 1 hour) are 5 decibels below the background noise level. This is indicative of negligible impact.

- 4.10 With reference to Figure 4.1, Table E and F (6 persons per table i.e. 2 x 3 person picnic benches either side) are located beneath a window to the first floor accommodation. 6 simultaneous voices is 67 dB at 1 metre. The correction for 90° vertical is – 2 dB (the average of 500, 1,000 and 2,000 hertz), so 65 dB at 1 metre. With reference to the first floor accommodation, there is no direct transmission path due to the mono-pitched closed roof above. The weighted sound reduction index of 10 mm toughened glass is 36 dB Rw. The cumulative noise level from Tables E and F (assuming full occupancy, patrons all talking at the same time for a continuous 1-hour duration to give a comparison to the background noise level; clearly an overly robust worst case modelling scenario) is calculated in the following table.

Table 4.5 – Worse Case Noise Levels at First Floor Accommodation (LAeq, 1 hour)

Table	Vocal Effort	Distance to Receptor (d)	Distance Attenuation (- 20*log(d))	Roof	Resultant
E	65 dB(A) at 1 metre	3 metres	- 10 dB	- 36 dB	19 dB
F	65 dB(A) at 1 metre	3 metres	- 10 dB	- 36 dB	19 dB
Cumulative 22 dB LAeq (1 hour)					
Note: Background Noise Level 54 dB LA90 (1 hour)					

- 4.11 The overly robust extreme worse case noise levels at the first floor accommodation (LAeq, 1 hour) are 32 decibels below the background noise level. This is indicative of no impact.

5.00 GOVERNMENT POLICY, ACOUSTIC STANDARDS AND GUIDANCE

National Planning Policy Framework

- 5.01 The National Planning Policy Framework (NPPF), which was revised in July 2021, states in Paragraph 174 that '*Planning policies and decisions should contribute to and enhance the natural and local environment by: ... e) 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.*'

National Planning Policy Framework: Planning Practice Guidance on Noise

- 5.02 The National Planning Policy Framework Planning Practice Guidance on Noise (NPPF-PPGN) states that the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. These factors include: The source and the absolute level of noise; the content of the noise; and the general character of the noise.
- 5.03 The NPPF-PPGN presents a table of noise exposure hierarchy, which relates the NOAEL, LOAEL and SOAEL to the subjective perception of noise and examples of outcomes (reproduced in the table overleaf).

Table 5.1 – Summary of Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Adverse Effect Level (NOAEL)			
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 volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a 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 a 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 windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

- 5.04 With reference to the predicted noise levels associated with the single storey extension compared to the background noise level, these are considered to be at the No Observed Adverse Effect Level.

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

- 5.05 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 effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.
- 5.06 Typically, the greater this difference, the greater the magnitude of the impact. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context. A difference of around +5 dB 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 low impact, depending on the context.
- 5.07 Adverse impacts may include but not be limited to annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

- 5.08 It is also important to consider the absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low. Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.
- 5.09 With reference to the predicted noise levels associated with the single storey extension compared to the background noise level, these are considered to be a negligible impact.

6.00 CONCLUSION

- 6.01 A noise impact assessment has been undertaken for the erection of a single storey side extension to provide additional seating area at 701 Wilmslow Road, Manchester, M20 6RE
- 6.02 Based on an overly robust extreme worse case modelling scenario, the noise levels associated with the extension are below background noise levels and in accordance with the National Planning Policy Framework Planning Practice Guidance on Noise are considered to be at the No Observed Adverse Effect Level.

We trust the foregoing is to your satisfaction but should you have any queries, please do not hesitate to contact us.

Yours sincerely

Jonathan Rigg
Associate Member of the Institute of Acoustics
For and on behalf of RP Acoustics Ltd

APPENDIX 1 GLOSSARY OF ACOUSTIC TERMS

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 μPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 μPa).

A-weighting Network

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T , has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T . $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T . L_{A90} is typically taken as representative of background noise.

$L_{AF \max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

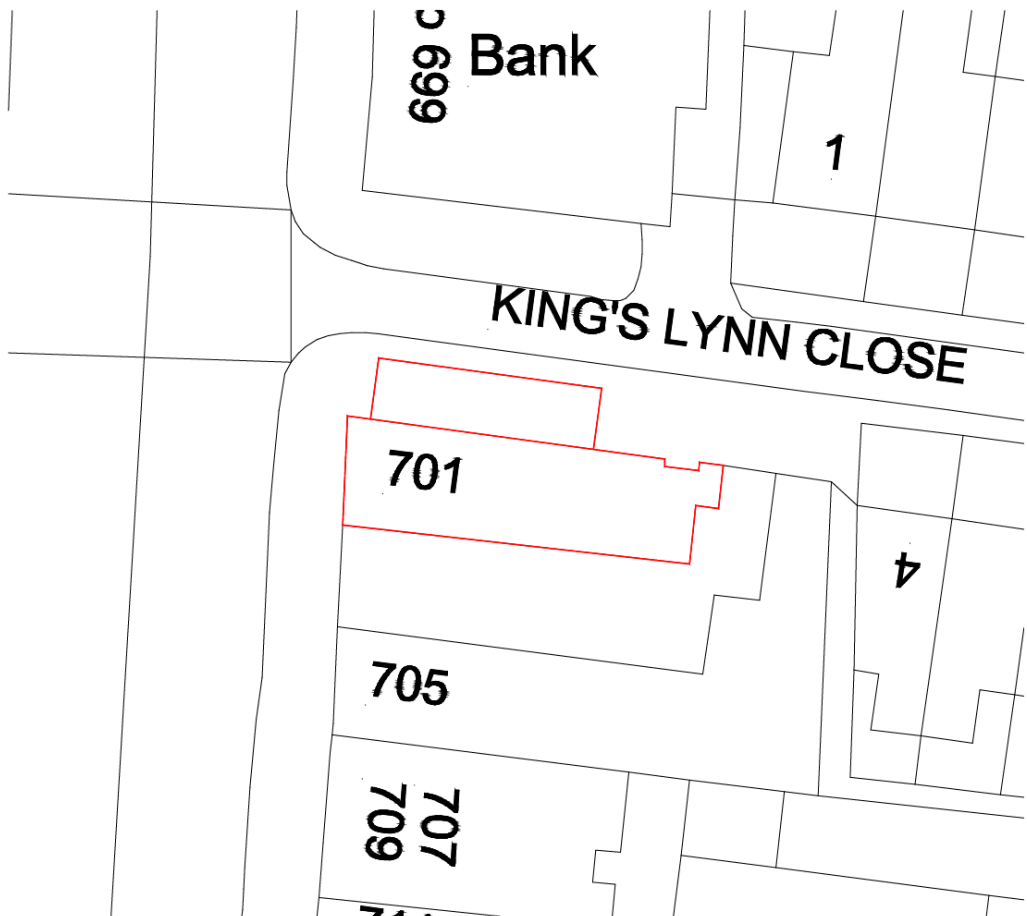
Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparison between different noise events that occur over different lengths of time.

APPENDIX 2
APPLICATION SITE LOCATION PLAN

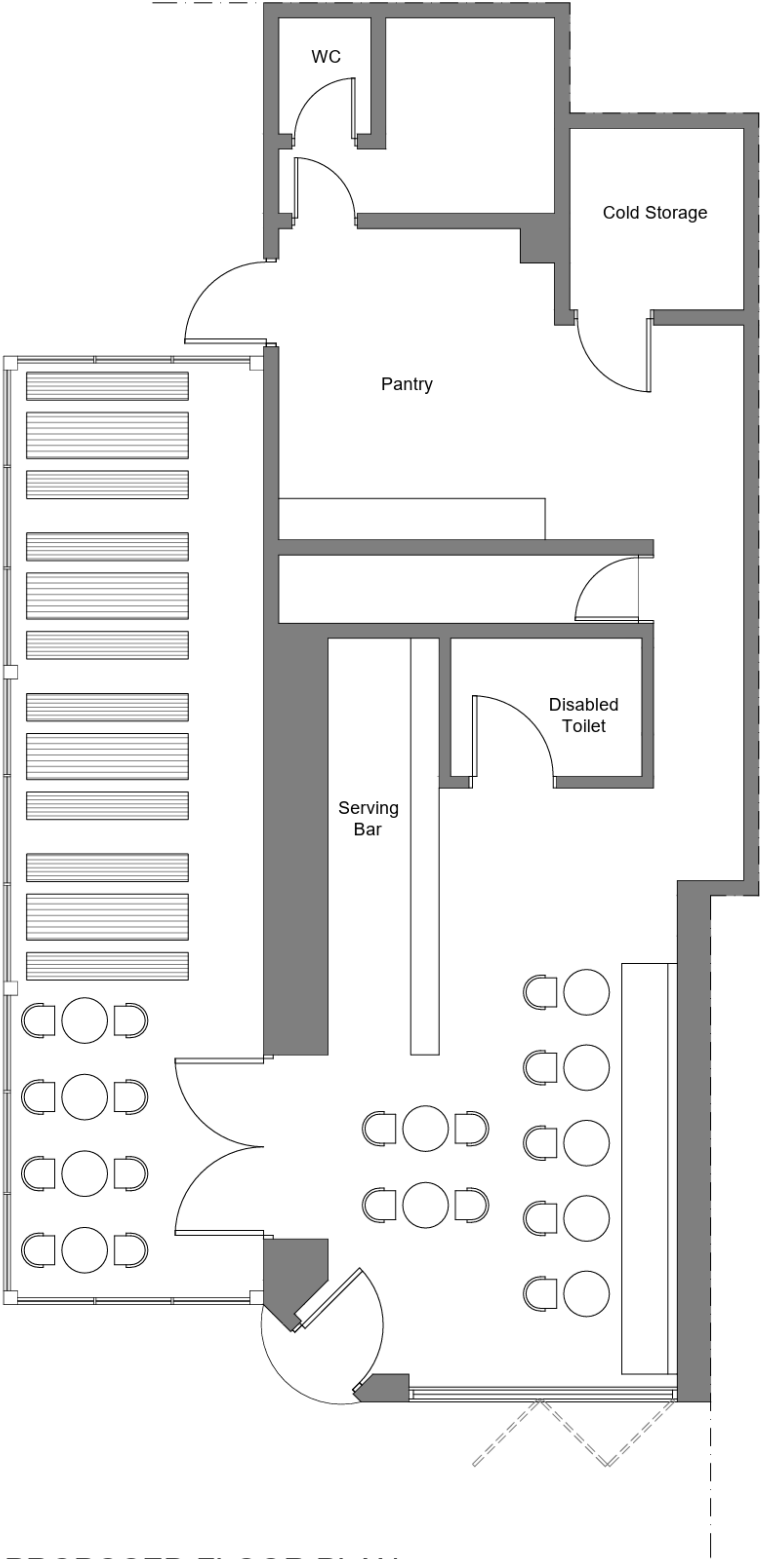


LOCATION PLAN
(SCALE 1:1250)



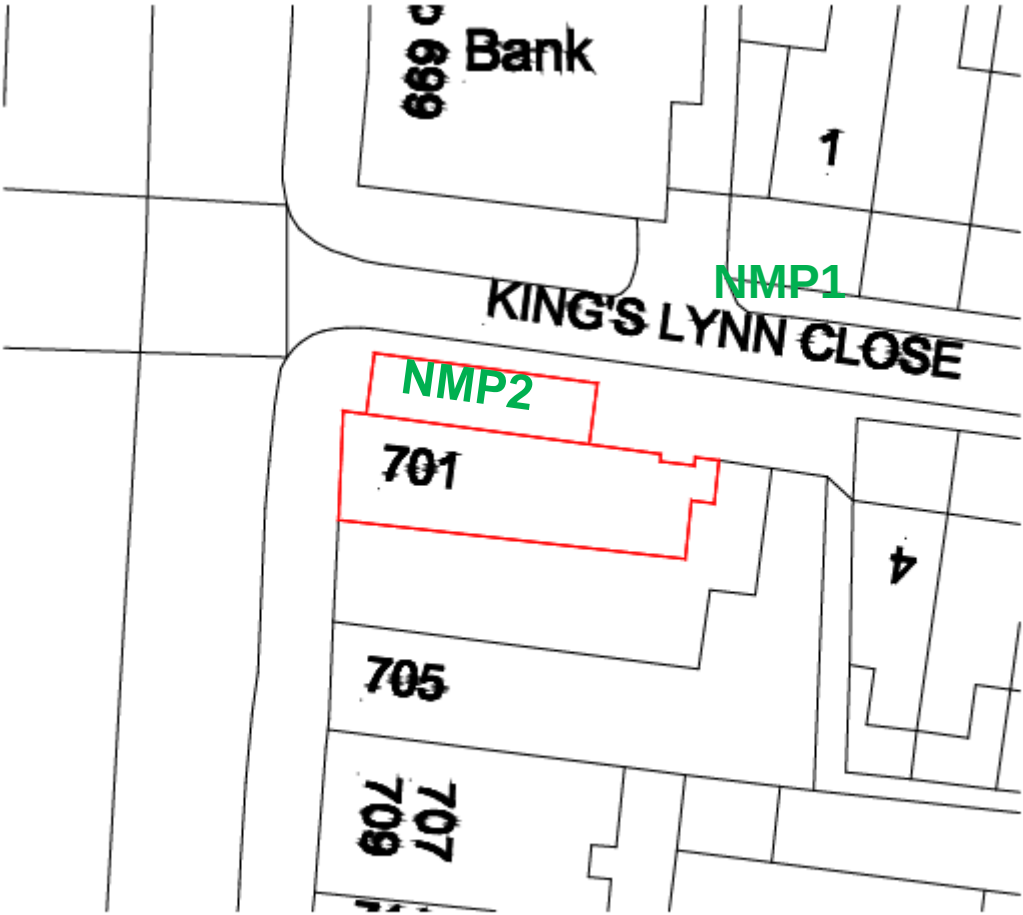
SITE PLAN
(SCALE 1:1250)

**APPENDIX 3
PROPOSED FLOOR PLAN**



**PROPOSED FLOOR PLAN
(SCALE 1:50)**

APPENDIX 4
NOISE MONITORING POSITIONS



SITE PLAN
(SCALE 1:1250)

APPENDIX 5

CALIBRATION CERTIFICATE FOR SOUND LEVEL METER (CALIBRATION EVERY 2 YEARS)

Laboratory Location

Campbell Associates Ltd

5b Chelmsford Road Industrial Estate

GREAT DUNMOW, Essex, GB-CM8 1HD

Phone 01371 871030



Certificate of Calibration and Conformance

Certificate number: **U46717**

Test Object: Sound Level Meter, BS EN IEC 61672-1:2013 Class 1
Associated Frequency Analyser to BS EN IEC 61260:1996 Class 1

Producer: NTi Audio
Type: XL2-TA
Serial number: A2A-17283-E0
Customer: RP Acoustics Ltd
Address: 1 Dobcroft Close,
Sheffield. S11 9LL.

Contact Person: Richard Pennell
Order No: RPA/24/CAL/01

Introduction:

Calibration has been performed as set out in CA Technical Procedures which are based on the procedures for periodic verification of sound level meters as per the Test Object listed above. Results and conformance statement are overleaf and detailed results, where appropriate, are provided in the attached Measurement Report.

Tested:	Producer	Type	Serial No	Certificate No
Microphone	NTi Audio	MC230A	A23655	46716
Calibrator*	Larson Davis	CAL200	17115	U46700
Preamplifier	NTi Audio	MA220	11174	Included

* The calibrator was complete with any required coupler for the microphone specified.

Additional items that have also been submitted for verification:

Wind shield N/A
Attenuator N/A
Extension cable N/A

These items have been taken into account wherever appropriate.

Instruction Manual: NTi-Audio XL2 Operating Manual v3.11.02 August 2016 Firmware Version: V4.71 The test object is a single channel instrument.

Conditions	Pressure kPa	Temperature °C	Humidity %RH
Reference conditions	101.325	23	50
Measurement conditions	97.15 ±0.02	22.30 ±0.4	43.48 ±0.65

Calibration Dates:

Received date: 23/01/2024 Reviewed date: 09/02/2024
Calibration date: 09/02/2024 Issued date: 09/02/2024

Technicians: (Electronic certificate)

Calibrated by: *Palanivel Marappan B.Eng (Hons), M.Sc*

Reviewed by: *Darren Batten*

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Doc ref: Slim-Cert-Master-V3-07

APPENDIX 5

CALIBRATION CERTIFICATE FOR SOUND CALIBRATOR (CALIBRATION EVERY YEAR)

Laboratory Location

Campbell Associates Ltd

5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, GB-CM8 1HD
Phone 01371 871030



Certificate of Calibration and Conformance

Certificate number: **U46700**

Test Object: **Sound Calibrator**

Producer: **Larson Davis**

Type: **CAL200**

Serial number: **17115**

Customer: **RP Acoustics Ltd**

Address: **1 Dobcroft Close,
Sheffield. S11 9LL.**

Contact Person: **Richard Pennell**

Order No:

Measurement Results	Level dB	Frequency Hz	Distortion %
Measurement 1	114.11	1000.36	0.37
Measurement 2	114.11	1000.36	0.37
Measurement 3	114.12	1000.37	0.37
Result (Average):	114.11	1000.36	0.37
Expanded Uncertainty:	0.1	1	0.3
Degree of Freedom:	>100	>100	>100
Coverage Factor:	2	2	2

The stated level is relative to 20 μ Pa. The level is traceable to National Standards.
The stated level is valid at measurement conditions

Conditions	Pressure kPa	Temperature °C	Humidity %RH
Reference conditions	101.325	23	50
Measurement conditions	98.28 $\pm$ 0.01	21.63 $\pm$ 0.35	45.58 $\pm$ 1.8

Calibration Statement

The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by the coverage factor of $k=2$, providing a level of confidence of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level, the coverage factor is increased to maintain this confidence level. The uncertainty has been determined in accordance with UKAS requirements.

Multi Level Multi Frequency

Refer to page 3 for details of additional levels and frequencies calibrated.

Calibration Dates:

Received date: 23/01/2024
Calibration date: 08/02/2024

Reviewed date: 09/02/2024
Issued date: 09/02/2024

Technicians: (Electronic certificate)

Calibrated by: *Kathryn Brown*

Reviewed by: *Darren Batten*

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Doc ref: Calb-V7-Cert-Master-V1.02