



King's House Manchester

Noise Impact Assessment

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21091 Kings House Manchester Planning Report R02

Client: Bruntwood

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REVISION HISTORY

Revision	Date	Revision Details	Author	Checked
R02	23/03/2022	Original Draft Issue	Luke Hine BSc	Ben Tomlin Bsc MIOA

1 INTRODUCTION

- 1.1 dBx Acoustics Ltd has been appointed by Bruntwood to carry out a noise impact assessment for the proposed plant at King's House at King St. West, Manchester, M3 2WY.
- 1.2 The intent of this report is to present the results of a noise survey undertaken at and around the site, to detail the subsequent noise impact assessment in terms of achieving Manchester City Council's standard planning requirements.
- 1.3 A glossary of acoustic terminology has been supplied in Appendix A in order to assist the reader.

2 ACOUSTIC DESIGN CRITERIA

Local Authority Criteria

- 2.1 The relevant Local Authority is Manchester City Council (MCC). MCC states 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 of 5 dB $L_{Ar,Tr}$ below the typical background L_{A90} level at the nearest noise sensitive location.

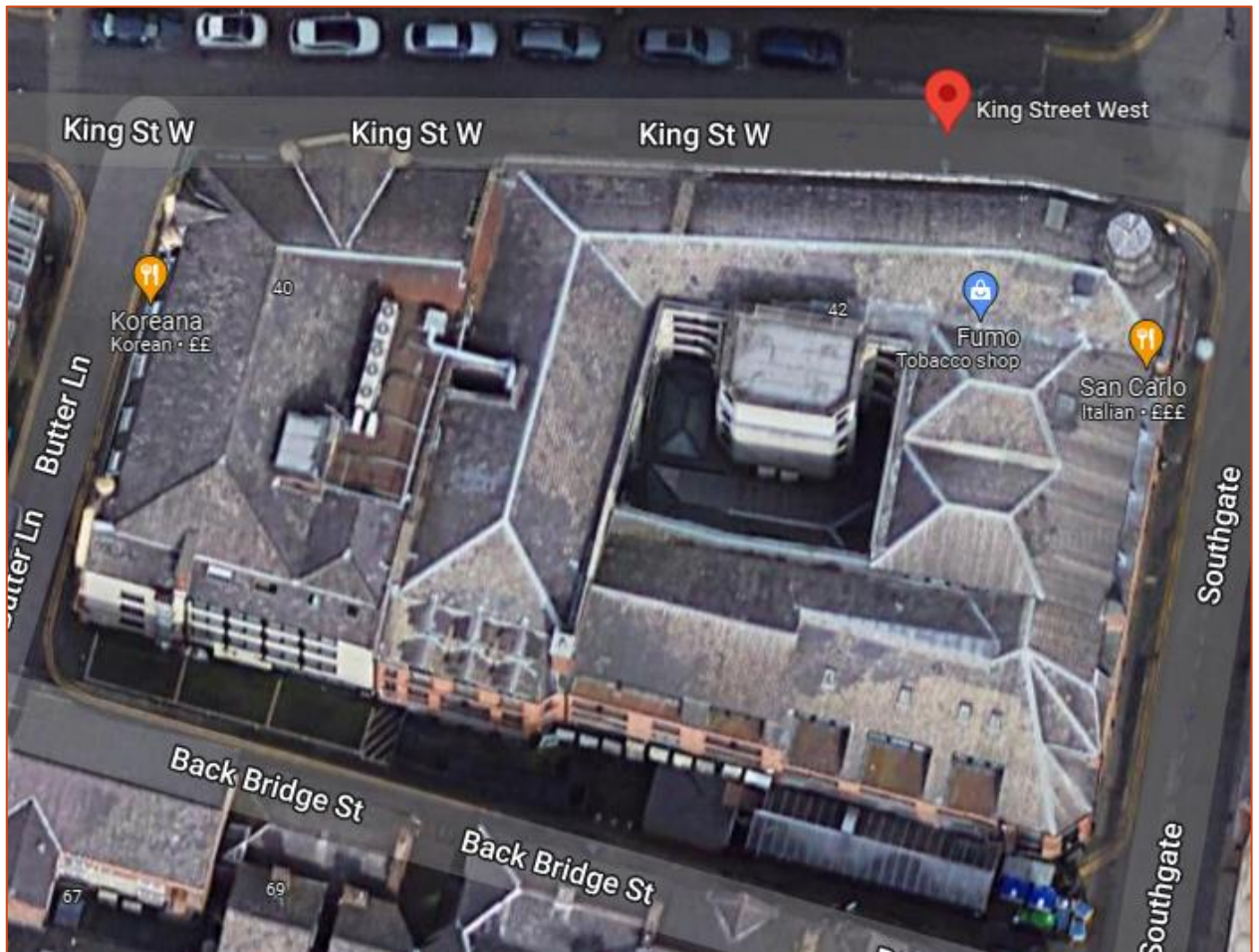
BS 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound'

- 2.2 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.
- 2.3 The Rating Level ($dB L_{Ar,Tr}$) 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.
- 2.4 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.

3 SITE DESCRIPTION

- 3.1 The assessment site is King's House, which can be seen in figure 1 below, the site is located on King St. West, Manchester, M3 2WY.
- 3.2 The noise levels at the site are dominated by the road noise from the road network that surrounds the location, King St W, Southgate, Back Bridge St and Butter Ln and plant noise servicing the building.

Figure 1 – Site Location



Noise Sources

- 3.3 The predominant noise source, as detailed above is the surrounding road network which comprises of King St W, Southgate, Back Bridge St and Butter Ln however there is also plant serving the buildings on Butter Lane and Back Bridge St.

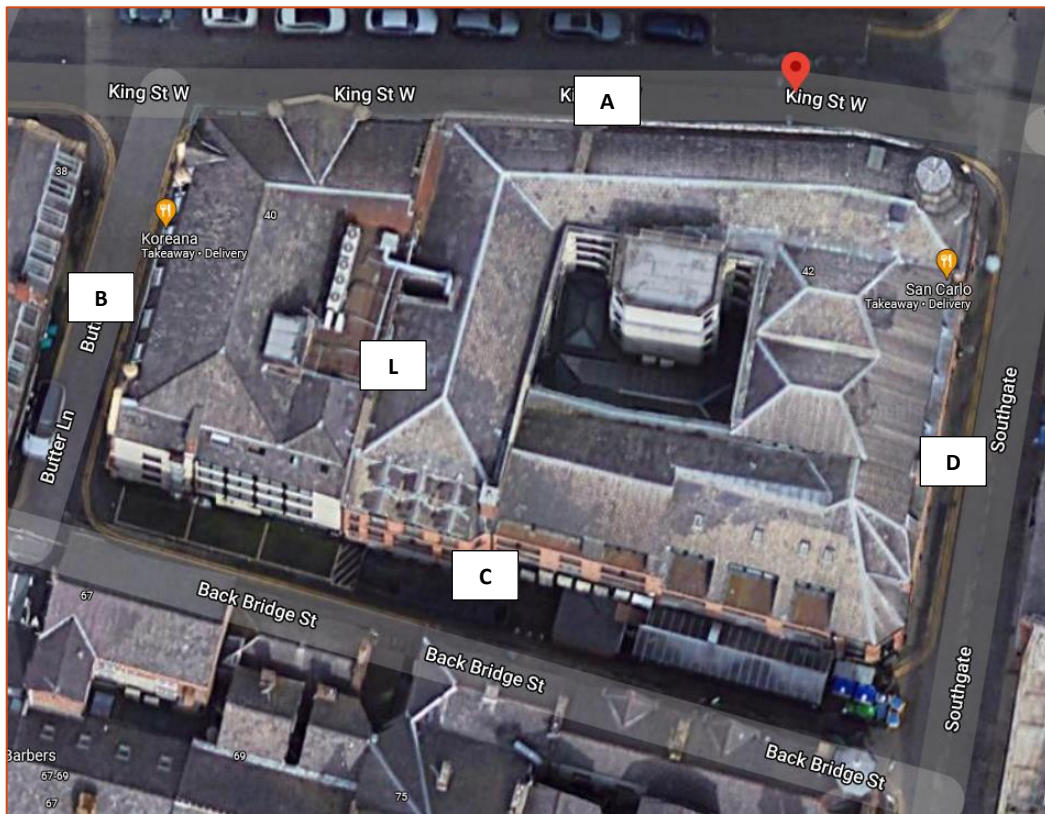
Proposed Development

- 3.4 The proposed development will consist of six floors in total including a basement and lower ground floor.

4 ENVIRONMENTAL NOISE SURVEY

- 4.1 dBx Acoustics has undertaken noise measurements at the site to establish the typical existing ambient, background and maximum sound levels affecting the site and its surroundings.
- 4.2 An attended environmental noise survey was undertaken on Wednesday 3rd November 2021 at four locations around the building, as indicated in the figure below.
- 4.3 In addition, unattended noise levels were measured with a noise logger at Location L, which can also be seen in Figure 2.
- 4.4 All measurements were undertaken in accordance with BS 7445-1:2003 *Description and Measurement of Environmental Noise*.

Figure 2 – Measurement Locations



Equipment Used

4.5 The equipment used in the environmental noise survey is detailed below.

Table 1: Equipment Used

Measurement Type	Equipment	Manufacturer / Model	Serial Number
Attended measurements	Sound Level Meter	Cirrus CR:171C	G300741
	Microphone	Cirrus MK:224	211733D
	Calibrator	Cirrus CR:515	87921
Unattended measurements	Sound Level Meter	Casella C633C	1716934
	Microphone	CEL 251	000847
	Calibrator	CEL 120/1	2045151

4.6 The sound level meters were calibrated before and after the measurements with no significant drift recorded. An accredited laboratory calibrated the equipment not more than two years prior to the measurements being made, except for the calibrators, which had been calibrated not more than one year prior to the survey.

Weather Conditions

4.7 Weather conditions throughout the survey were cool with little/no wind and scattered clouds.

4.8 All microphones were protected with a windshield for the duration of the survey.

5 ENVIRONMENTAL NOISE SURVEY RESULTS

- 5.1 A summary of the noise levels measured during the attended noise survey on Wednesday 3rd November 2021 are shown in Table 2, below.
- 5.2 Noise levels were measured at four locations around the building, as indicated in Figure 2, below.

Table 2: Summary of Attended Noise Measurements

Location	Period	Ambient Noise Level, dBL _{Aeq,15min}	Background Noise Level, dBL _{A90,15min}
A	1400-1410h	60	51
	1500-1510h	55	50
	1600-1615h	61	51
B	1415-1425h	57	52
	1515-1525h	55	51
C	1430-1440h	56	55
	1530-1540h	58	57
D	1445-1455h	58	51
	1545-1555h	56	51

- 5.3 Noise levels at locations A and D were dominated by road traffic, on King St West and local traffic, while noise levels at Locations B and C were dominated by plant serving the buildings on Butter Lane and Back Bridge St.
- 5.4 Unattended measurements were taken at Location L over a weekend period of 12th-14th November 2021, on the roof of Kings House, at approximately 1.5m from the existing building services plant.
- 5.5 A summary of the measured unattended noise levels is displayed in Table 3, below. The full measurements are presented graphically in Appendix B.
- 5.6 The daytime period is 07:00h-23:00h, with night-time assessed from 23:00h-07:00h.

Table 3: Summary of unattended Noise Measurements

Date	Period	Ambient Noise Level, $\text{dBL}_{\text{Aeq,T}}$	Typical Background Noise Level, $\text{dBL}_{\text{A90,T}}$
12/11/2021	Day ¹	55	52
	Night	52	46
13/11/2021	Day	53	52
	Night	52	45
14/11/2021	Day	51	49
	Night	48	45

- 5.7 In terms of the background noise levels, the statistical analysis methodology described in BS 4142:2014 '*Methods for Rating and Assessing Industrial and Commercial Sound*' (BS4142), has been used to determine the typical background noise levels in each daytime and night-time period.
- 5.8 Comparing the background noise levels presented in Tables 5 and 6, the daytime background noise levels measured at Locations A, B and D during the attended noise survey are broadly similar to the background noise levels measured during the unattended noise survey.
- 5.9 The measured background noise levels at Location C are approximately 3-5dB louder than the measured unattended typical background noise levels. On this basis, background noise levels at the nearest affected noise sensitive receptors (flats and offices on Back Bridge Street) would be around 3-5dB higher than those detailed in Table 6.

¹ Only part of measurement period measured, from 1445h – 2300h

6 PLANT NOISE ASSESSMENT

- 6.1 Manchester City Council's standard planning condition is to achieve a level of 5dB below the existing background noise levels.
- 6.2 The nearest noise sensitive locations are the flats and offices on Back Bridge Street, at Location C in Figure 2, above.
- 6.3 A full weekend background noise survey was undertaken on 12-14th November 2021 at location L in Figure 2.
- 6.4 Based on the background noise levels detailed in Table 1, typical daytime background noise levels are around 50dB_{LA90,T}, which is typical for a city centre location. This therefore relates to a rated plant noise limit of 45dB_{LA,r,Tr}.
- 6.5 At night, this drops to around 48dB_{LA90,T} which therefore relates to a limit of 43dB_{LA,r,Tr}.
- 6.6 Given the distance and screening to the nearest noise sensitive locations (offices and what appear to be flats in the buildings on the surrounding streets), this is unlikely to be onerous, but this will be confirmed in detail once details of the plant are known.

7 CONCLUSION

- 7.1 dBx Acoustics Ltd has been appointed by Bruntwood to carry out a noise impact assessment for the proposed plant at King's House at King St. West, Manchester, M3 2WY.
- 7.2 The report presents the results of a noise survey undertaken at and around the site, and sets plant noise limits in terms of achieving Manchester City Council's standard planning requirements.
- 7.3 The requirements are not onerous, and will be assessed once details of the plant are known.
- 7.4 On this basis, noise should 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 $2 \times 10^{-5} \text{ N/m}^2$. The sound pressure level existing when microphone measured pressure is $2 \times 10^{-5} \text{ N/m}^2$ 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.
$L_{Ar,Tr}$	The equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise.
Reverberation Time, T	The time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped. The descriptor T often includes other nomenclature to describe the type of reverberation time measurement or if the reverberation time is an average taken for specific frequencies. For example, a T_{mf} is the mid-frequency reverberation time.
Absorption Coefficient, α	The fraction of reverberant sound energy absorbed by a material. It is expressed as a value between 1.0 which equates to perfect absorption and 0 which equates to zero absorption.
Acoustic Class, A - E	Classification of sound absorbers into Sound Absorption Classes A-E, according to BS EN ISO 11654, including frequencies 200-5000 Hz
NRC	A single-number rating system used to compare the sound-absorbing characteristics of building materials. A measurement of the acoustical absorption performance of a material, calculated by averaging its Sound Absorption Coefficients at 250, 500, 1000 and 2000 Hz
STI	Speech Transmission Index , Metric ranging between 0 and 1 representing the transmission quality of speech with respect to intelligibility by a speech transmission channel
R	Sound Reduction Index , the laboratory measured sound insulation properties of a material or building element in octave or third octave bands.
R_w	Weighted Sound Reduction Index , a single number which represents the sound reduction of a material. It is derived by plotting the sound reduction index against a set of reference curves. The curves are shifted until a best-fit is established and the curve which best fits the sound reduction spectrum is used to represent the single figure value.
D_w	Weighted Level Difference , the weighted level difference between a pair of rooms, stated as a single figure.
D_{nT}	Standardised Level Difference , a frequency-dependent measurement of airborne sound insulation, calculated using the following formula: $D_{nT} = L_1 - L_2 + 10 \log(T/T_0)$ dB Where: L_1 is the energy-averaged sound pressure level due to the pink noise source measured in the source room using a sweep technique.

L_2 is the energy-averaged sound pressure level measured in the receiving room using a sweep technique.

T is the mean receiving room reverberation time (derived from T_{30} measured in seconds).

T_0 is the reference reverberation time (= 0.5s for dwellings).

$D_{nT,w}$	Weighted Standardised Level Difference , a single-figure value of airborne sound insulation performance, derived according to procedures in BS EN ISO 717-1, based on the D_{nT} values at different frequencies (100-3150 Hz third octave bands).
$D_{nF,w}$	Weighted, Normalised Flanking Level Difference , the normalised, weighted difference in sound level between a pair of rooms via a flanking element, such as mullion or ceiling detail. The level difference in octave bands is first normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
D_{ne}	Normalised Element Level Difference , The normalised difference in sound level between a pair of rooms via a small element such as a trickle ventilator. The level difference in octave bands is normalized to a reference amount of absorption.
$D_{n,e,w}$	Weighted, Normalised Element Level Difference , The normalised, weighted difference in sound level between a pair of rooms via a small element such as a trickle ventilator, stated as a single figure. The level difference in octave bands is normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
C_{tr}	Spectrum Adaptation Term , a correction term applied to the sound insulation single-number values (R_w , D_w , and $D_{nT,w}$) in accordance with BS EN ISO 717-1. Applying the C_{tr} penalises a construction's performance if its low frequency performance is poor in relation its performance at higher frequencies.
Impact Sound	The noise generated by an impact on a structure. This is normally used to describe the noise created by people walking or moving furniture on a floor structure.
L_{nT}	Standardised Impact Sound Pressure Level , a frequency dependent measurement of impact sound insulation, calculated using the following formula: $L_{nT} = L_1 + 10\log(T/T_0)$ dB Where: L_1 is the mean sound pressure level due to the tapping machine measured in the receiving room using a sweep technique. T is the mean receiving room reverberation time (derived from T_{30} measured in seconds). T_0 is the reference reverberation time (0.5s for dwellings)
$L'_{nT,w}$	Weighted Standardised Impact Sound Pressure Level , a single-figure value (@ 500 Hz) of impact sound insulation, performance, derived according to BS EN ISO 717-2, based on the L_{nT} values at different frequencies (100Hz- 3150 Hz third octave bands).
Insertion Loss, IL	The reduction of noise level due to the presence of a noise control device such as an attenuator, excluding any regeneration noise created by its presence.
NR	The Noise Rating level . This is a single figure value derived by plotting a noise spectrum against a set of curves. The curve under which the spectrum fits is the resulting NR level.

APPENDIX B – MEASURED UNATTENDED NOISE LEVELS

