



Pall Mall Court

Noise Survey and Noise Impact Assessment

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Date: 25/04/2022

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REVISION HISTORY

Revision	Date	Revision Details	Author	Checked
R01	08/04/2022	Original Issue	Susan Witterick BSc MIOA	Ben Tomlin BSc MIOA
R01A	25/04/2022	Added information on local plan, and qualification of offices as noise sensitive receptors	<i>Susan Witterick</i> Susan Witterick BSc MIOA	

1 INTRODUCTION

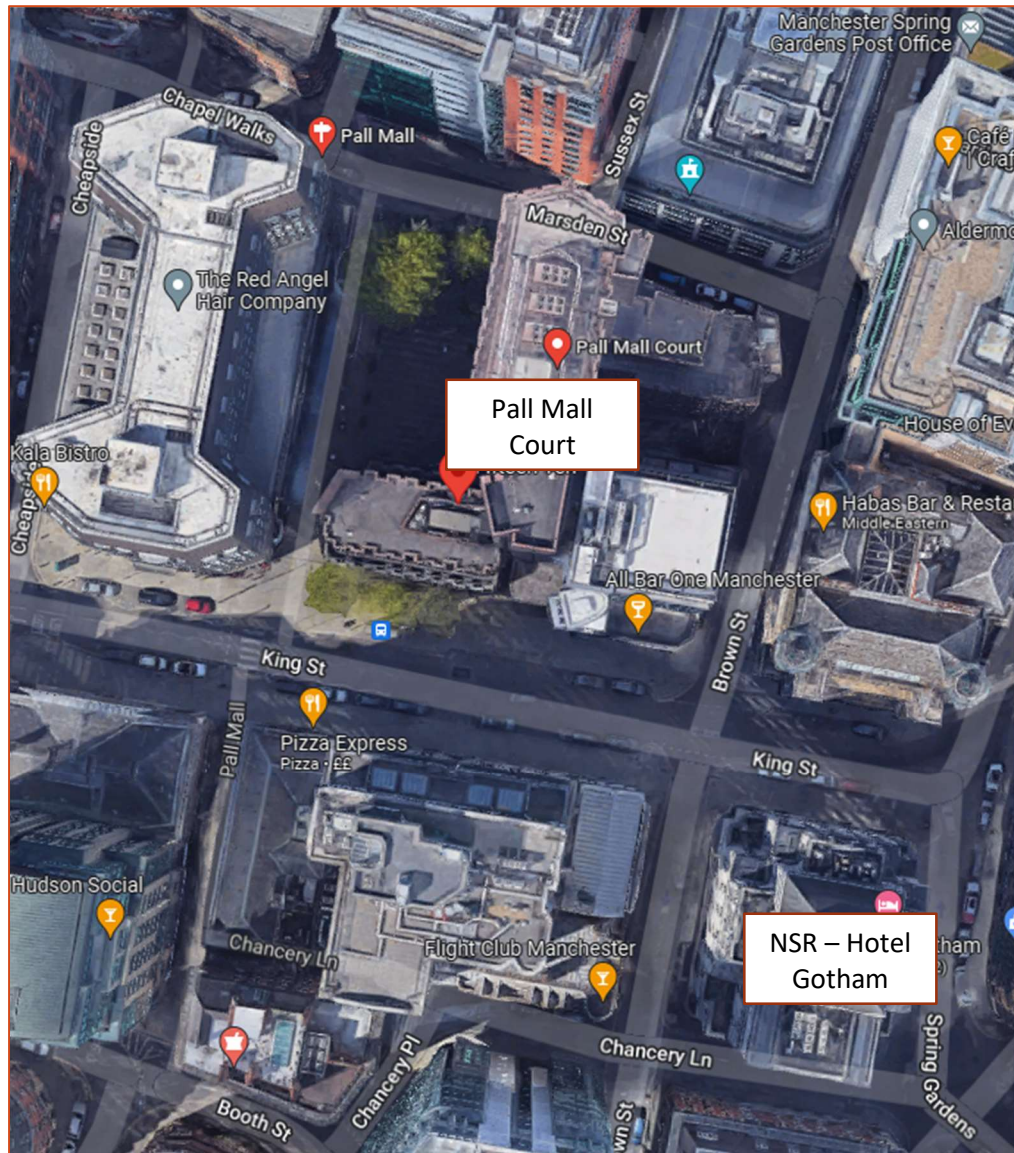
- 1.1 dBx Acoustics has been appointed by Bruntwood to undertake a noise survey and noise assessment for the proposed redevelopment of Pall Mall Court, Manchester, to provide commercial office accommodation.
- 1.2 A glossary of acoustic terminology is presented in Appendix A.

2 SITE DESCRIPTION

Site Description

- 2.1 Pall Mall Court is located in Manchester City Centre. It is bounded by King Street to the south, Brown Street to the East, and Marsden Street to the north.
- 2.2 The building is Grade II listed, with three interconnecting buildings of between 4 and 10 storeys.
- 2.3 Figure 1 illustrates the location of the building, and the nearest noise sensitive receptors (NSRs).

Figure 1: Site Boundary and Nearby Noise Sensitive Properties



Nearby Noise Sensitive Receptors

- 2.4 The site is surrounded by predominantly commercial buildings (offices with ground floor retail) which are presumed only to be noise sensitive receptors during the daytime.
- 2.5 The nearest noise sensitive receptor at night is considered to be Hotel Gotham, approximately 50m to the south-east. There are also thought to be residential properties at the junction of King Street and Cross Street, approximately 100m to the south west.

Proposed Development

- 2.6 The proposed development includes the refurbishment of the existing buildings to create a mixture of office space, plus a fourth-floor bar and roof terrace on the King Street building.

3 BASIS OF NOISE ASSESSMENT

Local Authority

- 3.1 The site falls within the boundary of Manchester City Council (MCC).
- 3.2 The relevant Local Plan policy considerations are Core Strategy DM1 and Saved UDP Policy DC26. Please see the planning statement for further information.

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

- 3.3 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.
- 3.4 With regards to building services plant, MCC's guidance document states:

"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."

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

- 3.5 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.
- 3.6 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.
- 3.7 BS 4142:2014 seeks to determine a "representative" Background Sound Level, stating that

"...the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods".
- 3.8 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.

BS 8233:2014: 'Guidance on sound insulation and noise reduction for buildings'

Internal Ambient Noise Levels within Offices

3.9 With respect to intrusive external noise, BS 8233 identifies the British Council for Offices (BCO) Guide to Specification for general acoustic guidance on offices. BS 8233 highlights that complaints from office workers typically arise from the intrusion of external noise, high internal noise levels from services, low background noise, excessive reflections from room surfaces, and inadequate sound insulation between offices. Advice is provided within the BS 8233 guidance in respect of the internal design of offices, including open-plan offices for speech privacy and the control of noise.

3.10 The relevant criteria for offices are reproduced in Table 1.

Table 1: BS 8233 Acoustic Design Criteria for Offices

Activity	Location	Design Range	
		L _{Aeq, T} (dB)	L _{AFmax} (dB)
Study and work requiring concentration	Executive office	35 – 40	50
Work requiring acoustic privacy	Open plan office	45 – 50	55
Speech or telephone Communications	Corridor, circulation space	45 – 55	50

3.11 Furthermore, BS 8233 advises that: *"In order to achieve unintelligible speech from another office, the minimum sound insulation between two offices needs to be approximately $D_w = 38$ dB. Where privacy is important the minimum sound insulation should be $D_w = 48$ dB."*

3.12 BS 8233 also provides maximum noise levels for reliable speech communication, which are summarised in Table 2.

Table 2: BS 8233 Maximum Steady Noise Levels for Reliable Speech Communication

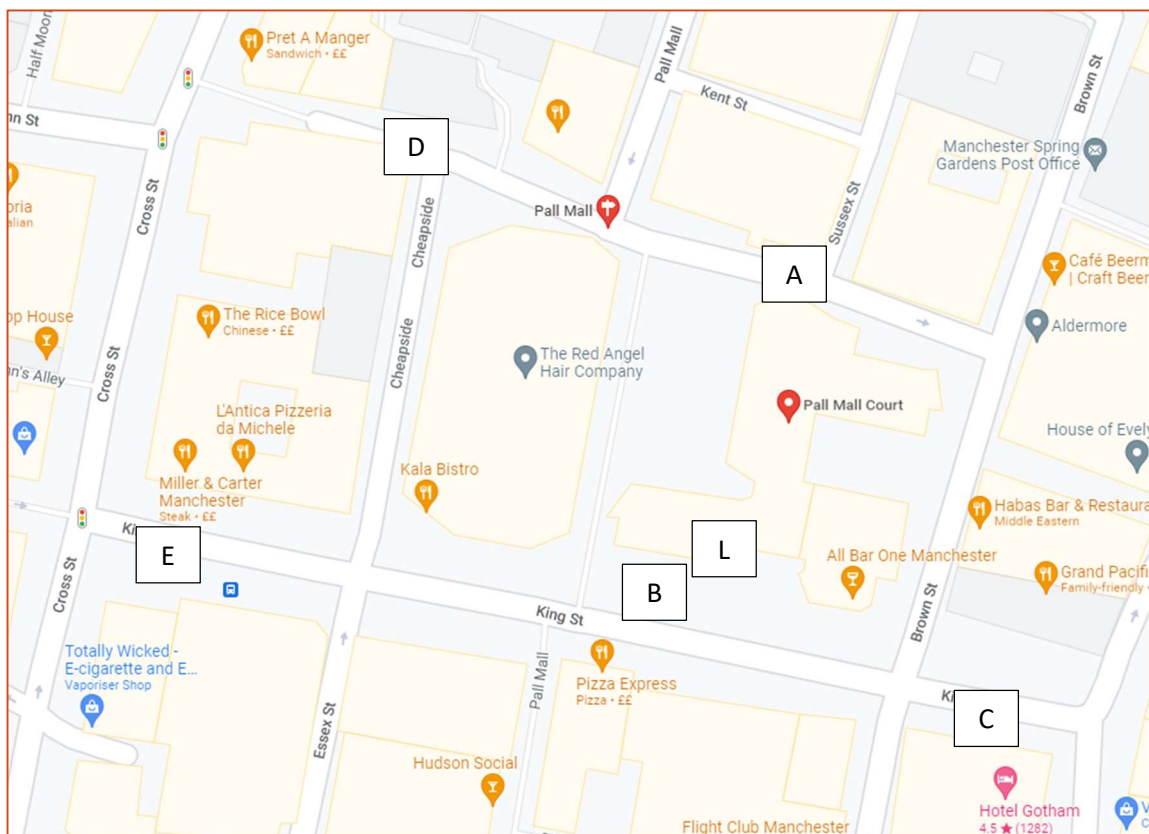
Distance Between Talker and Listener (m)	Noise Level (dB L _{Aeq, T})	
	Normal Voice	Raised Voice
1	57	62
2	51	56
4	45	50
8	39	44

4 NOISE SURVEY

Methodology

- 4.1 dBx Acoustics has undertaken noise measurements at the site to establish the existing ambient, background and maximum noise levels affecting the site and its surroundings.
- 4.2 Unattended measurements were logged at roof level of the King Street block from approximately 17:15h on Thursday 24th March 2022 to 12:45h on Monday 28th March 2022 at location L as indicated on Figure 2.
- 4.3 An attended environmental noise survey was undertaken between 14:15h and 17:15h on Friday 25th March at Locations A, B and C, as indicated on Figure 2.
- 4.4 Attended night time measurements were taken on Monday 28th March between approximately 01:00h and 03:00h at locations C, D and E as indicated on Figure 2.

Figure 2: Noise Monitoring Locations



- 4.5 These noise measurement locations were selected to measure noise levels representative of those affecting the façade of Pall Mall Court during the daytime, and at the nearest NSRs at night.
- 4.6 Attended measurements were undertaken in accordance with BS 7445-1:2003 'Description and Measurement of Environmental Noise', with microphones located at approximately 1.5 m above the local ground level and at approximately 2m from the building façades. These measurements were therefore taken in façade conditions for which a -3dB correction has been made when assessing noise ingress and plant noise impact.
- 4.7 Unattended measurements were taken at approximately 1.5 m above roof level of the King Street block. These measurements were made in the free field.

Equipment

4.8 The equipment used during the environmental noise survey is detailed in Table 3.

Table 3: Equipment Used in the Environmental Noise Survey

Equipment	Attended Measurements (Manufacturer & Part No./ Serial Number)	Unattended Measurements (Manufacturer & Part No./ Serial Number)
Sound Level Meters	Norsonic NOR145 / 14529301	Casella 633c / 1716934
Pre-amplifiers	NOR 1209 / 22565	CEL 495 / 001773
Microphones	NOR 1227 / 402449	CEL 251 / 000847
Calibrators	NOR 1255 / 125525453	CEL 120-1 / 2045151

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

Weather Conditions

4.10 Weather conditions throughout the survey period were suitable for environmental measurements with wind speeds of less than 5 m/s. No precipitation was recorded during the noise survey. Temperatures varied between 5°C and 19°C.

5 ENVIRONMENTAL NOISE SURVEY RESULTS

- 5.1 Ambient noise levels across the site were dominated by distant road traffic, with background noise caused by distant plant. Maximum noise events were due to vehicle movements in the car park.
- 5.2 A summary of the attended daytime noise levels measured is presented in Table 4. All measurements were 15 minutes in duration.

Table 4: Summary of Measured Daytime Attended Noise Levels

Location - Receptor (Figure 2)	Time(hh:mm)	Ambient Noise Level (dB $L_{Aeq,15mins}$)	Maximum Noise Level (dB L_{AFmax})	Background Noise Level (dB $L_{A90, 15mins}$)
A - Marsden Street	14:32	60	78	55
	15:37	60	80	54
	16:41	59	79	54
B – King Street	14:48	65	82	55
	15:54	66	92	55
	16:57	64	80	57
C – King Street (Hotel Gotham)	14:15	65	84	56
	15:20	64	77	56
	16:24	64	80	57

- 5.3 The attended night time noise levels are presented in Table 5. Again, all measurements were 15 minutes in duration.

Table 5: Summary of Measured Night Time Attended Noise Levels

Location - Receptor (Figure 2)	Time(hh:mm)	Ambient Noise Level (dB $L_{Aeq,15mins}$)	Maximum Noise Level (dB L_{AFmax})	Background Noise Level (dB $L_{A90, 15mins}$)
C – King Street (Hotel Gotham)	01:00	58	78	49
	01:51	56	72	49
	02:39	58	75	49
D – Chapel Walks	01:34	56	83	51
	02:23	51	62	50
E – King Street / Cross Street	01:17	58	76	49
	02:07	56	74	49

- 5.4 Table 6 summarises the measured unattended noise levels. The full measurements are shown graphically in Appendix B.

Table 6: Measured Unattended Noise Levels

Date	Period (hhmm – hhmm)	Ambient Noise Level (dB L _{Aeq,15mins})	Typical Background Noise Level (dB L _{A90, 15mins})
Thursday 24/03/2022	Day (07:00 – 23:00)*	58	53
	Night (23:00 – 07:00)	57	50
Friday 25/03/2022	Day (07:00 – 23:00)	59	54
	Night (23:00 – 07:00)	58	51
Saturday 26/03/2022	Day (07:00 – 23:00)	59	53
	Night (23:00 – 07:00)	58	51
Sunday 27/03/2022	Day (07:00 – 23:00)	57	50
	Night (23:00 – 07:00)	55	49
Monday 28/03/2022	Day (07:00 – 23:00)*	59	54

**Only part period measured*

- 5.5 It can be seen that the measured noise levels at each location were consistent, which is a good indication that the measurements represent typical conditions. The primary noise sources were noted to be road traffic, and existing building services plant both at Pall Mall Court and on the surrounding buildings.

6 BUILDING SERVICES NOISE EMISSIONS

External Plant Noise Assessment

- 6.1 As described in Section 3, MCC require that the rated noise level from all new items of building services plant is controlled to a level at least 5 dB lower than the typical background noise level at the nearby NSRs.
- 6.2 MCC considers offices to be noise sensitive receptors and as such these have been considered in setting daytime plant noise emission limits. At night, the limits are set with regard to the surrounding residential receptors.
- 6.3 The proposed external plant items have not been established at this early design stage. The noise emission limits for compliance with MCC criteria are presented in Table 8, below. A -3dB correction has been made to the attended measurements to account for façade reflections.

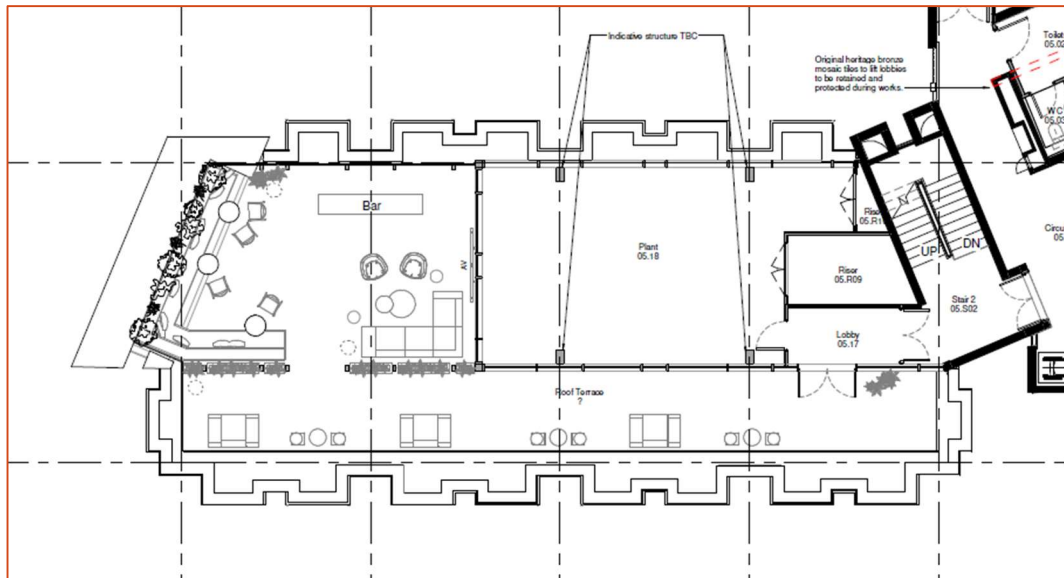
Table 7: Plant Noise Emission Limits

Receptor Location	Plant Noise Emission Limit, $L_{A,T,r}$	
	Daytime (07:00-23:00)	Night Time (23:00-07:00)
A - Marsden Street	46	n/a
B – King Street	47	n/a
C – King Street (Hotel Gotham)	48	41
D – Chapel Walks	n/a	42
E – King Street / Cross Street	n/a	41

7 ROOF TERRACE

- 7.1 A rooftop bar and external seating area is proposed on the King Street block, as indicated in Figure 3, below.
- 7.2 At the time of writing, it is assumed that the bar would be for the use of building tenants only, and would not be open beyond 23:00h. No amplified music is anticipated in this assessment.

Figure 3: Proposed Roof Terrace



- 7.3 This assessment therefore considers a potential worst-case noise impact assessment to the residential properties for a lively social event taking place on the terrace.
- 7.4 Hotel Gotham is presumed to be the noise sensitive receptor most likely to be affected by noise from the Terrace due to its proximity and as it does not benefit as significantly from screening from the rooftop structures. The following calculation therefore considers the potential noise impact from the raised voices of people on the roof at an average distance of 50m.
- 7.5 The prediction has been made based on data measured in an anechoic chamber under test conditions at various speech efforts¹. The study found that in an urban environment, with background noise levels of 61 dB, the speech level was measured as 65 dB at 1 metre. This equates to the sound level of a raised male voice when measured in an anechoic chamber. Where background levels were lower, the study found that speech levels dropped to approximately 55 dB. The higher speech level has been used in this assessment to provide a worst case assessment.
- 7.6 A worst case of 40 people on the roof has been used in the calculation. Although there may be 40 people in the external area, the nature of conversation means that there would only ever be, at most, half of the occupants talking at any one time; for this reason 20 noise sources are used in the calculation.
- 7.7 The screening effect of the parapet and rooftop structures has not been considered within the calculation, in order to provide a worst-case assessment of noise impact.

¹ Speech Levels in Various Noise Environments - Pearsons, Bennett, & Fidell (1977)

Table 8: Noise Impact from Roof Terrace

Stage of Calculation	Equivalent Continuous Noise Level $L_{Aeq, 1h}$
Male voice (raised) at 1 m	65 dB
40 sources at 1 m	78 dB
Corrected for a distance of 50 m	44 dB
Predicted level at Hotel Gotham	44 dB

- 7.8 The lowest daytime background sound level measured during the noise survey was $50\text{dB}_{LA90,15\text{min}}$ on Sunday 27th March. This is based on measurements made at roof level of Pall Mall Court, which can be considered representative of the upper floors of Hotel Gotham.
- 7.9 The predicted sound level arising from 20 simultaneous raised male voices on the terrace is 6dB below this and it is therefore considered that there will be no adverse noise impact on the noise sensitive properties as a result of use of the terrace, even for heavily attended social events.

8 SUMMARY AND CONCLUSION

- 8.1 dBx Acoustics Ltd has been appointed by Bruntwood to undertake a noise survey and noise assessment for the redevelopment of Pall Mall Court, Manchester.
- 8.2 A noise survey was undertaken around the site to determine existing noise levels affecting the site and nearby noise sensitive receptors.
- 8.3 Based on the measured noise levels, noise emission limits have been set for external building services plant for compliance with MCC's anticipated planning criteria.
- 8.4 An assessment of noise emissions from the proposed rooftop terrace affecting Hotel Gotham has been undertaken which indicates that there will be no adverse noise impact.
- 8.5 Taking the above into account, 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 2×10^{-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.
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.
$L_{Aeq,T}$	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.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T. $L_{A90,T}$ represents the background sound level.
L_{AFmax}	The instantaneous maximum A-weighted sound pressure level, measured with a fast time weighting.
$L_{Ar,Tr}$	The rating level: the equivalent continuous A-weighted sound pressure level, plus any adjustment for the characteristic features of the sound.

APPENDIX B: UNATTENDED MEASURED NOISE LEVELS

