

Acoustic Consultancy Report

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Background Noise Survey

Report Prepared For

Butler And Young Associates
Alexandra Road, Camden
20 February 2019

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i) Executive Summary

New mechanical plant is to be installed at Alexandra Road, in Camden.

LCP has been commissioned by Butler and Young Associates to carry out an acoustic environment survey.

The design criterion is as follows:

Day:	41 dB $L_{Aeq, T}$ at 27m, MP1;
Evening:	40 dB $L_{Aeq, T}$ at 27m, MP1;
Night:	38 dB $L_{Aeq, T}$ at 27m, MP1;
Day:	43 dB $L_{Aeq, T}$ at 10m, MP2;
Evening:	43 dB $L_{Aeq, T}$ at 10m, MP2;
Night:	42 dB $L_{Aeq, T}$ at 10m, MP2.

Any new mechanical plant will be installed to meet the above design criteria.

ii) Document History

Issue	Date	Issue Details	Issued By	Checked By
1	20 th February 2019	Initial Issue	JT	MB

1 Introduction

New mechanical plant is to be installed at Alexandra Road, in Camden.

LCP has been commissioned by Butler and Young Associates to carry out an acoustic environment survey.

The guidance in this report is on the basis that the mechanical plant will be consistently operating over a 24 hour period.

2 Survey

2.1 Site Description

The site layout together with the measurement position is shown in the drawing contained within Appendix A.

2.2 Receiver Location

The site was surveyed to determine the location of the most affected receiver.

The nearest residential receiver with direct line of sight to the plant area (MP1) is approximately 27m to the north of the site. In addition, there is a residential receiver with no line of sight to the plant area (MP2), approximately 10m to the west of the site. This is shown in the site plan in Appendix A.

2.3 Local Noise Climate

The predominant local noise sources were the existing plant room on site, and, to a lesser extent, passing pedestrians, frequent rail traffic from the rail line which adjoins South Hampstead and Kilburn High Road, occasional aircraft noise and noise from a neighbouring children's play park.

2.4 Measurements

The noise monitoring took place between 25th and 28th January 2019. The measurement period was considered sufficient to establish the representative background sound levels corresponding to the operational period of the plant. The weather conditions monitored during the survey are shown in the following table.

Table 1: Weather Conditions at Measurement Location

Weather	25/01/2019	26/01/2019	27/01/2019	28/01/2019
Average Wind Speed	3m/s	4m/s	4m/s	4m/s
Wind Direction	S/ SW	NE	E	SE
Cloud Cover	80%	80%	70%	50%
Max. Temperature	12°C	11°C	8°C	5°C
Min. Temperature	7°C	7°C	3°C	-3°C
Precipitation	n/a	17:00 – 18:00 Light Rain	07:00 – 8:00 Light Rain. 13:00 – 15:00 Drizzle.	n/a

2.5 Measurement Results

The measured statistical broad-band sound pressure levels are shown within Appendix B. The representative background sound level(s) obtained being as follows:

Table 2: Representative background sound levels, dB re 2x10⁻⁵ Pa

Measurement Position	L _{A90} , 15 mins Day*	L _{A90} , 15 mins Evening*	L _{A90} , 15 mins Night*
MP1	46	45	43
MP2	48	48	47

* Day, Evening and Night periods are defined as between 07:00 - 19:00, 19:00 - 23:00 and 23:00 – 07:00 respectively.

3 Evaluation of Design Criteria

3.1 Residential Design Criterion

3.1.1 BS4142:2014

BS4142:2014 states that 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.

Table 3: BS4142 assessment based upon rating level

Difference between background noise and rating levels	Assessment
+ 10 dB	Indication of a significant adverse impact
+ 5 dB	Indication of an adverse impact
0 dB	Indication of low impact

Certain acoustic features can increase the significance of impact. The specific sound level should be corrected if a tone, impulse or other acoustic feature is expected to be present.

Table 4: Corrections for acoustic features, subjective method

Acoustic Feature	Correction, dB		
	Just Perceptible	Clearly Perceptible	Highly Perceptible
Tonality	2	4	6
Impulsivity	3	6	9
Other Characteristics	3		
Intermittency	3		

Typically the acoustic feature correction would not be expected to exceed 10dB.

Where the level of uncertainty could affect the conclusion, take reasonably practicable steps to reduce the level of uncertainty.

3.1.2 World Health Organisation (WHO) Guidelines for Community Noise (1999)

The WHO's 'Guidelines for Community Noise' gives the following relevant noise criteria:

Table 5: Guideline values for community noise, from Guidelines for Community Noise (WHO, 1999)

Specific Environment	$L_{Aeq, T}$ dB	Time Base (hours)	$L_{Amax, fast}$ dB
Outdoor living area (serious annoyance, daytime and evening)	55	16	-
Outdoor living area (moderate annoyance, daytime and evening)	50	16	-
Dwelling, indoors	35	16	-
Inside bedrooms	30	8	45
Outside bedrooms	45	8	60
Outdoors in parkland and conservation areas*	-	-	-

* Existing quiet outdoor areas should be preserved and the ratio of intruding noise to natural background sound should be kept low

The WHO's 'Guidelines for Community Noise' also gives the following general guidance on the expected sound insulation performance of a façade with a partly open window, it states that:

“At night, sound pressure levels at the outside facades of the living spaces should not exceed 45 dB L_{Aeq} and 60 dB L_{Amax} , so that people may sleep with bedroom windows open. These values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15 dB.”

3.1.3 BS8233:2014

The criteria offered in BS8233 for residential buildings are largely based on the recommendations made in the Guidelines for Community Noise.

Using the general guidance from above, on the expected sound insulation performance of a façade with a partly open window, the criteria shown in the table below have been adapted from the criteria offered in table 4 of BS8233 in order to obtain acceptable external noise levels.

The noise levels shown should be treated as overall noise levels, i.e., the combination of all existing noise levels at the site, and noise levels from any proposed plant or activity.

Table 6: External ambient noise levels for dwellings, based on BS8233, dB re 2×10^{-5} Pa

Activity	Location	Time period	
		07:00 to 23:00	23:00 to 07:00
Resting	Living Room	50 $L_{Aeq, 16 \text{ hour}}$	-
Dining	Dining Room/area	55 $L_{Aeq, 16 \text{ hour}}$	-
Sleeping (daytime resting)	Bedroom	50 $L_{Aeq, 16 \text{ hour}}$	45 $L_{Aeq, 8 \text{ hour}}$

In addition to the above criteria, BS8233 goes on to say:

“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 $L_{Aeq, T}$, with an upper guideline value of 55 dB $L_{Aeq, T}$ which would be acceptable in noisier environments.”

The above criteria are in line with the recommendations made in WHO's 'Guidelines for Community Noise'.

3.1.4 Local Authority Requirements

Camden Local Authority Conditions state that:

Table E: Noise levels from plant and machinery at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dB LAeq

3.1.5 Recommended Residential Design Rating Level

On the basis of the above the recommended residential design rating level should therefore be:

Residential Design Rating Level

Representative LA90, 15 mins - 5 dB

3.2 Design Rating Levels

The design levels to be adopted for this project are set out in the table below.

Table 7: Design rating levels, dB re 2x10⁻⁵ Pa

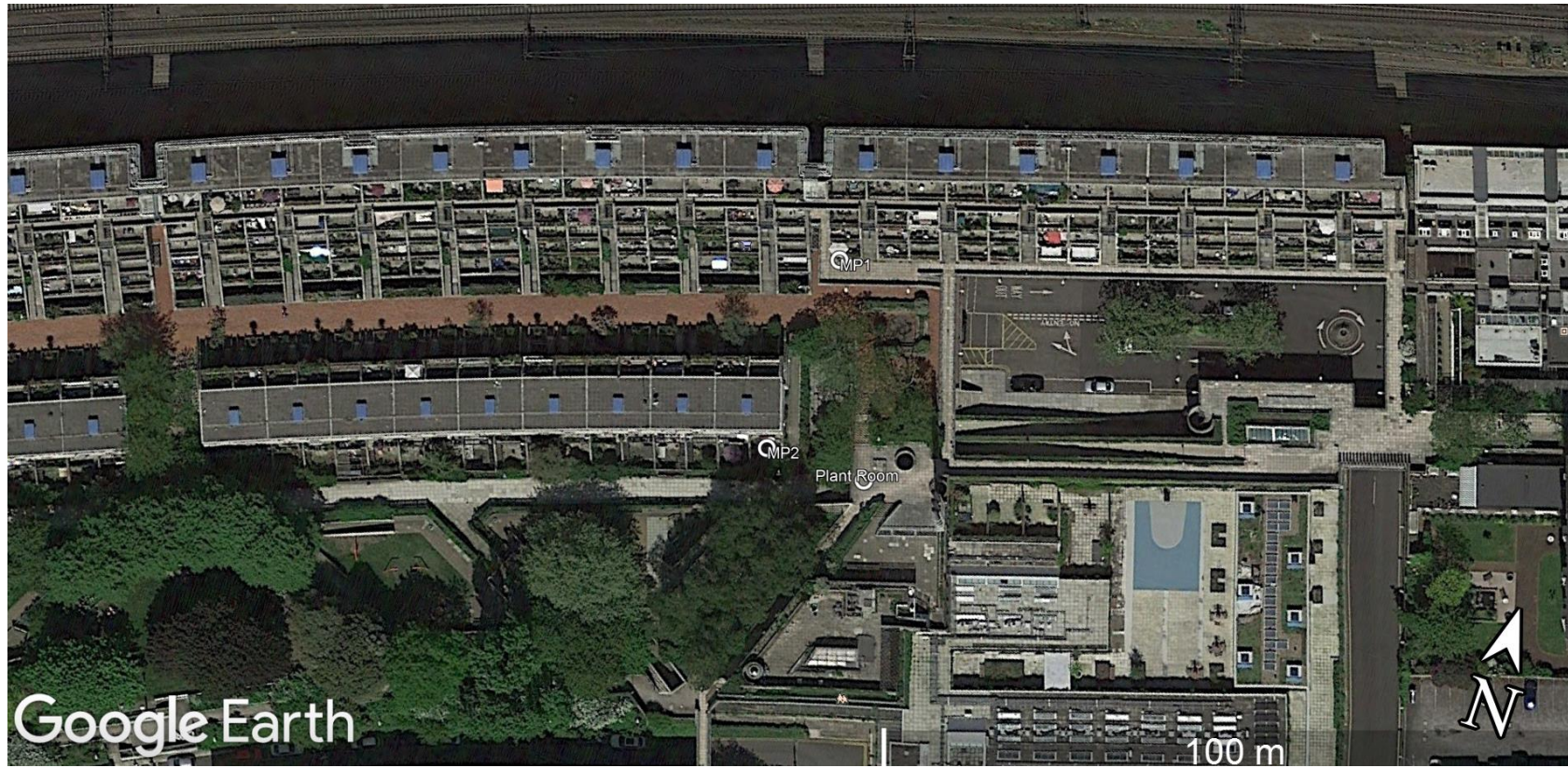
Receiver Premises	Approximate Distance (m)	Design Level (Day) LAeq, 12 hr	Design Level (Evening) LAeq, 4 hr	Design Level (Night) LAeq, 8 hr
Nearest residential with direct line of sight.	27	41	40	38
Nearest residential with no direct line of sight.	10	43	43	42

4 Conclusion

An environmental noise survey has been undertaken in order to establish the representative background sound levels local to the site generally in accordance with the method contained within BS4142: 2014.

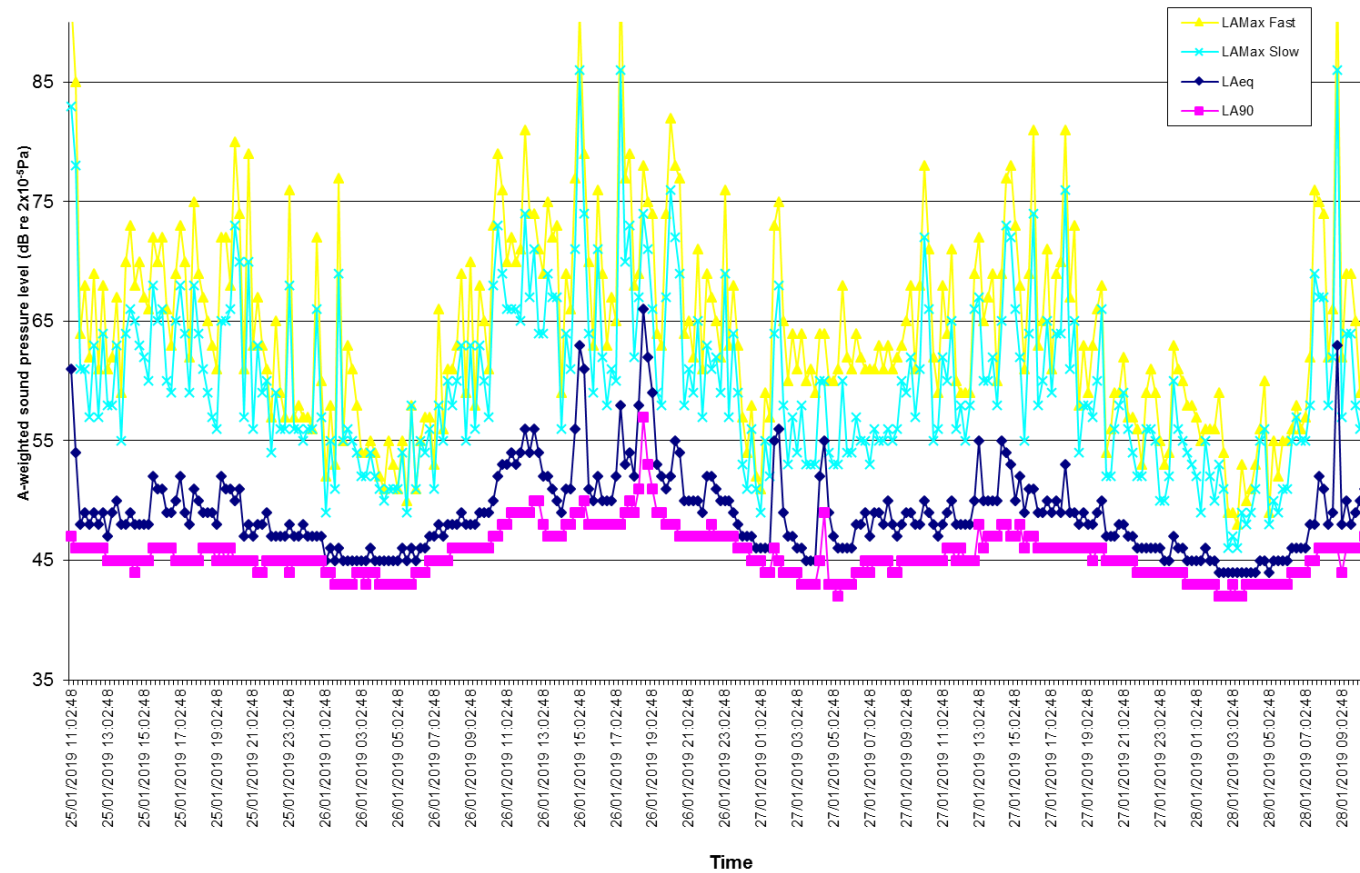
Any new mechanical plant will be installed to meet the above design criteria.

Appendix A: Site Plan



Appendix B: Measurement Data

MP1

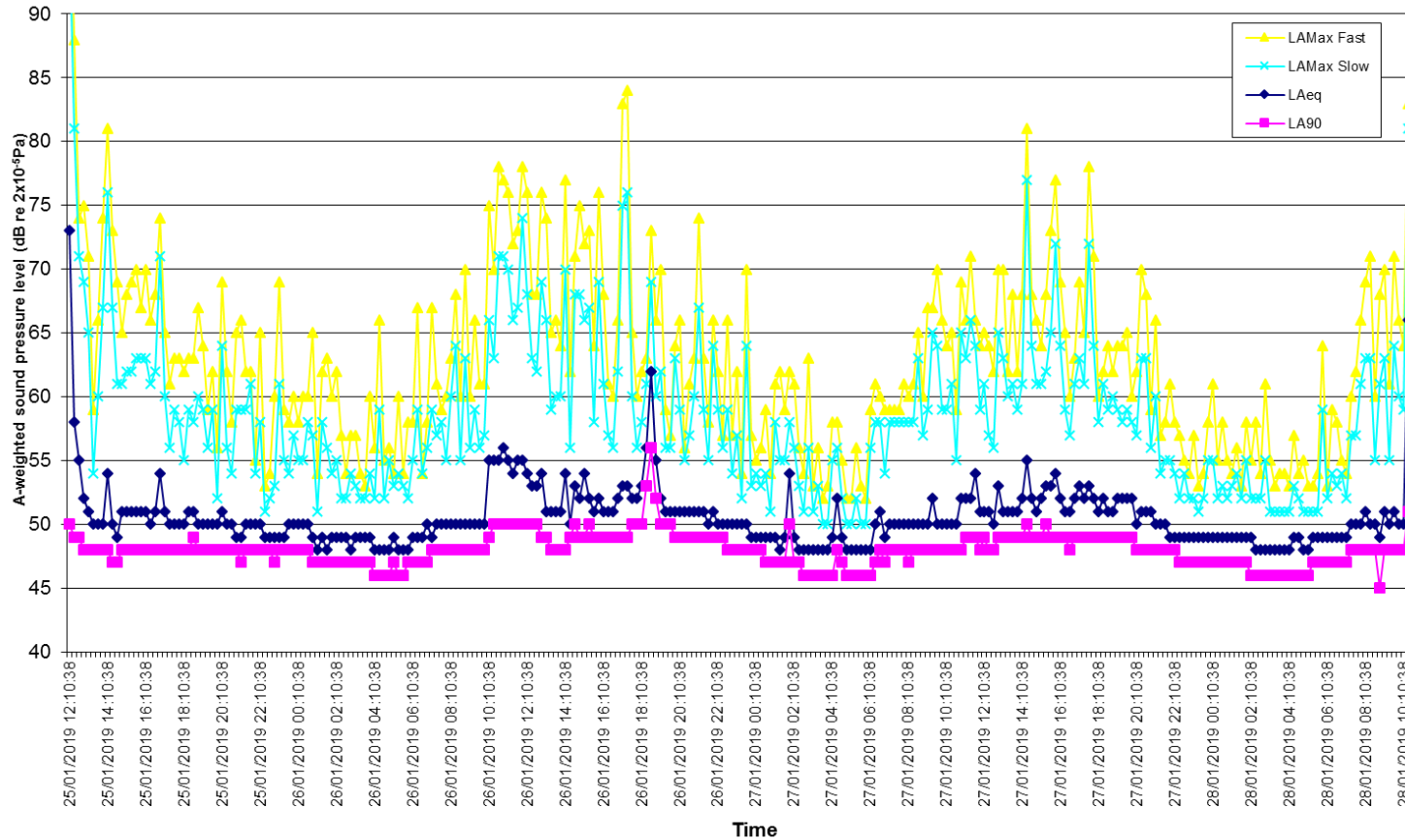


Sound pressure level measurements were obtained using the following instrumentation complying with the Class 1 specification of BS EN 61672:2003

- Svantek 959 Sound Level Meter S/N: 11205
- Svantek pre-amplifier SV12L S/N: 13245 with GRAS microphone capsule 40AE S/N: 75181

Calibration checks were made prior to and after completion of measurements using a Svantek SV30A calibrator, S/N:10893 complying with Class 1 specification of BS EN 60942:2003, calibration level 114 dB @ 1.0 kHz. All acoustic instrumentation carried current manufacturer's certificates of conformance.

MP2



Sound pressure level measurements were obtained using the following instrumentation complying with the Class 1 specification of BS EN 61672:2003

- Svantek 959 Sound Level Meter S/N: 11207
- Svantek pre-amplifier SV12L S/N: 49860 with GRAS microphone capsule 40AE S/N: 215511

Calibration checks were made prior to and after completion of measurements using a Svantek SV30A calibrator, S/N:10893 complying with Class 1 specification of BS EN 60942:2003, calibration level 114 dB @ 1.0 kHz. All acoustic instrumentation carried current manufacturer's certificates of conformance

Appendix C: Glossary

The list below details the major acoustical terms and descriptors, with brief definitions:

'A' Weighting

Weighting applied to the level in each stated octave band by a specified amount, in order to better represent the response of the human ear. The letter 'A' will follow a descriptor, indicating the value has been 'A' weighted. An 'A' weighted noise level may also be written as dB(A).

Airborne Noise

Noise transmitted through air.

Ambient Noise

The total noise level including all 'normally experienced' noise sources.

dB or Decibel

Literally meaning 'a tenth of a bel', the bel being a unit devised by the Bell Laboratory and named after Alexander Graham Bell. A logarithmically based descriptor to compare a level to a reference level. Decibel arithmetic is not linear, due to the logarithmic base. For example:

30 dB + 30 dB \neq 60 dB

30 dB + 30 dB = 33 dB

$D_{nT} + C_{tr}$

The weighted, normalised difference in airborne noise levels measured in a source room (L1) and a receive room (L2) due to a separating partition.

D	Is simply $L1 - L2$.
D_{nT}	Is the normalisation of the measured level difference to the expected (in comparison to the measured) reverberation time in the receiving room.
D_{nTw}	Is the weighted and normalised level difference. This value is the result of applying a known octave band weighting curve to the measured result.
C_{tr}	Is a correction factor applied to the D_{nTw} to account for the known effects of particular types of noise, such as loud stereo music or traffic noise.

Frequency (Hz)

Measured in Hertz (after Heinrich Hertz), and represents the number of cycles per second of a sound or tone.

Insertion Loss, dB

The amount of sound reduction offered by an attenuator or louvre once placed in the path of a noise level.

$L_{A90, T}$

The 'A' weighted noise level exceeded for 90% of the time period T, described or measured. The '90' can be substituted for any value between 1 and 99 to indicate the noise level exceeded for the corresponding percentage of time described or measured.

$L_{Aeq, T}$

The 'A' weighted 'equivalent' noise level, or the average noise level over the time period T, described or measured.

L_{Amax}

The 'A' weighted maximum measured noise level. Can be measured with a 'slow' (1 sec) or 'fast' (0.125 sec) time weighting.

L_{Amin}

The 'A' weighted minimum measured noise level.

NR

Noise Rating (NR) level. A frequency dependent system of noise level curves developed by the International Organisation for Standardisation (ISO). NR is used to categorise and determine the acceptable indoor environment in terms of hearing preservation, speech communication and annoyance in any given application as a single figure level. The US predominantly uses the Noise Criterion (NC) system.

Octave

The interval between a frequency in Hz (f) and either half or double that frequency (0.5f or 2f).

Pa

Pascals, the SI unit to describe pressure, after physicist Blaise Pascal.

Reverberation Time, T_{mf} , RT60, RT30 or RT20

The time taken in seconds for a sound to diminish within a room by 1,000 times its original level, corresponding to a drop in sound pressure of 60 dB. When taking field measurements and where background noise levels are high, the units RT20 or RT30 are used (measuring drops of 20 or 30 dB respectively). Sometimes given as a mid-frequency reverberation time, T_{mf} which is the average of reverberation time values at 500Hz, 1kHz and 2kHz.

R_w

The sound reduction value(s) of a constructional element such as a door, as measured in a laboratory, with a known octave band weighting curve applied to the result.

Sound Power Level

A noise level obtained by calculation from measurement data, given at the face of an item of plant or machinery. Referenced to 10^{-12} W or 1pW.

Sound Pressure Level

A noise level measured or given at a distance from a source or a number of sources. Referenced to 2×10^{-5} Pa.

Subjective Effect of Changes in Sound Pressure Level

The table below details the subjective effects of variations in sound pressures (adapted from Bies and Hansen).

Difference between background noise and rating levels	Increase in ambient noise level in 'real terms'	Change in apparent loudness
+ 10 dB	+ 10 dB	Twice as loud
+ 5 dB	+ 6 dB	Clearly noticeable
0 dB	+ 3 dB	Just perceptible
-10 dB	0 dB	No change

W

Watts, the SI unit to describe power, after engineer James Watt.