JPM ACOUSTICS

36 Brook Street, Wrexham

NOISE IMPACT ASSESSMENT

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1.0. INTRODUCTION

1.1. OVERVIEW

1.1.1. JPM Acoustics Ltd has been appointed to undertake a Noise Impact Assessment to support a planning application for a mixed-use development at 36 Brook Street in Wrexham.

1.1.2. This report considers the potential for the existing noise environment on the site to impact the proposed noise sensitive receptors (residential dwellings) which form part of the development proposals. The assessment has been undertaken with due regard to relevant planning policies, British Standards, and technical guidance documents relating to noise.

1.1.3. This report is necessarily technical in nature. Therefore, to assist the reader, a glossary of acoustic terminology is provided in **Appendix A**.

1.2. Site Location and Proposed Development

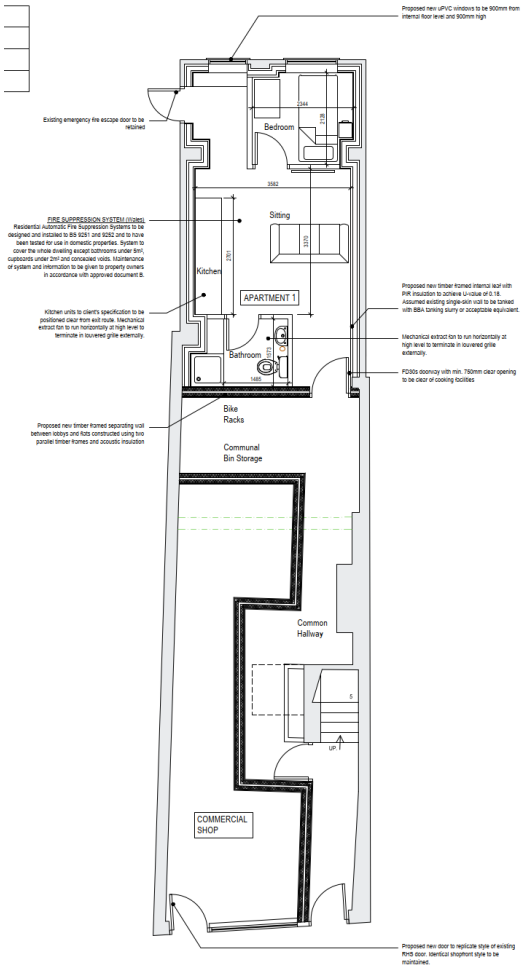
1.2.1. The site currently comprises a retail unit at ground floor level with flats above. The proposed development comprises the retention of part of the ground floor retail unit, and conversion of part ground floor, first and second floors into 4 residential apartments.

1.2.2. The site is bounded by Brook Street to the south, an existing commercial/residential building to the west and an MOT garage to the east, which shares an adjoining wall. To the north is a large retaining wall beyond which is a small car park associated with an Iceland Supermarket. **Figure 1.1** shows the site location. **Figure 1.2** shows the proposed internal layouts.

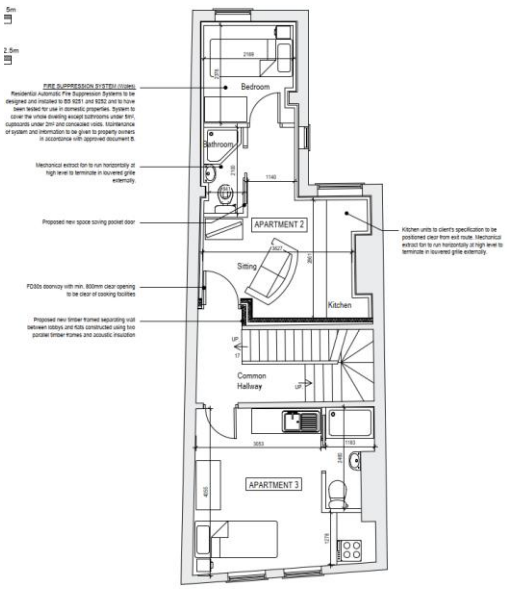
Figure 1.1: Site location plan



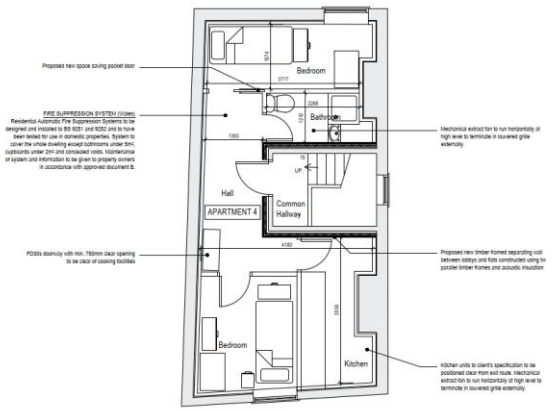
Figure 1.2: Proposed internal layouts



Proposed Ground Floor Plan
Scale - 1:50



Proposed First Floor Plan
Scale - 1:50



Proposed Second Floor Plan
Scale - 1:50

2.0. STANDARDS AND GUIDANCE

2.1. BS 8233:2014: GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS (BS 8233)

2.1.1. BS 8233 provides guidance for the control of noise in and around buildings and recommends internal and external noise level criteria for residential dwellings. The British Standard states that it is desirable that internal ambient noise levels do not exceed the guideline values in **Table 2.1**.

Table 2.1: Internal desirable guideline values from BS 8233

Activity	Location	Period	
		07:00 to 23:00 (Daytime)	23:00 to 07:00 (Night-Time)
Resting	Living Room	35 dB $L_{Aeq, 16h}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq, 16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16h}$	30 B $L_{Aeq, 8h}$

2.1.2. BS 8233 does not provide specific criteria for one-off noise events (L_{AFmax}), however, it is common practice to adopt 45 dB L_{AFmax} as a criterion for typical events at night, based on the guidance from the World Health Organisation (WHO) *Guidelines for Community Noise* 1999 and *Environmental Noise Guidelines for the European Region* 2018. Therefore, this criterion has been adopted for this assessment.

2.2. BS 4142:2014+A1:2019: Methods for Rating and Assessing Industrial and Commercial Sound (BS 4142)

2.2.1. This British Standard describes methods for rating and assessing the following:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.

2.2.2. The method uses outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

2.2.3. In accordance with the assessment methodology, the specific sound level ($L_{Aeq,T}$) of the noise source being assessed is corrected by the application of penalties for characteristic features, such as tonal qualities and/or distinct impulses, to give a rating level ($L_{Ar,Tr}$). The British Standard effectively compares the difference between the rating level and the typical background sound level ($L_{A90,T}$) in the absence of the noise source being assessed.

2.2.4. It is advised that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) when the noise source in question is likely to operate or is proposed to operate in the future.

2.2.5. Comparing the rating level with the background sound level, BS 4142 states:

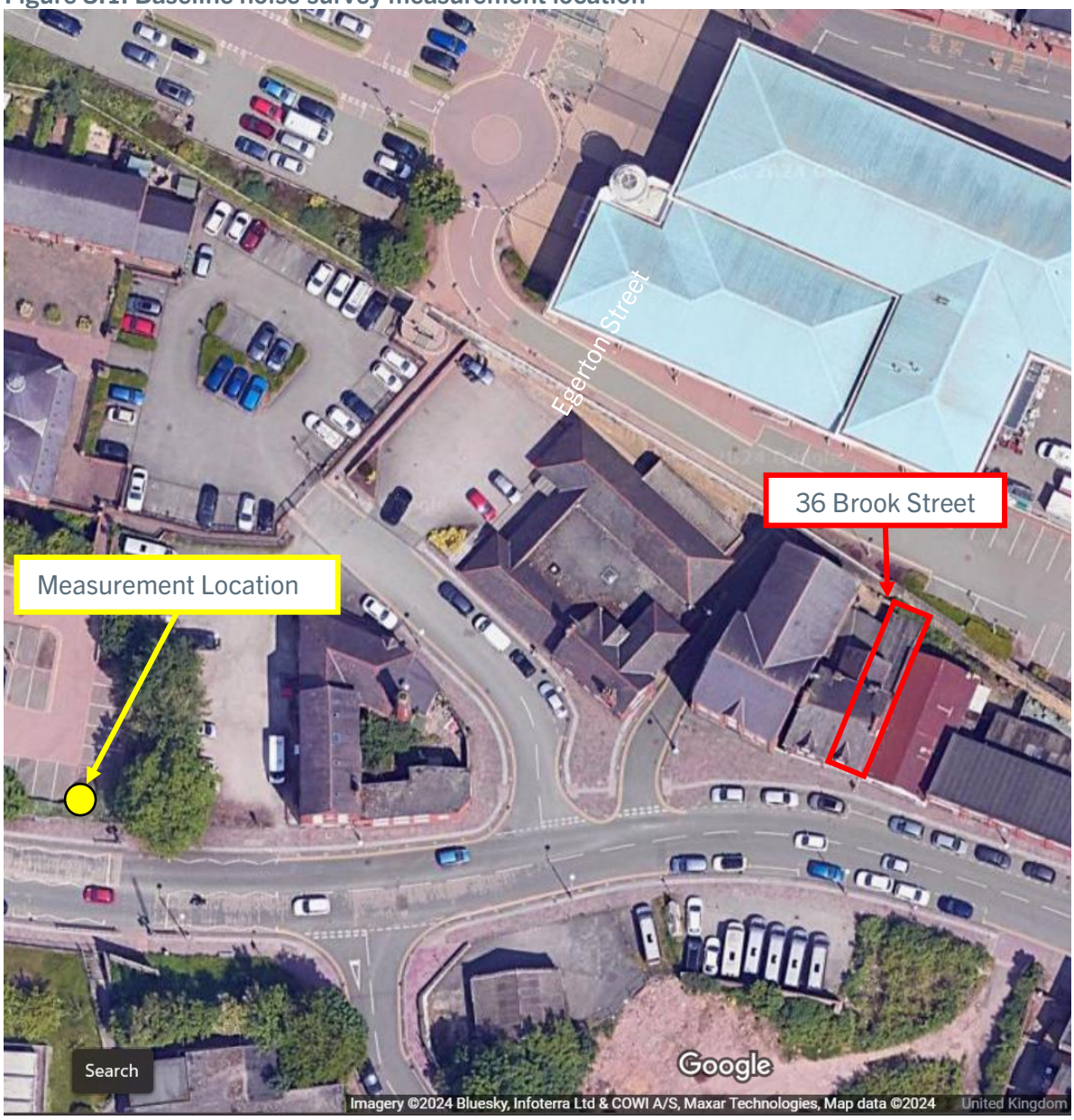
> *"Typically, the greater this difference, the greater the magnitude of impact.*
>
> *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
>
> *A difference of around +5 dB is likely to be an indication of an adverse impact, 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."*

3.0. BASELINE NOISE SURVEY

3.1.1. A baseline noise survey has been undertaken to determine the prevailing noise climate at a location representative of the proposed development site. It was not possible to adopt a measurement location at the proposed development, as the retail unit at ground level and apartments above are currently occupied.

3.1.2. However, observations externally at the development site indicated that the noise environment was dominated by road traffic noise on Brook Street. As a measurement location couldn't be adopted on the site, a measurement location adjacent to the same road in a car park to the west of the site was adopted. **Figure 3.1** shows the adopted measurement location.

Figure 3.1: Baseline noise survey measurement location



3.1.3. Attended measurements were undertaken at Measurement Location 1 (ML1) from 13:42 until 16:42 on 3rd December 2024. The purpose of the measurements was to establish the noise levels generated by road traffic on Brook Street, at the same distance from the road as the façade of 36 Brook Street. The microphone at ML1 was in free-field conditions at a height of 1.5 m. The horizontal distance to the nearside kerb edge of the road was 5 m.

3.2. Equipment

3.2.1. The noise survey was undertaken using the Class 1 specification noise measurement equipment detailed in **Table 3.1**. The measurement equipment was calibrated using a portable calibrator immediately before and after the measurements with no significant drift in calibration observed.

3.2.2. The sound level meter, pre-amplifier and microphone were calibrated to traceable standards within 24 months prior to the measurements. The portable calibrator was calibrated within 12 months prior to the measurements.

Table 3.1: Equipment details

Equipment	Make and Model	Serial Number	Calibration due Date
Sound Level Meter	Svantek 971	60745	06/09/2025
Microphone	Aco Pacific 7052E	66815	
Preamplifier	Svantek SV18	64535	
Calibrator	Svantek SV33A	90275	21/02/2025

3.3. Weather Conditions

3.3.1. Weather conditions during the survey were generally conducive to environmental noise monitoring, it being dry with low wind speeds (<5 ms^{-1}).

3.4. Results

3.4.1. A summary of the measured noise levels at ML1 during the survey is presented in **Table 3.2**.

Table 3.2: Summary of measured sound pressure levels, free-field

Date and Start time	Period	Measured Sound Pressure Levels			
		dB $L_{Aeq,T}$	dB $L_{A10,T}$	dB $L_{A90,T}$	dB L_{AFmax}
03/12/2024 13:42	1-hour	66	67	51	96
03/12/2024 14:42	1-hour	63	66	53	84
03/12/2024 15:42	1-hour	64	67	51	74
03/12/2024 13:42	3-hours	-	67[1]	-	-
03/12/2024 06:00	18-hours	-	66[2]	-	-
03/12/2024 07:00	Daytime (07:00 – 23:00)	64[3]	-	-	-
03/12/2024 23:00	Night-time (23:00 – 07:00)	55[4]	-	-	74[5]

[1] derived in accordance with CRTN (average $L_{A10,1hr}$ over three consecutive 1-hour periods)

[2] derived in accordance with CRTN ($L_{A10,18hr} = L_{A10,3hr} - 1$)

[3] derived in accordance with BS 8233 ($L_{Aeq,16hr} = L_{A10.18hr} - 2$)

[4] derived from DEFRA, TRL and Casella Stanger document Method for Converting the UK Road Traffic Noise Index $L_{A10,18h}$ to the EU Noise Indices for Road Noise Mapping (Lnight = 0.9 x $L_{A10,18h}$ – 3.77 dB)

[5] Taken to be the lowest $L_{AFmax,1hour}$ from 3-hour daytime measurement period

4.0. ASSESSMENT

4.1. Noise from MOT Garage

4.1.1. During the survey there was no audible noise coming from the adjacent MOT garage. However, from discussions with employees of the garage, it is understood that power tools can be used and motorcycles can be "revved" within the garage space. The roller shutter doors can also be left open.

4.1.2. From JPM Acoustics library data, it is known that use of power tools in an automotive garage environment can typically generate internal reverberant sound pressure levels of 95 dB(A). Assuming an open roller shutter door with an area of circa 9 m^2 (3 m x 3 m), the sound power level of the opening has been calculated using the following equation:

$$L_w = L_{p(internal)} + 10\,Log\,S - \mathrm{Cd}$$

4.1.3. Where 'S' is given by the surface area of the roller shutters and 'Cd' is the "diffusivity term" as sound transfers from a reverberant to free-field conditions.

4.1.4. The distance from the centre of the roller shutter door to the nearest window of the development is 6 m, and the window fully screened from the roller shutter door. The amount of attenuation due to distance between the roller shutter door and the closest window on the proposed development is given by the following equation:

$$Distance\ Attenuation = 20\,Log\,(d) + 8$$

4.1.5. Where 'd' is the distance between the source and the receiver. A further 10 dB attenuation would be expected when accounting for the screening (i.e. no line of sight from the roller shutter to the window).

4.1.6. By adopting the calculation methodology outlined above, the predicted free-field noise level incident on the closest window of the development is 65 dB(A) during assumed worst-case operations within the MOT garage.

4.1.7. The background noise levels measured at ML1 were between 51 and 53 dB $L_{A90,1hr}$. The background noise levels at ML1 are considered representative of those at the proposed development site during daytime periods when the garage will be operational. The predicted specific sound level from operations in the MOT garage could therefore exceed the prevailing background sound level by up to 14 dB. In accordance with guidance from BS 4142, this indicates a significant adverse impact. As such, consideration has been given to appropriate mitigation measures in the Mitigation Section of this report.

4.2. Road Traffic Noise

4.2.1. As ML1 was at the same set back distance from Brook Street as the front elevation of the development site, the noise levels at ML1 are considered to be representative of those incident on the worst affected elevation of the development site.

4.2.2. In accordance with guidance from BS 8233, internal noise levels can be estimated from external free-field noise levels by applying a -15 dB correction, assuming the façade contains a partially open window. **Table 4.1** shows the predicted internal noise levels with windows open, derived by applying a -15 dB correction to the values from **Table 3.2**.

Table 4.1: Predicted internal noise levels with windows open

Date and Start time	Period	Duration	Measured Sound Pressure Levels	
			dB $L_{Aeq,T}$	dB L_{AFmax}
03/12/2024 07:00	Daytime	16 hours	49	-
03/12/2024 23:00	Night-time	8 hours	40	59

4.2.3. It can be seen from **Table 4.1** that the predicted internal noise levels with windows open are above the desirable guideline values from BS 8233, as detailed in **Table 2.1**. As such, consideration has been given to the noise levels that can be achieved with windows closed.

4.2.4. In accordance with Section G.1 of BS 8233, internal noise levels with windows closed can be estimated by subtracting the sound insulation performance of the glazing from the external free-field noise levels. Double glazing with a performance of 34 dB R_w would allow the relevant criteria from BS 8233 to be achieved by a margin of 5 dB, this performance corresponds to a glazing arrangement of 4 mm glass/12 mm air gap/6 mm glass or similar. **Table 4.2** shows the predicted internal noise levels accounting for double-glazed windows with a sound insulation performance of 34 dB R_w.

Table 4.2: Predicted internal noise levels with windows closed

Date and Start time	Period	Duration	Measured Sound Pressure Levels	
			dB $L_{Aeq,T}$	dB L_{AFmax}
03/12/2024 07:00	Daytime	16 hours	30	
03/12/2024 23:00	Night-time	8 hours	21	40

4.2.5. It can be seen from **Table 4.2** that the desirable guideline values from BS 8233 are predicted to be achieved with windows closed, assuming that appropriate double glazing is installed. The 45 dB L_{AFmax} night-time criterion from the WHO guidelines is also predicted to be achieved.

4.2.6. It is assumed that whole dwelling ventilation rates (as defined in Approved Document F of the Building Regulations) could be achieved in the proposed dwellings using a continuous

mechanical extract ventilation (MEV) system, with passive frame mounted trickle ventilators installed in the building façade (i.e. System 3 from Approved Document F). To ensure that trickle ventilators in the building façade do not undermine the sound insulation performance of the wider façade, it is recommended that all ventilators are selected to achieve a minimum sound insulation performance of 34 dB $D_{n,e,w}$ when in the open position.

4.2.7. Given that the desirable internal guideline values from BS 8233 can be achieved provided suitable glazing and trickle ventilators are selected, it is considered that further mitigation measures for road traffic noise are unwarranted.

5.0. MITIGATION

5.1. Noise from MOT Garage

5.1.1. It was identified in the assessment section of this report that a significant adverse impact could be expected on the site due to noise from the adjoining MOT Garage. As such consideration has been given to mitigation measures in this section.

5.1.2. It should be noted that BS 4142 states the following with regard to new residential development in an area with extant industrial noise:

> "*NOTE Where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it should be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation.*"

5.1.3. Given the above, it is considered appropriate to determine the extent of required mitigation by using the desirable guideline values from BS 8233, rather than the comparative assessment approach outlined in BS 4142.

5.1.4. It was detailed in the assessment section that noise levels from assumed worst case activities in the MOT Garage could result in a free-field noise level of 65 dB(A) at the front façade of the 36 Brook Street site. The assessment section also determined that glazing with a performance of 34 dB R_w should be applied to this elevation to control noise break-in due to road traffic noise to habitable spaces.

5.1.5. Accounting for the proposed glazing performance, and assuming a 50% on-time for noisy operations at the MOT Garage, the predicted internal noise levels during worst-case operations at the garage would be 28 dB(A). This is 7 dB below the desirable guideline value of 35 dB(A) from BS 8233 during the daytime. As the MOT Garage does not operate at night, consideration has only been given to potential impacts during daytime periods.

5.1.6. As the noise levels from BS 8233 are predicted to be achieved during noisy operations with the roller shutter door open at the MOT Garage, it is considered that further mitigation measures to control airborne noise transfer are unwarranted.

5.1.7. It should be noted that there is also the potential for structure-borne noise transfer through the adjoining wall between the MOT Garage and the proposed residential dwellings. Where noise sensitive spaces (living rooms, bedrooms, kitchens etc.) are proposed to be located adjacent to the wall with the MOT Garage, additional mitigation should be implemented.

5.1.8. A further assessment should be undertaken to determine the extent of the mitigation required to control structure-borne noise transfer, once the building is unoccupied and internal

measurements / sound insulation testing can be undertaken. However, it is reasonable at this stage to assume that an independent wall lining comprising 2 x 15 mm dense plasterboard with mineral wool in the cavity may be required for spaces adjacent to the MOT Garage.

6.0. CONCLUSION

6.1.1. JPM Acoustics Ltd has been appointed to undertake a Noise Impact Assessment to support a planning application for a mixed-use development at 36 Brook Street in Wrexham.

6.1.2. This report considers the potential for the existing noise environment on the site to impact the proposed residential dwellings associated with the development proposals. The assessment has been undertaken with due regard to relevant planning policies, British Standards, and technical guidance documents relating to noise.

6.1.3. The assessment of noise levels measured on the site indicated that the desirable guideline values from BS 8233 are achievable provided suitable glazing and ventilation units are selected.

6.1.4. Structure-borne noise will also be required to be assessed once the building is unoccupied, and internal measurements can be taken. At this stage it is appropriate to assume that an independent wall lining as described in this report would be required.

6.1.5. Given the findings of this assessment, it is considered that noise need not be a determining factor in granting planning consent for the proposed development.

APPENDIX A: GLOSSARY

Table A.1: Noise terminology

Terminology	Description
A-weighting, dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Decibel, (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 $\log_{10}$ (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20 Pa.
Façade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting (F)	Averaging time constant used in sound level meters and commonly used in the measurement of environmental noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m away.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period, T. L_{10} may be thought of as the "average maximum" noise level. Generally used to describe road traffic noise.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period, T. L_{90} may be thought of as the "average minimum" noise level. Generally used to describe background noise.

Terminology	Description
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period, T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period, T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
Sound Power	The sound energy radiated per unit time by a sound source. Measured in watts (W).
Sound Power Level, L_w	Sound power measured on a decibel scale, relative to a reference value of 10^{-12} W.
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure. Measured in pascals (Pa).
Sound Pressure Level (Sound Level), L_p	The sound level is the sound pressure on a decibel scale, relative to a reference value of $20x10^{-6}$ Pascals.