

## APPENDIX L – GLOSSARY OF ACOUSTIC TERMS

Noise is defined as unwanted sound. Human ears respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or  $L_{Aeq}$ ,  $L_{A90}$  etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

Terminology relating to noise:

**Table L - Terminology**

Terminology	Description
<b>Sound Pressure</b>	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
<b>Sound Pressure Level (Sound Level)</b>	The sound level is the sound pressure relative to a standard reference pressure of 20 Pa ( $20 \times 10^{-6}$ Pascals) on a decibel scale.
<b>Decibel (dB)</b>	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds $s_1$ and $s_2$ is given by $20 \log_{10} (s_1 / s_2)$ . 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.
<b>A-weighting, dB(A)</b>	The unit of sound level, weighted according to the A-scale, which considers the increased sensitivity of the human ear at some frequencies.
<b>Noise Level Indices</b>	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 conducted.
<b><math>L_{eq,T}</math></b>	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.

Terminology	Description
<b>L<sub>max,T</sub></b>	A noise level index defined as the maximum noise level during the period T. L <sub>max</sub> is sometimes used for the assessment of occasional loud noises, which may have negligible effect on the overall L <sub>eq</sub> noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
<b>L<sub>90,T</sub></b>	A noise level index. The noise level exceeded for 90% of the time over the period T. L <sub>90</sub> can be considered to be the "average minimum" noise level and is often used to describe the background noise.
<b>L<sub>10,T</sub></b>	A noise level index. The noise level exceeded for 10% of the time over the period T. L <sub>10</sub> can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
<b>Free-Field</b>	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5 m.
<b>Façade</b>	At a distance of 1 m in front of a large sound reflecting object such as a building façade.
<b>Fast/Slow Time Weighting</b>	Averaging times used in sound level meters.
<b>Octave Band</b>	A range of frequencies whose upper limit is twice the frequency of the lower limit.
<b>Sound power level, L<sub>w</sub></b>	Sound power measured on a decibel scale, relative to a reference value of 10 <sup>-12</sup> W.