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COCKPIT BARN, KNOWLE LANE ACOUSTIC ASSESSMENT

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Project Ref:	ASI3931	Project Name:	Cockpit Barn, Knowle Lane
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Clarke Saunders Acoustics Winchester SO22 5BE		This report has been prepared in response to the instructions of our client. It is not intended for and should not be relied upon by any other party or for any other purpose.	

1.0 EXECUTIVE SUMMARY

- 1.1 Clarke Saunders Acoustics has conducted an assessment of potential acoustic impacts due to vehicle movements and unloading activity associated with the Class R change of use to Class B8 at Cockpit Barn, Knowle Lane, Fair Oak, SO50 7DZ.
- 1.2 Environmental sound survey data has been used alongside transport information to provide a range of representative assessments.
- 1.3 The cumulative traffic generation, when including this proposal and the consented proposals, is shown to represent a minor to negligible change compared to the current consented scenario.
- 1.4 The effect of the site related traffic movements against the pre-existing ambient sound level is also shown to represent a minor to negligible change.
- 1.5 The BS4142 assessment of on-site vehicle movements and unloading activity indicates a low likelihood of adverse impact being experienced by the local residents.
- 1.6 The proposals to change the use of a part of Cockpit Barn to Class B8 is not anticipated to result in adverse acoustic impacts.

2.0 INTRODUCTION

- 2.1 Clarke Saunders Acoustics (CSA) has been appointed to conduct an acoustic assessment of the proposed Class R change of use to Class B8 at Cockpit Barn, Knowle Lane, Fair Oak, SO50 7DZ.
- 2.2 Under Class R of the general permitted development order, 'noise impacts of the development' require consideration.
- 2.3 Environmental sound survey data will be used to quantify and describe the existing sound climate at the site vicinity. This will allow the future influence of traffic movements to be described, based on information provided by the transport consultants.
- 2.4 A summary of the acoustic terminology used throughout this report is provided at Appendix A.

3.0 DESCRIPTION OF SITE AND PROPOSALS

- 3.1 The site is a part of an existing agricultural building, located on Knowle Lane, a 30mph road, which connects Botley Road and Mortimers Lane. As the use of this route avoids the centre of Fair Oak, it can be used as a cut through.
- 3.2 The Deer Park Farm Industrial Estate, East Horton Business Park and Fair Oak Household Waste Recycling Centre are located off Knowle Lane, also contributing to the existing traffic flows on Knowle Lane.
- 3.3 It is noted that consent has been granted for residential dwellings on the site, under application ref F/23/94713. As the site boundary for this Class R application overlaps the residential site boundary, it would not be possible for both schemes to be implemented. As a result, assessment has been made to the closest existing residential property, *The Mazels*, which is situated on the other side of Knowle Lane.

- 3.4 The transport consultants have predicted the number of traffic movements from a typical Class B8 use at this site, using the TRICS database. An extract from the report is shown below.

TRICS Trip Rate B8 Warehouse			
	Arrivals	Departures	Two-way Total
AM Peak Hour	0.121	0.083	0.204
PM Peak Hour	0.060	0.143	0.203
Daily Traffic	1.489	1.492	2.981
TRICS Vehicle Trip Generation Based on 500 sqm			
AM Peak Hour	0.61 (1)	0.42 (1)	1
PM Peak Hour	0.30 (0)	0.72 (1)	1
Daily Traffic	7.5 (8)	7.5 (7)	14

- 3.5 This table shows that there is predicted to be a single two-way movement in each morning and afternoon peak hour, with a total of 14 two-way movements across the day.
- 3.6 Further transport information has been provided regarding the cumulative traffic impact with two other consented light industrial schemes. This results in a total of 64 two-way movements per day.
- 3.7 The site and surrounding area are shown in site plan AS13931/SP1.

4.0 RELEVANT GUIDANCE

4.1 ENVIRONMENTAL HEALTH COMMENTS

- 4.1.1 An Environmental Health Contractor (Paul Bieda) has commented on the application, raising concerns regarding the increase in traffic movements, including loading/unloading/plant movements. It was recommended that an acoustic assessment was conducted, following the methodology within BS4142:2014+A.1:2019 *Methods for rating and assessing industrial and commercial sound* (BS4142).

4.2 BS4142

- 4.2.1 BS4142 is relevant to the vehicle manoeuvring and unloading activity conducted on site.
- 4.2.2 A summary of the BS4142 assessment methodology is provided at Appendix B. BS4142 is not, however, relevant to vehicle movements on public roads.

5.0 SOUND SURVEY

5.1 PROCEDURES AND EQUIPMENT

- 5.1.1 A survey of the existing sound levels was undertaken at a free-field location shown in the appended site plan AS13931/SP1.
- 5.1.2 Background sound levels at this position are representative of those at *The Mazels*, owing to this being primarily determined by road traffic on Botley Road and the M27. Ambient and maximum sound levels, primarily determined by road traffic on Knowle Lane, are

likely to be circa 8dB to 9dB higher at the monitoring position than at the façade of *The Mazels*, owing to the increased distance to Knowle Lane traffic.

5.1.3 The monitors were set to record measurements of consecutive 5-minute L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} sound pressure levels between 16:35 hours on Friday 7th March and 08:05 hours on Tuesday 11th March 2025.

5.1.4 The following equipment was used during the survey:

- Rion sound level meter type NL32;
- Rion sound level calibrator type NC74.

5.1.5 The calibration of the sound level meter was verified before and after use, with no significant calibration drift detected. Equipment has current laboratory calibration. Certification can be provided upon request.

5.1.6 Measurements were made following procedures in BS4142 and BS7445:1991 (ISO1996-2:1987) *Description and measurement of environmental noise Part 2-Acquisition of data pertinent to land use*.

5.1.7 The weather during the survey was settled, with light winds and no periods of notable rainfall. The conditions were, therefore, suitable for the measurement of environmental sound.

5.2 SURVEY RESULTS

5.2.1 Figures ASI3931/TH1-TH4 show the L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} sound pressure levels as time histories at the monitoring location.

5.2.2 Table 5.1 details the average ambient, typical lowest background, and average maximum sound levels during the survey. Overall daytime and night-time periods are shown, alongside a typical working hours period of 07:00 hours to 18:00 hours.

Period	Average Ambient $L_{Aeq,T}$	Typical Lowest Background L_{A90}	Average Maximum L_{AFmax}
07:00 – 23:00 hours	53 dB	32 dB	67 dB
23:00 – 07:00 hours	45 dB	23 dB	51 dB
07:00 – 18:00 hours	54 dB	35 dB	69 dB

Table 5.1 - Environmental sound survey results

5.2.3 The typical lowest background levels have been calculated as the 10th lowest percentile of the relevant dataset.

6.0 ASSESSMENT AND DISCUSSION

6.1 The possible acoustic impact of the traffic and B8 activity associated with the site has been considered in a number of ways, as follows:

- Total cumulative future traffic generation against current consented scenario.
- Effect of site traffic movements across typical working hours period against the existing ambient noise levels.
- Effect of site traffic movements in a peak hour period against the existing ambient noise levels.
- Effect of B8 activity on site (on-site vehicle manoeuvre and unloading), using the BS4142 methodology.
- Discussion of vehicle passby noise maxima.

6.2 The scope of BS4142 does not include the effect of traffic on public roads, so the assessments of vehicles on Knowle Road do not follow the methodology of BS4142.

6.3 These considerations are detailed in the following sub-sections.

6.4 INFLUENCE ON ROAD TRAFFIC NOISE

Cumulative Traffic Generation

6.4.1 As discussed in Section 3.0, there are two other consents for light industrial use at Cockpit Barn, resulting in a current consented 50 two-way movements per day. Including the 14 two-way movements expected for this site results in 60 two-way daily movements. This increase in traffic associated with the site is expected to result in a 1dB increase in site-related traffic noise. A 1dB change in noise level is unlikely to be noticeable, so represents a minor to negligible change, with respect to the guidance within Design Manual for Roads and Bridges – LA 111 Noise and Vibration (Revision 2) [LA 111].

Site Traffic Movements Across Typical Working Hours

6.4.2 As vehicle movements associated with the site will be entering and exiting the site, they will be moving at fairly low speed in the vicinity of the receptor. CSA library data of a light goods vehicle (LGV) moving off from stationary to around 10mph has, therefore, been used to predict the influence of the proposed vehicle movements on the existing sound levels.

6.4.3 The 14 two-way movements per day have been incorporated into an average sound level between the typical operating period of 07:00 and 18:00 hours, assuming each movement on Knowle Lane lasts up to 30 seconds. When accounting for distance propagation losses of 40m and line of sight screening to the ground floor area in front of the property, afforded by the boundary fence, the resultant noise level is $L_{Aeq,11hr}$ 41dB.

6.4.4 The existing average sound levels at the assessment position (the façade of *The Mazels*) is anticipated to be around the mid-40's (with reference to paragraph 5.1.2 and Table 5.1). The resultant increase in average sound level across the typical operating hours is, therefore, anticipated to be around 1dB, which is a minor to negligible change, with respect to LA 111.

Site Traffic Movement in a Single Hour Period

- 6.4.5 When assuming a single movement in a peak hour period, the predicted noise level at the receptor is $L_{Aeq,1hr}$ 28dB.
- 6.4.6 The pre-existing average sound level at the assessment position across the peak hours is expected to typically vary around the mid-40's ($L_{Aeq,5min}$), such that the effect of the single movement should be negligible.

Passby Noise Maxima

- 6.4.7 Site-related vehicle movements are only anticipated during the daytime period, where there is no guidance or typically adopted noise maxima target. A consideration has, nonetheless, been given to pre-existing noise maxima of vehicle passbys and that from vehicles accessing the site in the future.
- 6.4.8 With reference to paragraph 5.1.2 and Table 5.1, the pre-existing average maximum noise levels at the receptor are anticipated to be in the low 60's (L_{AFmax}). Vehicles accessing and exiting the site will necessarily be travelling at a lower speed than traffic driving past the site, such that the noise maxima are likely to be lower than the existing levels.

6.5 BS4142 ASSESSMENT

- 6.5.1 As shown in the transport statement extract in Section 3.0, a single two-way vehicle movement is anticipated in a peak hour period. The BS4142 assessment of on-site activity has, therefore, considered a single LGV manoeuvring on site, being unloaded, then leaving the site.
- 6.5.2 CSA library data has been used of the manoeuvring and unloading activity, whilst activity time corrections and distance propagation losses have been incorporated into the calculations.
- 6.5.3 As there is a potential for unloading activity to be discernible above the Background Sound Level, a +3dB feature correction has been applied to the Specific Sound Level, to calculate the Rating Level.
- 6.5.4 Table 6.1 shows a summary of the BS4142 initial impact estimate.

Parameter	Arriving/Manoeuvring	Unloading	Manoeuvring/Leaving
Source Level	$L_{Aeq,T}$ 69dB at 5m	$L_{Aeq,T}$ 57dB at 10m	$L_{Aeq,T}$ 69dB at 5m
Activity Time Correction	3 minutes = $10 \cdot \log(3/60)$ = -13dB	10 minutes = $10 \cdot \log(10/60)$ = -8dB	2 minutes = $10 \cdot \log(2/60)$ = -15dB
Distance Loss	50 metres = $20 \cdot \log(5/50)$ = -20dB	50 metres = $20 \cdot \log(10/50)$ = -14dB	50 metres = $20 \cdot \log(5/50)$ = -20dB
Screening	Line of sight screening = -5dB		
Specific Sound Level at Receptor	$L_{Aeq,1hr}$ 31dB	$L_{Aeq,1hr}$ 30dB	$L_{Aeq,1hr}$ 29dB
Feature correction	0dB	+3dB	0dB

Parameter	Arriving/Manoeuvring	Unloading	Manoeuvring/Leaving
Rating Level	L _{Aeq,1hr} 31dB	L _{Aeq,1hr} 33dB	L _{Aeq,1hr} 29dB
Rating Level (cumulative)	L _{A,rTr} 36dB		
Background Sound Level	L _{A90} 35dB		
Assessment Level	+1dB		

Table 6.1 - BS4142 initial impact estimate

6.5.5 An assessment level of +1dB indicates a low likelihood of adverse impact being experienced by the residents of *The Mazels*. This likelihood would further decrease at more distant receptors, owing to the increased distance propagation losses.

6.5.6 The character of the vehicle sound would be generally congruous with that of the local area, being primarily determined by traffic on Knowle Lane. The absolute levels are also relatively low when compared with the pre-existing ambient levels. These contextual factors indicate that the initial impact estimate of a low likelihood of adverse impact does not need to be modified.

Uncertainty

6.5.7 As per the requirements of BS4142, the uncertainty in the assessment is considered and reported. This is not an indication of error, but an acknowledgement of possible variability of the factors contributing to this assessment.

6.5.8 The environmental sound surveys were conducted over five days, thereby allowing variability in pre-existing ambient sound levels to be noted and taken into account.

6.5.9 As the B8 activity is not yet in operation, it has been necessary to refer to CSA library data of vehicle movements and unloading activity.

6.5.10 Use of calibrated class 1 sound level meters is considered to reduce measurement instrumentation error to insignificant levels as compared to environmental variations.

7.0 CONCLUSIONS

7.1 Clarke Saunders Acoustics has conducted an assessment of potential acoustic impacts of vehicle movements and unloading activity associated with the Class R change of use to Class B8 at Cockpit Barn, Knowle Lane, Fair Oak, SO50 7DZ.

7.2 Environmental sound survey data has been used alongside transport information to provide a range of representative assessments.

7.3 The cumulative traffic generation including this proposal and the consented proposals is shown to represent a minor to negligible change compared to the current consented scenario.

7.4 The effect of the site related traffic movements, against the pre-existing ambient sound level, is also shown to represent a minor to negligible change.

- 7.5 The BS4142 assessment of on-site vehicle movements and unloading activity indicates a low likelihood of adverse impact being experienced by the local residents.
- 7.6 The proposals to change the use of a part of Cockpit Barn to Class B8 is not anticipated to result in adverse acoustic impacts.

M Symmonds

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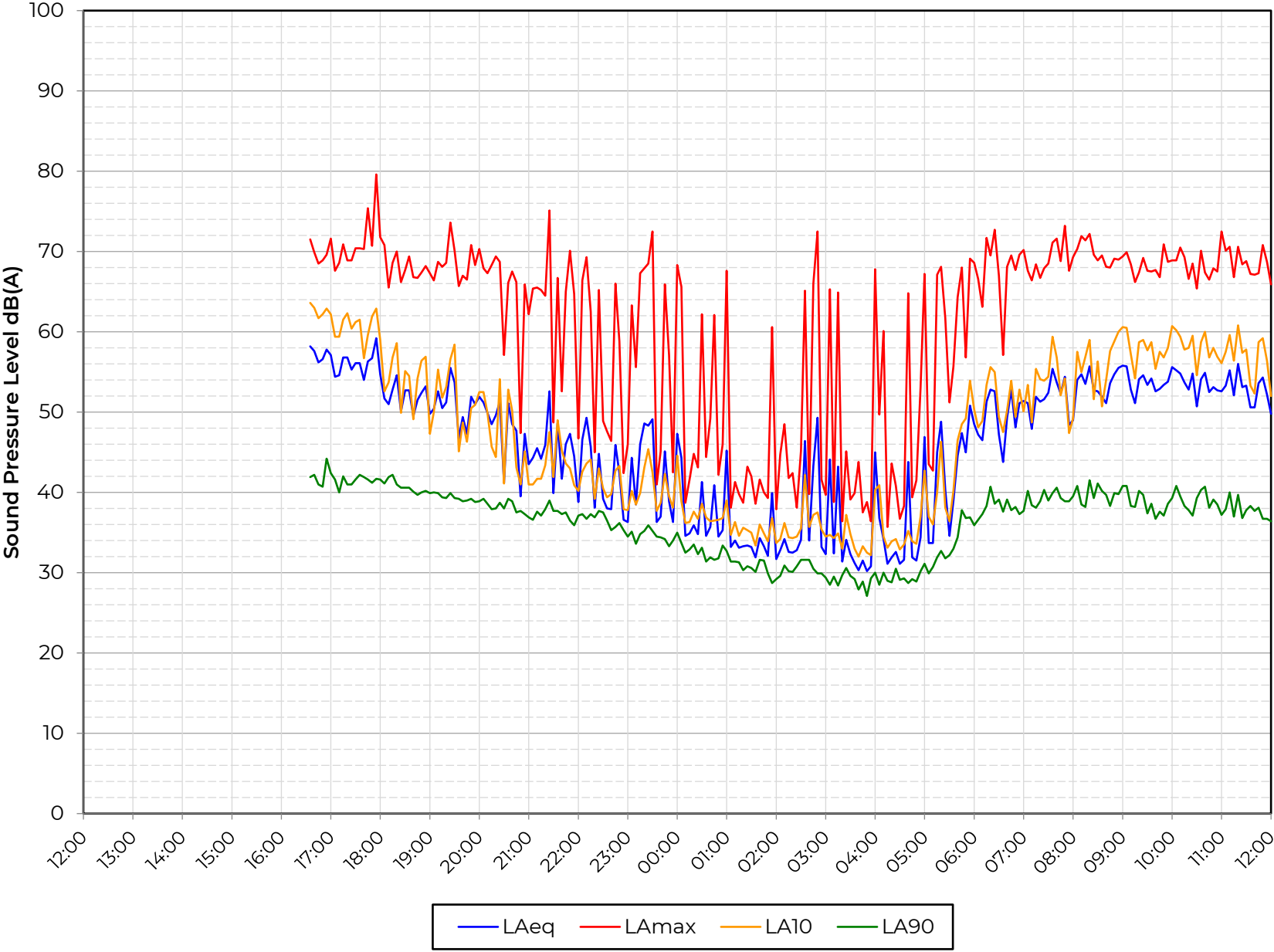


Indicative Site Plan

Figure AS13931.SP1

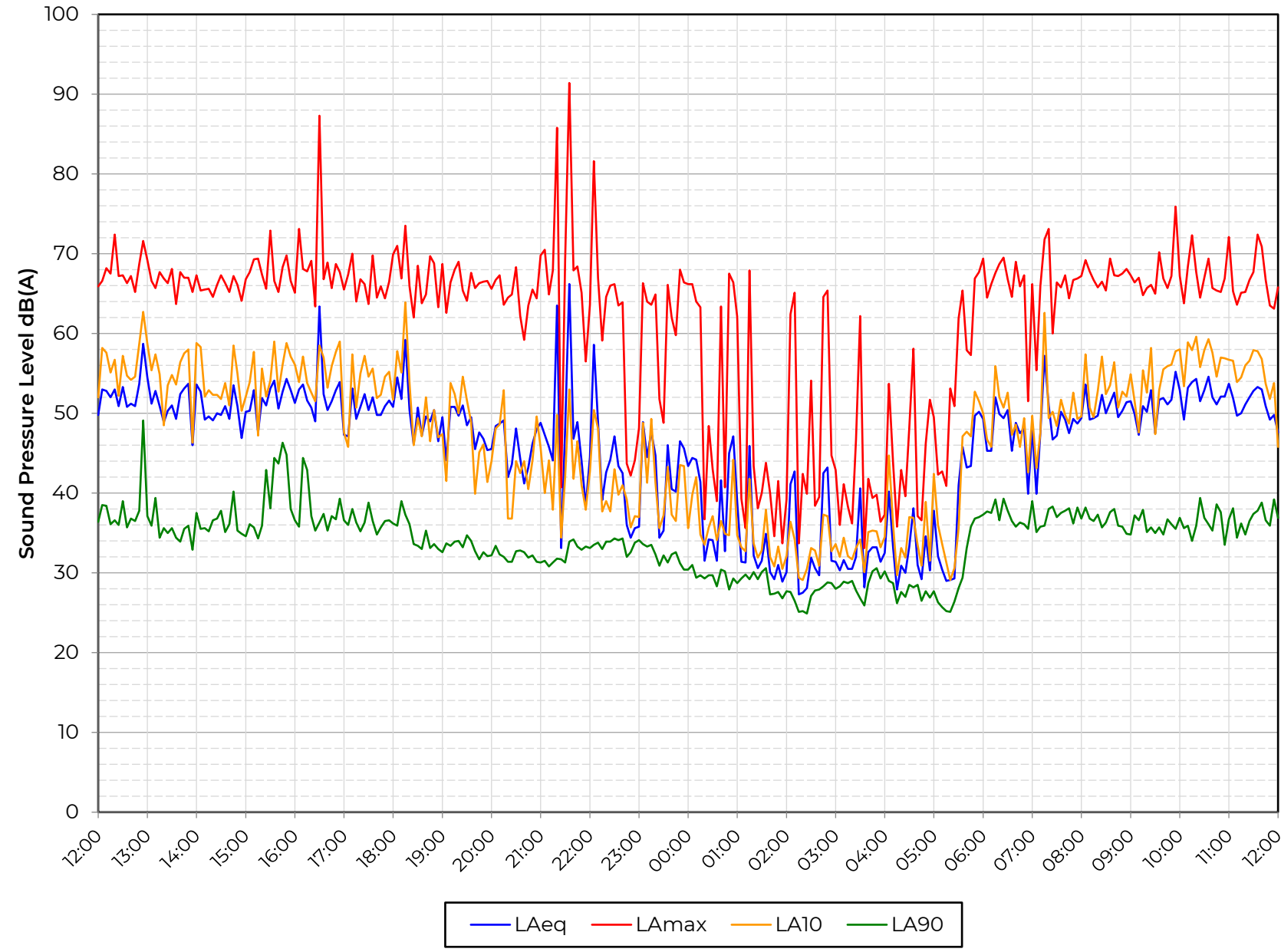
Cockpit Barn, Knowle Lane

Position 1



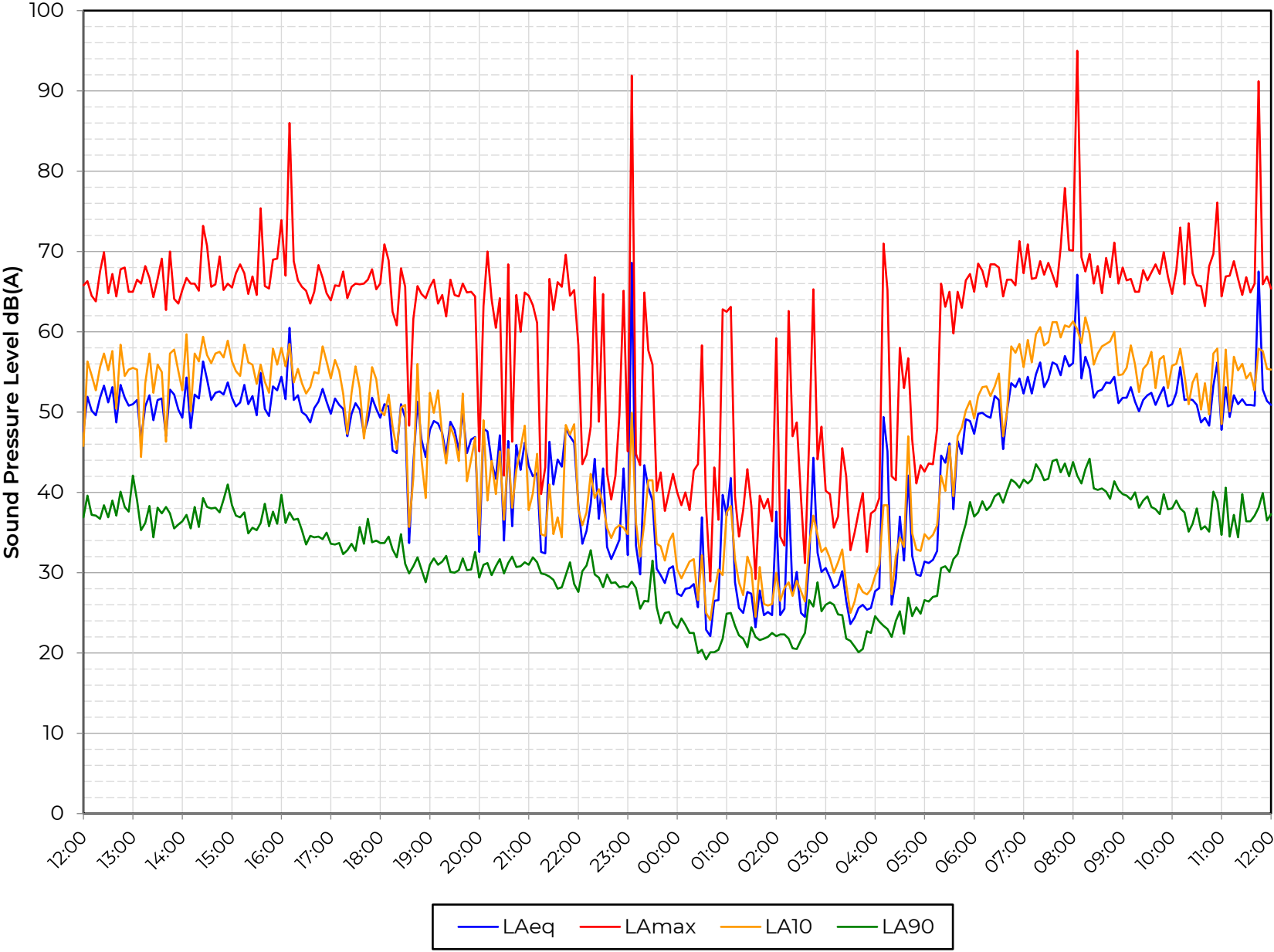
Cockpit Barn, Knowle Lane

Position 1



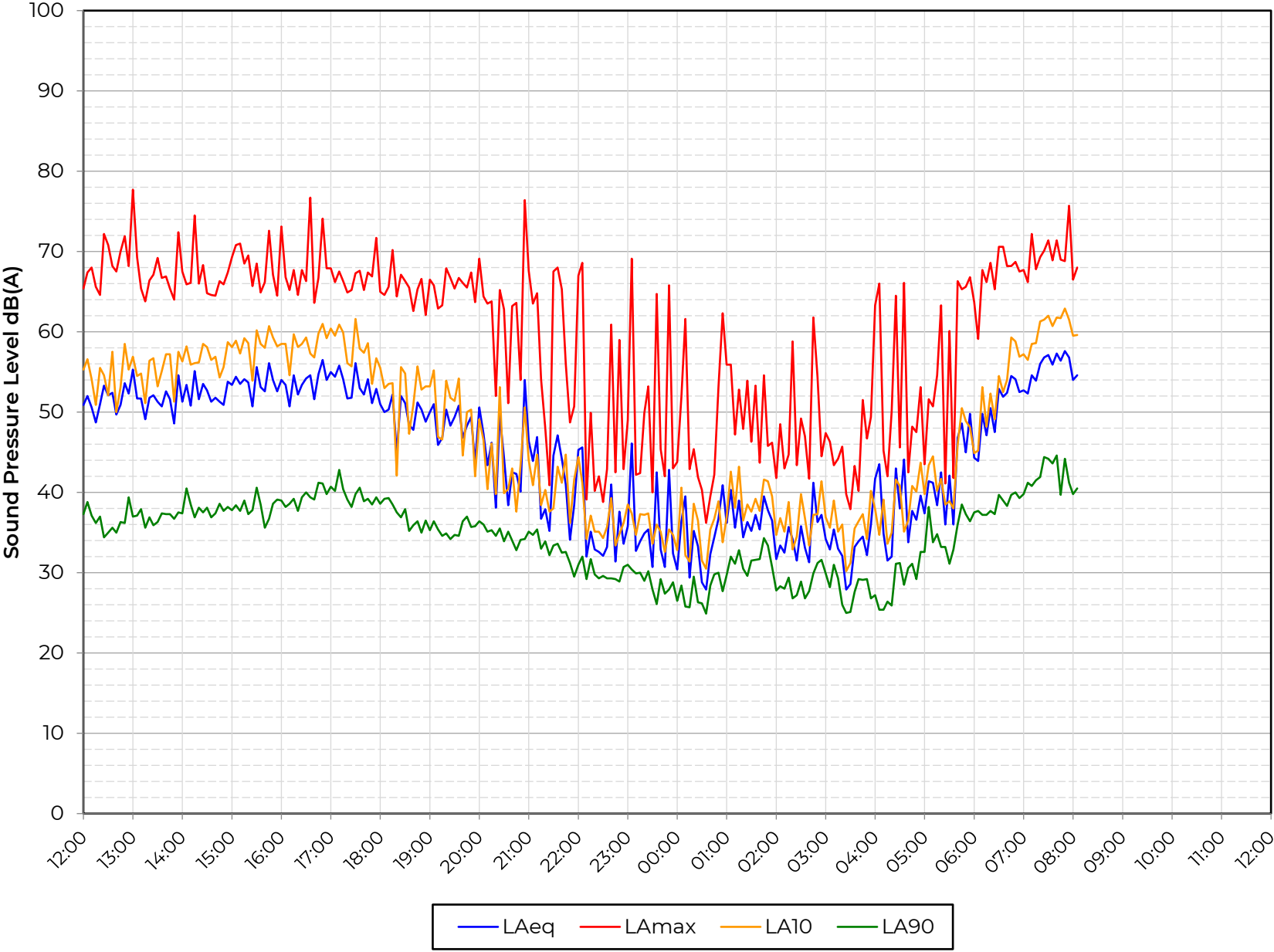
Cockpit Barn, Knowle Lane

Position 1



Cockpit Barn, Knowle Lane

Position 1



Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

Sound	Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.
Noise	Sound that is unwanted by or disturbing to the perceiver.
Frequency	The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'.
dB(A):	Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or L_A .
L_{eq}:	A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc). The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction. Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.
L_{10} & L_{90}:	Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, L_{10} is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise. It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.
L_{max}:	The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.

Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band.

In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000
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Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

INTERPRETATION

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

Earth Bunds and Barriers - Effective Screen Height

When considering the reduction in sound level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a tall barrier exists between a sound source and a listener, with the barrier close to the listener, the listener will perceive the sound as being louder if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the sound would seem quieter than if he were standing. This is explained by the fact that the "effective screen height" is changing with the three cases above. In general, the greater the effective screen height, the greater the perceived reduction in sound level.

Similarly, the attenuation provided by a barrier will be greater where it is aligned close to either the source or the listener than where the barrier is midway between the two.

AS13931 COCKPIT BARN, KNOWLE LANE

APPENDIX B

BS4142 METHODOLOGY

BS4142 is designed to allow contextual assessment of impact from commercial, or industrial sound on sensitive receptors. Examples covered by the Standard include:

- 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.

In brief, the assessment procedure involves establishing sound levels from the items or processes of interest, (the specific sound source(s)), corrected for any acoustic features to derive the Rating Level, (L_{Ar,T_r}), at the relevant assessment position(s). The Rating Level is compared against the existing Background Sound Level, ($L_{A90,T}$), to provide an initial estimate of impact. The Standard offers the following guidance with regard to the significance of estimated impact:

- Typically, the greater this difference, the greater the magnitude of the impact;*
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- A difference of around +5dB could be an indication of an adverse impact, depending on the context;*
- Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context. The lower the rating level is relative to the background sound level, the less likely it is that the specific sound source will have an adverse impact.*

Where relevant, the initial estimate should then be modified by accounting for contextual aspects of the operation of the specific sound source and / or the context of the character of the area.

Other Assessment Parameters and Guidance on Character Corrections

The Specific Sound Level (L_s) is expressed in terms of an L_{Aeq} for a reference time interval, (T_r) of one-hour during the daytime (07:00 – 23:00 hours) and a fifteen-minute period during the night-time (23:00 – 07:00 hours). The Rating Level is also expressed in terms of the reference time interval, T_r .

The Specific Sound Level can be determined by various means, which can include prediction based on manufacturer's data and accompanying propagation calculations to the assessment position(s). This method could be used, for instance, where the specific sound source is not yet in-situ, or is in-situ but not yet operational.

Where the specific sound source is already operational and in-situ, measurements of the sound climate resulting from both the specific sound source and all other contributing sources, (known as the Ambient Sound Level, $L_a = L_{Aeq,T}$) should be measured over a representative time period, ideally at the assessment position(s).

Depending on the relative contribution of other sources not related to the specific sound, (known as the residual sound), the Specific Sound Level can be derived by logarithmically subtracting the Residual Sound Level, $L_r = L_{Aeq,T_r}$, from the Ambient Sound Level.

With justification, representative proxy locations can be used for the measurement of the ambient and/or residual sound climate. Where these measurement locations are not fully representative of the assessment position(s), measurement can be supplemented with calculation.

The Background Sound Level should ideally also be measured at the assessment position(s) but can be measured at representative proxy locations where suitable reasons can be provided. The Background Sound Level should be measured over a period which is suitable to characterise the background sound climate during the period of interest and should normally be at least 15 minutes.

When deriving the Rating Level from the Specific Sound Level, consideration is given to the character of the sound. The Standard provides several methods for deriving appropriate character corrections, offering the following advice for subjective assessment:

Tonality

For sound ranging from not tonal to prominently tonal, the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be allocated as a penalty of 2 dB for a tone which is just perceptible at the sound receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9dB can be applied for sound that is highly impulsive considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be allocated as a penalty of 3dB for impulsivity which is just perceptible at the receiver, 6dB where it is clearly perceptible and 9dB where it is highly perceptible.

Other sound characteristics

Where the specific sound contains characteristics that are neither tonal nor impulsive, but are otherwise startling, disturbing or incongruous with the residual acoustic environment, a penalty of +3dB can be applied.

Intermittency

When the specific sound has identifiable on/off conditions, if the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3dB can be applied.