

PROPOSED NEW VOLVO DEALERSHIP AND SERVICING CENTRE, ANGMERING

NOISE IMPACT ASSESSMENT

On behalf of:

Caffyns plc

PROPOSED NEW VOLVO DEALERSHIP AND SERVICING CENTRE, ANGMERING

NOISE IMPACT ASSESSMENT

Report prepared by:
Hepworth Acoustics Ltd
First Floor Aztec Centre
Aztec West
Almondsbury
Bristol
BS32 4TD

On behalf of:
Caffyns plc

Report prepared by:
Graham Bowland BSc MIOA – Technical Director

Report checked by:
Donald Quinn BSc FIOA – Managing Director

CONTENTS

1.0	INTRODUCTION	1
2.0	ACOUSTIC CRITERIA	3
3.0	BACKGROUND NOISE SURVEY	5
4.0	OPERATIONAL NOISE SURVEY	6
5.0	NOISE ASSESSMENT AND MITIGATION MEASURES	9
6.0	SUMMARY AND CONCLUSIONS	12
	 FIGURE 1 – SITE PLAN	 13
	 APPENDIX I: NOISE UNITS & INDICES	 14
	APPENDIX II: BACKGROUND NOISE SURVEY RESULTS	16

1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Caffyns plc to carry out a noise impact assessment relating to a planning application for a proposed new Volvo dealership and servicing centre at a site to the east of Roundstone Lane, in Angmering, West Sussex.
- 1.2 The development is proposed on an existing brownfield site, bounded by Roundstone Lane to the west, and by relatively recent residential development at Quiet Waters Close, to the north.
- 1.3 To the east, the proposed development site will extend slightly into a car parking area of the existing Caffyns Audi dealership, and hence be bounded in that area by the remainder of that existing site.
- 1.4 To the south the proposed development site is bounded by the servicing route from Roundstone Lane to the Audi dealership and the Haskins Garden Centre, with a single large residential property beyond that. Further south is the A529 Roadstone By-pass, which is a major route.
- 1.5 The proposals incorporate car displays and customer parking to the frontage of the site, and a single main building towards the northern section, with further parking to the east (i.e. where this already exists as part of the Audi site).
- 1.6 The building will house the dealership to the west part and the service centre to the east, the latter incorporating a roller shutter vehicle access door to the east elevation. A small first floor area is proposed towards the northeast, housing staff areas and a plant room.
- 1.7 A plan is provided in Figure 1 showing the site boundary and development layout plan.
- 1.8 In terms of proposed noise generating fixed plant, two external condenser units are proposed to be installed externally close to the northeast part of the building, as indicated in Figure 1. The proposed items are as follows:
 - 1x Mitsubishi Electric model PURY-EP600YSNW-A1
 - 1x Mitsubishi Electric model PUZ-ZM50VKA
- 1.9 Also, an air handling unit is proposed with the first floor plant room, with intake and discharge grilles ducted to the north elevation, and mechanical ventilation of the workshop will be provided by roof or wall mounted extract fans. Precise selections for this equipment are not available at this stage.

- 1.10 It is understood that the proposed hours of operation of the dealership are 0830-1800hrs Monday-Friday, 0900-1700hrs Saturdays and 1000-1600hrs on Sundays, whereas the hours of operation of the servicing centre will be 0800-1800hrs Monday-Friday and 0830-1230hrs Saturdays, with no Sunday operation.
- 1.11 The various noise indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 ACOUSTIC CRITERIA

- 2.1 The National Planning Policy Framework (NPPF) 2021 provides some general guidance to local authorities on taking noise in to account in planning policies and decisions. This includes guidance that local authorities should *'aim to avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development'*. No specific guidance is given in the NPPF on acoustic criteria, therefore, the guidance discussed below has been used to determine acceptable noise criteria.

BS 4142

- 2.2 British Standard 4142: 2014 +A1:2019 *'Methods for rating and assessing industrial and commercial sound'* provides methods for rating and assessing sound of an industrial and/or commercial nature.
- 2.3 BS 4142 requires the 'rating' noise level for the operation to be compared with the L_{A90} background noise level in the absence of the operational noise. The 'rating' level is derived based on the 'specific' L_{Aeq} noise level attributable to the operation with an 'acoustic feature' penalty added for any noise sources which give rise to tonal, impulsive, intermittent, or other characteristics readily distinctive against the residual acoustic environment.
- 2.4 BS 4142 stipulates that noise impacts should be assessed over a reference time interval of 1-hour during the daytime (0700-2300hrs).
- 2.5 An initial estimate of the impact of the operation is determined by subtracting the background level from the rating level. BS 4142 states that:
- 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 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 level, the less likely it is that the operation 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.

2.6 Where the initial estimate of the impact needs to be modified due to the context, BS 4142 states that all pertinent factors should be taken into account in determining whether the initial estimate of the impact needs to be modified, including:

- The absolute level of sound, including *“where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds background”*
- The character and level of the residual sound
- The sensitivity of the receptor and whether dwellings ... will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
 - i) façade insulation treatment, ii) ventilation and/or cooling, and iii) acoustic screening.

3.0 BACKGROUND NOISE SURVEY

- 3.1 A survey of prevailing background and ambient noise levels was carried out at the site over the period 1100-1330hrs on Thursday 4 November 2021.
- 3.2 Noise monitoring was undertaken in sequential 15-minute samples at three locations, all representative of the nearest residential properties to the proposed development, as identified in Figure 1.
- 3.3 The noise monitoring was undertaken using a Norsonic 118 Class 1 Integrating Sound Level Meter (serial no. 31617) at Location 1, a Norsonic 140 Class 1 Integrating Sound Level Meter (serial no. 1406529) at Location 2, and a Bruel & Kjaer 2260 Type 1 Integrating Noise Level Meter (serial no. 2467014) at Location 3.
- 3.4 Calibration checks were carried out to all equipment using a Bruel & Kjaer Acoustic Calibrator, Type 4231 (serial no. 2389221) before and after the survey, and no variation in calibration level was observed.
- 3.5 Weather conditions during the survey were dry and mild, with a light breeze of speeds typically up to 4m/s of north-westerly direction.
- 3.6 At all locations, the measurement microphones were fitted with windshields. The microphones were mounted in 'free-field' conditions, at heights of 4m above local ground at Locations 1 and 2, and about 1.4m above local ground at Location 3.
- 3.7 All measured noise levels are detailed in Appendix II. The results are summarised in Table 1.

Table 1 : Summary of Background / Ambient Noise Level Survey

Location	dB LA90,15min Ambient Noise Level		dB LA90,15min Background Noise Level		
	Range	Overall	Range	Mean	Mode
1	51-54	52	47-48	47	48
2	49-53	50	46-47	47	47
3	52-53	53	47-49	48	48

4.0 OPERATIONAL NOISE SURVEY

- 4.1 A survey of typical operational noise levels was carried out at the new Caffyns Volkswagen dealership and servicing centre in Worthing on Friday 21 August 2015. Noting this date, the operational noise survey was undertaken in support of the original planning application for the existing Caffyns Audi dealership, adjacent to the proposed development. In terms of type of operations proposed at the Angmering Volvo development, the data acquired remains relevant.
- 4.2 Noise measurements were taken of servicing workshop activities and general vehicle manoeuvres around the site. The purpose of these measurements was to provide representative source noise level data to use as a basis for prediction of operational noise levels at the proposed development.
- 4.3 The noise measurements were undertaken using a Bruel & Kjaer 2260 Type 1 Integrating Sound Level Meter (serial no. 2467014). Calibration checks were carried before and after the survey using a Bruel & Kjaer Acoustic Calibrator, Type 4231 (serial no. 2389221), and no variation in the calibration levels was noted.

Workshop

- 4.4 With regard to the workshop, this was noted to be broadly similar in size and arrangement to that proposed at the Angmering Audi development and now proposed at Angmering Volvo, with a main workshop roller shutter door at one end and a separate MOT bay roller shutter door at the opposite end. These were both open during the operational noise survey, not least as it was a warm day. It is understood that whilst it is usual and preferable to operate with at least the main workshop door open, it is not essential for either of them to be open in terms of the ventilation of the space.
- 4.5 It was confirmed that the workshop operation during the survey was representative of typical conditions, albeit noted that it could be slightly busier at times. In general, noise generation due to working practices was sparse and sporadic, and the workshop radio was the dominant noise source for most of the time.
- 4.6 Minor noise generating activity was due to the use of battery powered hand tools, occasional closure of car doors and staff voices etc. More significant occasional noise is due to use of compressed air guns for wheel nut removal/replacement and car lift operation in the work bays.

- 4.7 A number of noise measurements were undertaken of the general reverberant workshop noise, and also specifically during use of a compressed air gun (operated 'artificially' for a sustained period to assist the noise survey) and of a car lift.
- 4.8 Internal noise measurements were taken as a moving average along the central area of the workshop, biased towards the areas where higher levels were generated throughout the individual measurement periods. Noise measurements during certain activities were also undertaken at 5m to the outside of the open main workshop roller shutter door.
- 4.9 The measured workshop noise levels are summarised in Table 2.

Table 2 : Summary of Workshop Noise Level Measurements

Noise Source	Location	dB L_{Aeq}
General Workshop Noise – Higher Level of Activity	Internal	70
	External	58
General Workshop Noise – Lower Level of Activity	Internal	64
	External	54
Compressed Air Gun (Sustained Operation)	Internal	87
	External	74
Car Lift (Upwards)	Internal	74
Car Lift (Downwards)	Internal	66

- 4.10 From observations of working practices and discussions with servicing centre staff, it is considered that a highly pessimistic estimate for a worst-case one-hour workshop noise level would be based on a cumulative on-time of 4-minutes for each of the compressed air gun, lift upwards and lift downwards, with the general workshop noise at the measured lower level of activity for the remainder of the time.
- 4.11 Based on the measurements summarised in Table 2, this yields a worst-case internal noise level of 76dB $L_{Aeq,1hr}$.
- 4.12 This is 6dB above the measured noise level for a higher level of general activity, corresponding to the busiest (i.e. noisiest) period observed during the survey, and hence corresponds to a fourfold intensification of operation in comparison to that measurement period. This may therefore be taken to be a very robust prediction of the worst-case one-hour workshop noise level.

Vehicle Manoeuvres

- 4.13 As set of noise measurements was undertaken at 5m from a number of vehicles manoeuvring slowly around the site and/or in and out of parking bays. These noise measurements were undertaken in terms of the L_{AE} or SEL (Sound Event Level) index.
- 4.14 The measured vehicle manoeuvre noise levels are summarised in Table 3.

Table 3 : Summary of Vehicle Manoeuvre Noise Level Measurements

Noise Source	Sound Event Level dB L_{AE}	
	Range	Logarithmic Average
Vehicle Manoeuvre at 5m	64-70	69

5.0 NOISE ASSESSMENT AND MITIGATION MEASURES

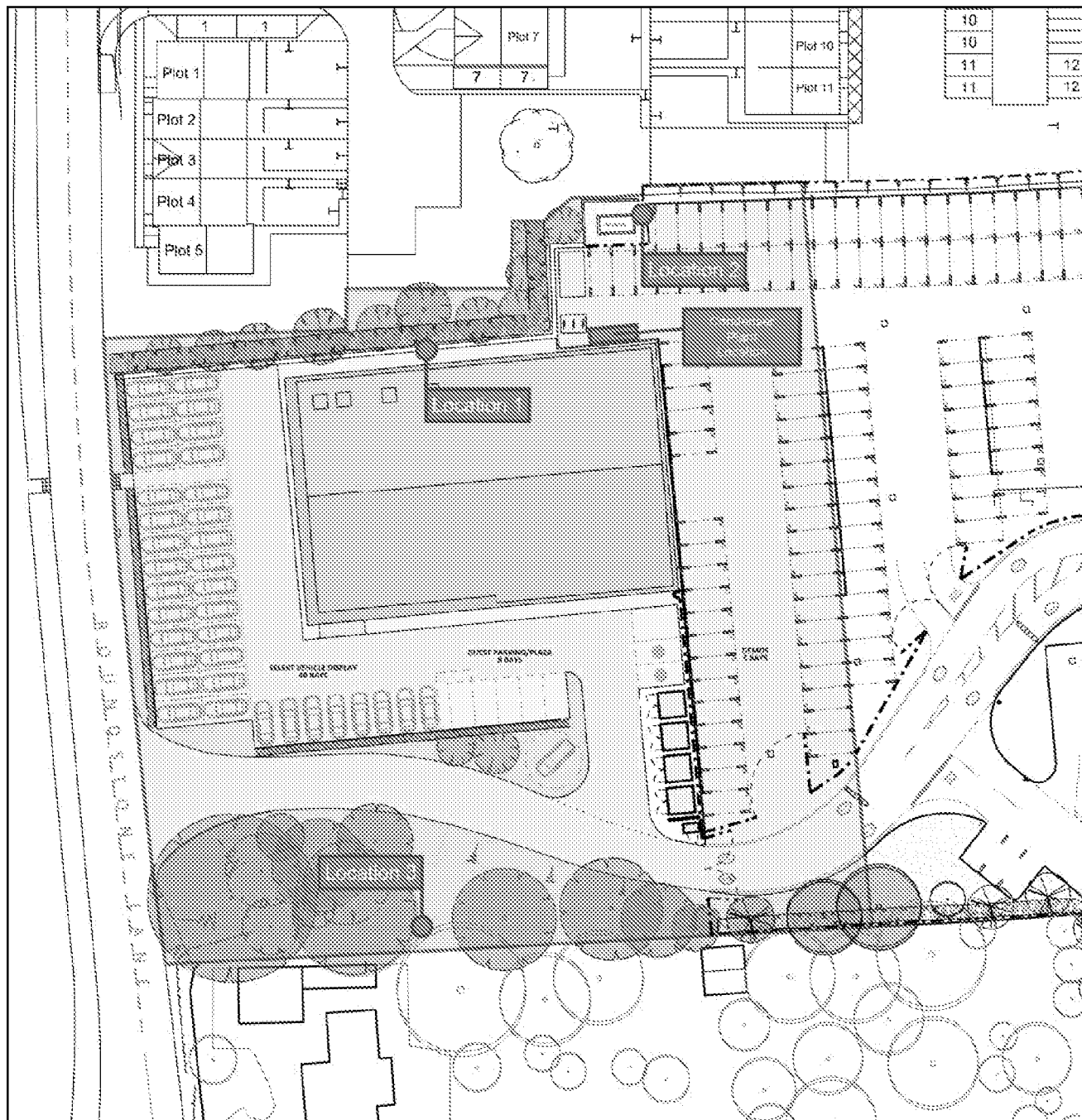
- 5.1 Based on the provisions of BS 4142, it is recommended that the rating level for noise associated with the proposed development should not exceed the existing background noise level. This is an indication of the proposed development having a low noise impact.
- 5.2 Based on the findings of the background noise survey as summarised in Table 1, it is recommended that this should be based on the lowest averaged 15-minute background noise level, i.e. 47 dB L_{A90} . Therefore, the recommended noise limit for the proposed development is 47dB L_{Ar} to be taken as a free-field level at any nearby residential property.
- 5.3 Considering firstly the impact of break-out noise from the proposed servicing workshop. The sound reduction via a closed roller shutter door has been conservatively estimated to be 25dB (inside to outside at 5m), based on experience of similar constructions. From an internal noise level of 76dB $L_{Aeq,1hr}$, this indicates a level of 51dB $L_{Aeq,1hr}$ at 5m with the door closed.
- 5.4 Based on a separation distance of 45m from the roller shutter door, the workshop break-out noise is therefore predicted to not exceed 29dB $L_{Aeq,1hr}$ at the nearest residences. This is based on distance attenuation, and also a conservative -3dB(A) correction to account for the oblique angle of view from the nearby residences to this source.
- 5.5 Accounting for the intermittent and impulsive character of some of the workshop noise sources, an acoustic feature correction of +6dB is considered appropriate in accordance with BS 4142. The predicted rating noise level for the workshop noise is therefore 35dB $L_{Ar,1hr}$ at the nearest residences. This is greater than 10dB(A) below the recommended noise limit and hence would not be expected to result in any adverse impact, or impinge upon overall noise emissions of the development with respect to the recommended limit.
- 5.6 Considering next the noise generated by vehicle movements within the development, this is expected to be very minimal. Based on a nominal scenario of up to 5 vehicle movements within an average of 10m of the boundary of any nearby residence, per hour, then based on the logarithmic average L_{AE} noise levels for vehicle manoeuvres, this equates to a vehicle noise level of 35dB $L_{Aeq,1hr}$. It is not considered that any acoustic feature penalty should be applied to this noise source, as it is comparable in character to the residual noise climate of the area. Noise from vehicle movements within the development are therefore not expected to be noticeable against the residual noise.

- 5.7 Finally, considering the noise generated by proposed building services plant, in terms of the proposed condenser units, the published noise emissions for these are as follows:
- Mitsubishi PURY-EP600YSNW-A1: Sound Power Level = 89dB L_{WA}
 - Mitsubishi PUZ-ZM50VKA: Sound Power Level = 65dB L_{WA}
- 5.8 Based on a separation distance of 25m from the proposed plant location, the predicted condenser noise levels at the nearest residences are predicted to be up to 51dB $L_{Aeq,T}$. This is entirely attributable to the PURY-EP600YSNW-A1 unit, as would be expected given that emissions from the smaller unit are 24dB(A) lower.
- 5.9 The predicted level takes account of surface reflections at the source plus a -5dB(A) correction due to the worst-case angle of view over the units, from nearby residences. This is based on extensive experience of noise measurements around similar units, noting that manufacturer's published data indicates a -9dB(A) difference between sound pressure levels at 1m directly above and 1m directly to the side of the unit.
- 5.10 Accounting for the likely intermittent character of the condenser units, an acoustic feature correction of +3dB is considered appropriate in accordance with BS 4142. The predicted rating noise level for condensers is therefore 54dB $L_{Ar,1hr}$ at the nearest residences. This is 7dB(A) greater than the recommended noise limit. Therefore, further noise mitigation measures will be required.
- 5.11 Noting that AHU intake and discharge, and extract grilles are also proposed, it is recommended noise emissions from the PURY-EP600YSNW-A1 unit are reduced by ~10dB(A). This will allow some further contribution from the proposed AHU and extract systems to be present.
- 5.12 There are a number of potential means of achieving the required level of noise reduction, including introduction of localised proprietary acoustic screening around the plant, of sufficient height to preclude the line-of-sight to the equipment from all habitable room windows, or by installation within a proprietary acoustic enclosure, or by fitting of proprietary bespoke bolt-on attenuator kits, as are available for this type of unit.
- 5.13 The precise means of achieving the required level of noise reduction will be a detailed design matter, and overall control of noise may be readily enshrined and enforced by way of a suitably worded planning condition.

- 5.14 Indeed, as discussed, precise details of the proposed AHU and extract systems are not confirmed at this stage. Generally, noise generation from this type of system will be straightforward to control. The noise-generating components (i.e. the fans) are expected to be housed internally to the building in this case, with external noise via the intake and discharge grilles only. Noise emissions from these elements may be controlled by incorporation of suitably specified in-duct attenuators or acoustic louvres.
- 5.15 Following on from above, it is recommended that, broadly, a noise rating level target of 44dB L_{Ar} should be adopted cumulative for these ducted elements, incorporating any acoustic feature penalty as necessary, to ensure that the combined effect of the noise from grilles and condenser noise does not exceed the overall recommended noise limit. However, the relative contributions may be kept under review during the detailed design. As stated, the overall recommended noise limit may be readily enshrined and enforced by way of a suitably worded planning condition.

6.0 SUMMARY AND CONCLUSIONS

- 6.1 Hepworth Acoustics has undertaken a noise impact assessment relating to a planning application for a proposed new Caffyns Volvo dealership and servicing centre at a site to the east of Roundstone Lane, in Angmering, West Sussex.
- 6.2 A background noise survey has been undertaken at the site during a period that is representative of proposed operational hours.
- 6.3 A survey of typical operational noise levels has been undertaken at a similar development to that proposed: Caffyns Volkswagen dealership and servicing centre at Worthing, and available plant details for the proposed development have been reviewed.
- 6.4 The noise impact of the proposed development has been assessed in accordance with British Standard 4142: 2014 +A1:2019 '*Methods for rating and assessing industrial and commercial sound*'.
- 6.5 Recommendations have been made to ensure a low noise impact from the development in line with BS 4142.

Figure 1 – Site Plan

Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Glossary of Term

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

L_{Aeq} This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.

L_{A90} This is the A-weighted noise level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.

L_{AE} This is the total A-weighted sound energy produced by an event and is effectively the L_{Aeq} of an event normalised to a duration of 1 second in length. L_{AE} can be scaled according to the number of events and can be further manipulated to provide an average noise level $L_{Aeq,T}$.

Appendix II: Background Noise Survey Results

Date	Noise Level dB								
	Location 1			Location 2			Location 3		
	<i>L</i> _{Aeq}	<i>L</i> _{Amax}	<i>L</i> _{A90}	<i>L</i> _{Aeq}	<i>L</i> _{Amax}	<i>L</i> _{A90}	<i>L</i> _{Aeq}	<i>L</i> _{Amax}	<i>L</i> _{A90}
11:00	52	65	47	50	63	47	-		
11:15	53	70	47	53	74	47			
11:30	52	69	48	50	65	47	53	76	48
11:45	52	60	48	50	58	47	53	65	49
12:00	52	61	47	49	56	47	52	65	47
12:15	52	60	48	50	57	47	53	65	48
12:30	51	59	47	49	61	46	-		
12:45	52	70	47	49	65	47			
13:00	53	66	48	51	66	47			
13:15	54	71	48	52	70	47			