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10c WARNER STREET, LONDON, EC1

Technical Note

Acoustic Assessment Report - DRAFT

29th February 2016 Peter Clark

1. INTRODUCTION

1.1 A noise survey has been carried out adjacent to the commercial property at the rear of 10c Warner Street, London, EC1. The noise survey and assessment report is required to accompany a retrospective Planning Application for the installation of air conditioning equipment at the property. Four units have been installed which are located on the rear wall of the property. 10c Warner Street is a commercial premises, undergoing refurbishment, which will be office space on completion. The air conditioning units are only expected/required to operate during normal office hours, on week-days, although allowance is made in the noise assessment should the units be required to run into evening, night and weekend periods. There are residential properties nearby in Rosebery Avenue and the nearest neighbouring areas for assessment purposes are the rear windows of these properties together with the terrace area above 10c Warner Street itself. The rear of the neighbouring block of flats in Mount Pleasant is also considered. Although the distance is much greater, there is no inherent barrier between the units and these windows.

1.2 The measurements have shown that the proposed installation meets with the requirements of the London Borough of Camden (LBC)

Environmental Noise Policy and no additional noise attenuation measures need to be incorporated to comply with LBC noise thresholds.

1.3 The site location and surroundings are given in Figure 1 below:

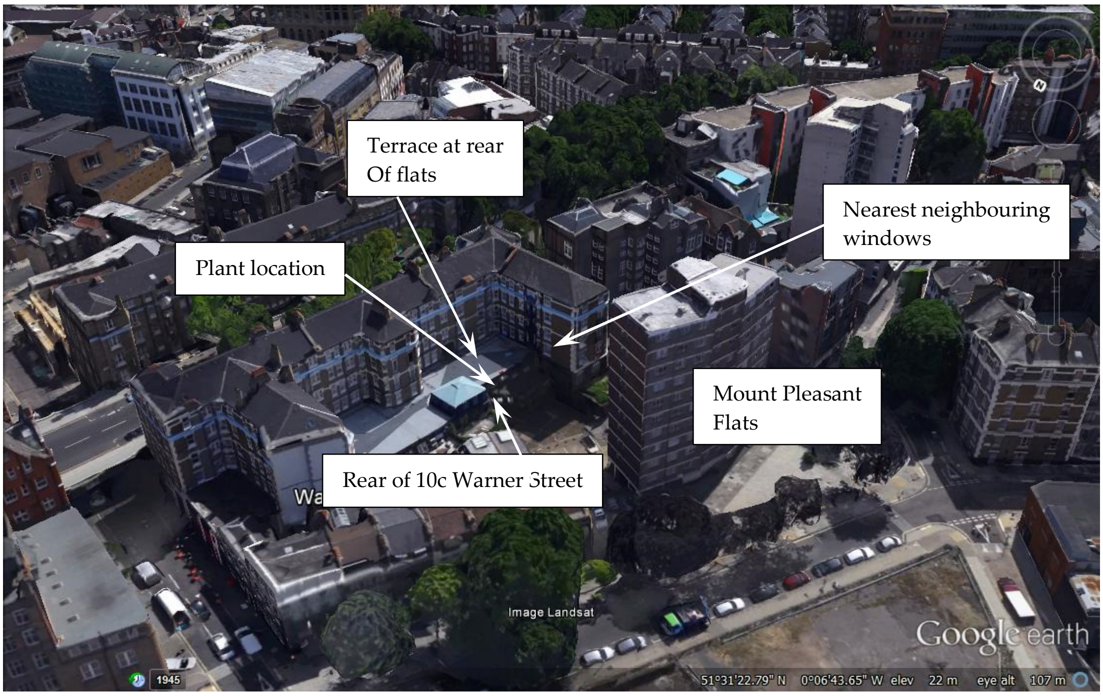

Figure 1: Site Location (© Google Maps)

2.0 NOISE MEASUREMENTS

2.1 Environmental noise measurements were carried out from Thursday 18th February to Tuesday 23rd February 2016. Sound level measurement equipment was installed in the roof at the rear of the property (near to the closest neighbouring windows) and used to log noise levels over the five day period. The measurement equipment is listed below in Table 1.0.

Table 1.0 Environmental Noise Measurement Instrumentation

No.	Description
1.	Larson Davis Model 812 Sound Level Meter.
2.	Larson Davis Model 2541 1/2" Diameter Condenser Microphone.
3.	Bruel & Kjaer Type 4231 Sound Level Meter Calibrator.

2.2 All acoustic equipment conforms to the relevant parts of BS EN 60651:1994 (equivalent to BS 5969:1981) for the requirements of Type 1 acoustic accuracy. Additionally, the relevant equipment conforms to the specifications contained within BS EN 60804:1994 (equivalent to BS 6698:1976) for integrating sound level meters.

2.3 In order to verify the correct operation of the equipment on site, an acoustic calibrator was applied during the course of the measurements. A maximum change of 0.1 dB(A) was noted, this can be considered as an insignificant change. The calibrator complies with the specifications of IEC 942:2003. The noise measurement equipment was previously laboratory calibrated in October 2015.

2.4 Fast meter response was used for all measurements carried out during the course of the survey.

2.5 Noise levels are expressed in terms of continuous equivalent noise levels (L_{Aeq}) over an appropriate time period. The use of L_{Aeq} allows non-steady and non-continuous noise to be assessed and compared to the existing noise climate. L_{Aeq} is referred to as the ambient noise level. In addition to this background noise levels have also been measured and are expressed as L_{A90}. A full explanation of terminology commonly used in the measurement and assessment of noise levels is given in Appendix B at the end of this report.

3.0 RESULTS

3.1 Noise level measurements were carried out at 5 minute intervals during the survey period. Ambient (L_{Aeq}) and background (L_{A90}) noise levels were measured. Minimum noise levels for the day-time (07:00 to 19:00 hrs), evening time period (19:00 to 23:00 hrs) and night time period (23:00 to 07:00 hrs) have been determined.

Table 2: Summary Results

	Day	Evening	Night
L_{A90}	51.0(46.5)*	48.0(44.7)*	45.5(43.1)*
L_{Aeq}	59.2	52.0	49.2

*Note: The lowest day time background noise level measured during the survey period was 46.5 dB(A) and occurred at 6.15pm on Sunday 21st February 2016. The corresponding lowest evening and night time background noise levels were 44.7 dB(A) and 43.1 dB(A) which occurred at 10.15pm on Monday 22nd February and 2.15am on Tuesday 23rd February 2016 respectively.

3.2 Although the survey was not attended on a full time basis, it was noted that during site visits that the area at the rear of 10c Warner Street is relatively quiet and sheltered but some noise from passing traffic and construction activities on the property itself was also audible. A full listing of 15 minute interval data for the period is given in the graph at the end of this report (Figure A1).

3.3 Noise level data for the installed units are given as 55 dB(A) and 56 dB(A) respectively in heating mode when measured at 1m (See attached data sheets shown in Figure A.2 – Mitsubishi PUHZ-P125 VHA3 and PUHZ-P140 VHA3).

3.4 The nearest neighbouring areas for assessment are the rear window of the ground floor flat of the neighbouring property (Rosebery Avenue) and the terrace area, at the rear of the Rosebery Avenue flats (at 1st floor roof level of 10c Warner Street) . There is no clear line of sight from these areas to the units as the rear wall of 10c Warner Street itself acts as a noise barrier. The rear of the flats in Mount Pleasant are also considered. These windows are a greater distance, but there is no inherent shielding between the units and the windows themselves. A layout drawing is shown in Figure A3. Calculated noise levels are as follows:

Rear Window – Rosebery Avenue

- Total S.P.L. at 1m: 62 dB(A) – (all units operating)
- Barrier/shielding effect from rear wall: -10 dB(A)
- Distance correction (8m): - 18.1 dB(A)
- Resultant predicted noise level: 33.9 dB(A)

Terraced Area – Rear of Rosebery Avenue Flats

- Total S.P.L. at 1m: 62 dB(A) – (all units operating)

- Barrier/shielding effect from rear wall: -10 dB(A)
- Distance correction (5m): - 13.9 dB(A)
- Resultant predicted noise level: 38.1 dB(A)

Rear Window – Mount Pleasant Flats

- Total S.P.L. at 1m: 62 dB(A) – (all units operating)
- Distance correction (18m): - 25.1 dB(A)
- Resultant predicted noise level: 36.8 dB(A)

3.5 The London Borough of Camden Replacement Unitary Development Plan – Appendix 1; Table E "Noise levels from plant and machinery at which planning permission will not be granted" is listed below.

Noise description and location of measurement	Period	Time	Noise Level
Noise at 1 metre external to noise sensitive façade	Day, evening & night	0000-2400	5dB(A)<L_{A90}
Noise that has a distinguishable discrete continuous note	Day, evening & night	0000-2400	10dB(A)<L_{A90}
Noise that has distinct impulses	Day, evening & night	0000-2400	10dB(A)<L_{A90}
Noise at 1 metre external to sensitive façade where L_{A90}>60dB	Day, evening & night	0000-2400	55dB L_{Aeq}

3.6 The proposed air conditioning equipment does not attract the + 5 dB(A) correction referred to in *" paragraph 8 of BS4142"* (i.e. contains no distinguishable discrete continuous note or distinct impulses)

3.6 For unrestricted operation (i.e. 24h/day), the night-time periods is critical and it therefore follows that the criterion to meet is 38.1 dB(A). It therefore follows that the required noise limits are met without the need for additional noise mitigation measures.

3.7 A photograph of the area showing the location of the noise monitoring equipment is shown in the Figure A.4 of Appendix A of this report.

4.0 CONCLUSION

4.1 A noise measurement survey and assessment has been carried out on the external air conditioning condensing plant installed on the rear wall of the commercial property at 10c Warner Street, London, EC1.

4.2 The proposed installation has been shown to meet with the London Borough of Camden's acoustic criteria. Additional attenuation measures are not required.

APPENDIX A: GRAPHS AND FIGURES.

Figure A.1: Environmental Noise Measurement Data – 21st to 29th January 2016

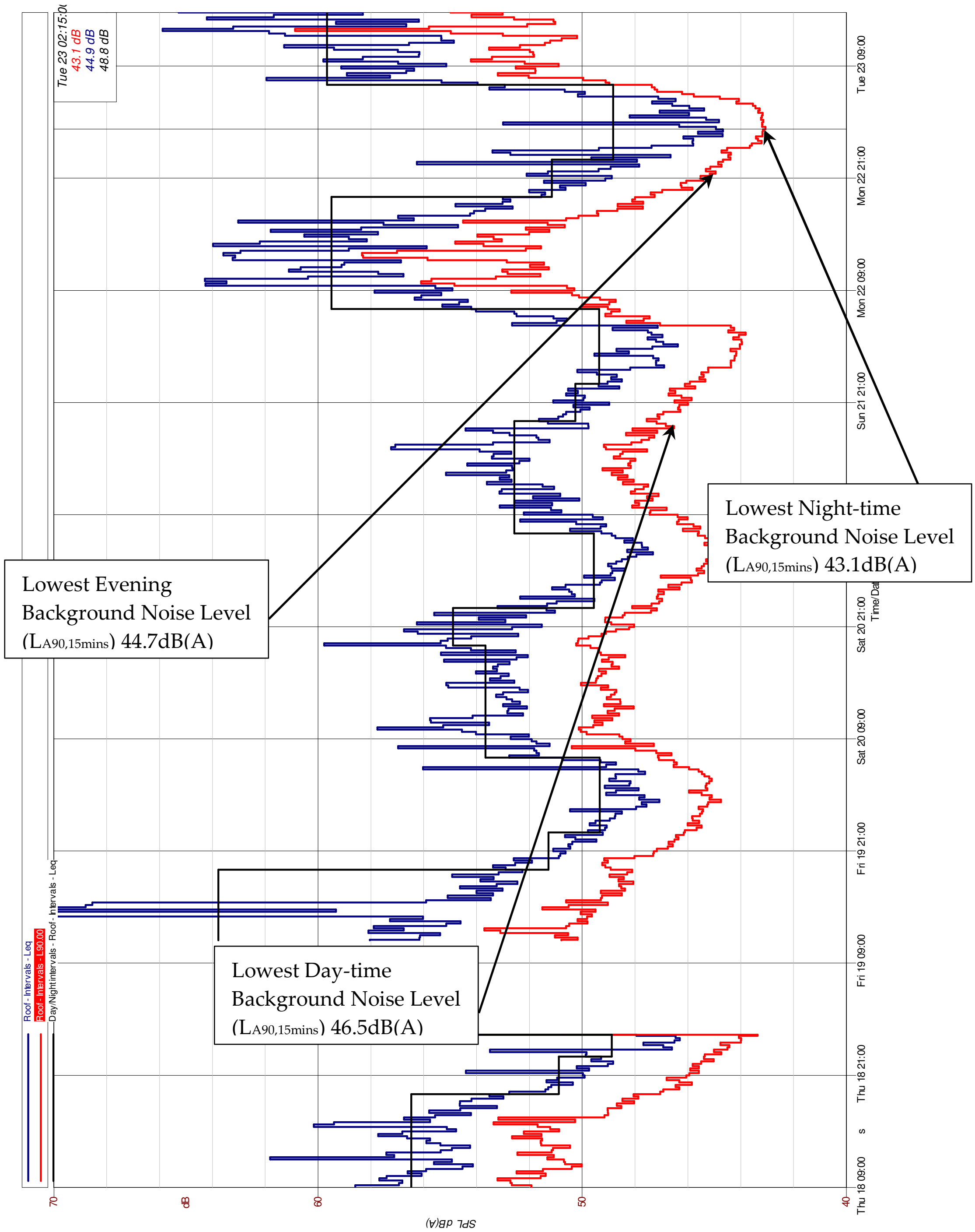

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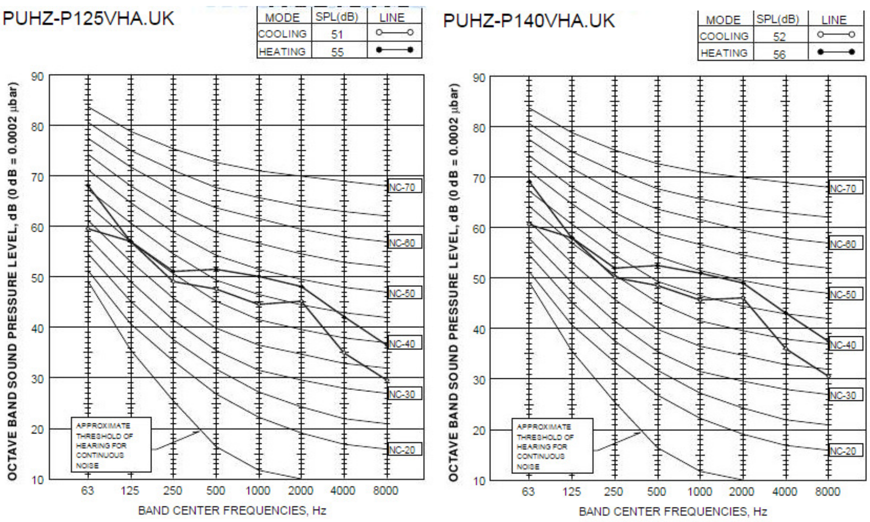
Figure A2: Equipment Noise Data

Mitsubishi PUHZ-P125 VHA3 & P140 VHA3



Service Ref.				PUHZ-P125VHA2.UK PUHZ-P125VHA21.UK PUHZ-P125VHA3.UK PUHZ-P125VHA3R1.UK		PUHZ-P140VHA2.UK PUHZ-P140VHA21.UK PUHZ-P140VHA3.UK PUHZ-P140VHA3R1.UK	
Mode				Cooling	Heating	Cooling	Heating
OUTDOOR UNIT	Power supply (phase, cycle, voltage)			Single 50Hz, 230V			
		Running current	A	17.37	16.74	22.48	21.31
		Max. current	A	28		29.5	
	External finish			Munsell 5Y 7/1 / Munsell 3Y 7.8/1.1 (VHA3R1)			
	Refrigerant control			Linear Expansion Valve			
	Compressor			Hermetic			
		Model		TNB306FPGM			
		Motor output	kW	3.4		3.9	
		Starter type		Inverter			
		Protection devices		HP switch Discharge thermo			
	Crankcase heater		W	30			
	Heat exchanger			Plate fin coil			
	Fan	Fan(drive) × No.		Propeller fan × 2			
		Fan motor output	kW	0.060+0.060			
		Airflow	m^3/min(CFM)	100(3,530)			
	Defrost method			Reverse cycle			
	Noise level	Cooling	dB	51		52	
		Heating	dB	55		56	
	Dimensions	W	mm(in.)	950(37-3/8)			
		D	mm(in.)	330+30(13+1-3/16)			
		H	mm(in.)	1,350(53-1/8)			
	Weight		kg(lbs)	99(218)			
	Refrigerant			R410A			
		Charge	kg(lbs)	4.5(9.9)			
		Oil (Model)	L	0.87(FV50S)			
REFRIGERANT PIPING	Pipe size O.D.	Liquid	mm(in.)	9.52(3/8)			
		Gas	mm(in.)	15.88(5/8)			
	Connection method	Indoor side		Flared			
		Outdoor side		Flared			
	Between the indoor & outdoor unit	Height difference		Max. 30m			
		Piping length		Max. 50m			

Figure A.3: Layout Drawing

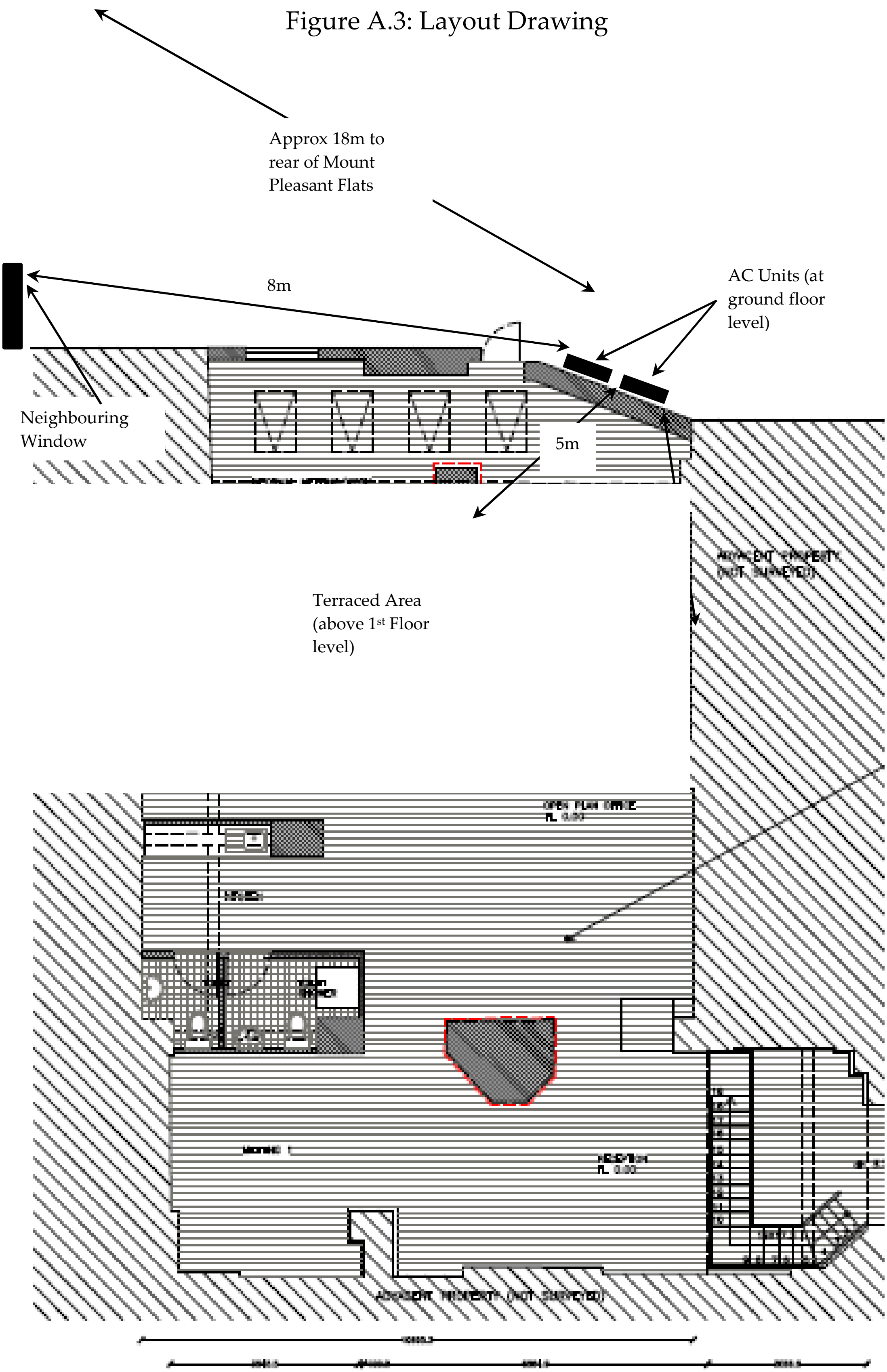


Figure A.4: Noise Monitoring Equipment at rear of 10c Warner Street

APPENDIX B: GLOSSARY OF NOISE TERMS AND UNITS.

1.0 Noise

1.1 The sounds that we hear are as a result of successive air pressure changes. These air pressure changes are generated by vibrating sources, such as train engines or wheels, and they travel to a receiver, i.e. the human ear, as air pressure waves.

1.2. The human ear is capable of detecting a vast range of air pressures, from the lowest sound intensity that the normal ear can detect (about 10^{-12} watts/m^2) to the highest that can be withstood without physical pain (about 10 watts/m^2). If we were to use a linear scale to represent this range of human sensitivity it would encompass more than a billion units. Clearly this would be an unmanageable scale yielding unwieldy numbers.

1.3. The scale can be compressed by converting it to a logarithmic or Bel scale, the number of Bels being the logarithm to the base 10 of one value to another (as applied by Alexander Graham Bell to measure the intensity of electric currents). The Bel scale gives a compressed range of 0 to 12 units which in practice is a little too compressed. A more practical operating range of 0 to 120 is obtained by multiplying by 10, ie. 10 x Bel, which produces the scale units known as decibels or dB.

1.4. Examples of typical sound intensity levels within the decibel range of 0 to 120 dB are listed below:

Commercial four-engine jet aircraft at 100m	120dB
Riveting of steel plate at 10m	105dB
Pneumatic drill at 10m	90dB
Circular wood saw at 10m	80dB
Heavy road traffic at 10m	75dB

Male speech, average, at 10m	50dB
Whisper at 10m	25dB
Threshold of hearing, 1000Hz	0dB

1.5. Due to this logarithmic scale noise levels have to be combined logarithmically rather than arithmetically. For example, two equal sound sources of 70 dB each, when operated simultaneously, do not produce a combined level of 140 dB but instead result in a level of 73 dB, ie. A rise of 3dB for each doubling of sound intensity. Subjectively, a 3dB change does not represent a doubling or halving of loudness; to make a sound appear twice as loud requires an increase in sound pressure level of about 10dB.

1.6. The subjective loudness of noise can be measured by applying a filter or weighting which equates to the frequency response of the human ear. This is referred to as an A-weighting and when applied results in noise levels expressed as dB(A).

1.7. dB(A) noise levels can be measured using a variety of noise indices. The index which correlates best with human response due to machinery noise is the L_{Aeq} this is the A-weighted L_{eq} which is referred to as the 'equivalent continuous noise level' and is a measure of the total sound energy generated by a fluctuating sound signal within a given time period.