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Units 1-5, Panattoni Park Brighton Shoreham-by-Sea

Planning Compliance Report
Report 27750.PCR.01

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KP Acoustics Ltd. 2024

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1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by Glencar Construction (South) Limited, Glencar House, 32-34 Upper Marlborough Road, St Albans, AL1 3UU to undertake a noise impact assessment of a proposed plant unit installation serving the building at Units 1-5, Panattoni Park Brighton, Shoreham-by-Sea, BN43 5FF.

A 6-day environmental noise survey has been undertaken on site and the background noise levels measured will be used to determine daytime and night-time noise emission criteria for a proposed plant installation in agreement with the planning guidance of Adur District Council.

This report presents the overall methodology and results from the environmental survey, followed by calculations to demonstrate the feasibility of the plant unit installation to satisfy the emissions criterion at the closest noise-sensitive receiver. Mitigation measures will be outlined as appropriate.

2.0 SITE SURVEYS

2.1 Site Description

As shown in Figure 2.1, the site is bounded by Almond Avenue to the north, Cecil Pashley Way and the River Adur to the east, with Brighton City Airport forming the west and south boundaries. A27/Shoreham Bypass is approximately 300m from the site to the north, and can be heard prominently on the site.



Figure 2.1 Site Location Plan (Image Source: Google Maps)

Initial inspection of the site revealed that the background noise profile at the monitoring location was dominated by traffic noise from the A27/Shoreham Bypass, raised by noise from air traffic at the neighbouring Brighton City Airport (formerly Shoreham Airport).

2.2 Environmental Noise Survey Procedure

Continuous automated monitoring was undertaken for the duration of the noise survey between 10/01/2024 at 11:30 and 16/01/2024 at 11:00.

The environmental noise measurement position, proposed plant installation locations, and the closest noise sensitive receiver relative to the plant installations are described within Table 2.1 and shown within Figure 2.2. The site layout and plant positions are shown in Figure 2.3.

Icon	Descriptor	Location Description
1	Noise Measurement Position 1	The microphone was installed above a fence at approximately 2.5m height, as shown in Figure 2.2. The microphone was positioned within free-field conditions at least approx. 1.5 metres from the nearest surface.
2	Noise Measurement Position 2 (Attended)	The microphone was installed on a tripod at approximately 1.5m height, as shown in Figure 2.2. The microphone was positioned within free-field conditions at least approx. 1.5 metres from the nearest surface.
	Nearest noise sensitive receptors	1st Floor window on the front façade of 192 Old Shoreham Road - a residential house to the east, across the river.
	Proposed plant installation location	Proposed plant installations are outlined in Section 5.1.

Table 2.1 Measurement positions and descriptions



Figure 2.2 Site measurement, receiver and plant positions (Image Source: Google Maps)



Figure 2.3 Plant Location Plan (Image Source: Glencar/HTA Architects)

The choice of the position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver and the proposed plant installation. It also avoided areas where generators and other constant construction noise affected the background noise climate, by positioning away from these and using the current building progress as a screen.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

2.3 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed. The equipment used is described within Table 2.2.

Measurement instrumentation		Serial no.	Date	Cert no.
Noise Kit 37	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21302-E0	12/09/2023	UK-23-103
	Free-field microphone NTI Acoustics MC230A	A23082		
	Preamp NTI Acoustics MA220	13798		
	NTI Audio External Weatherproof Shroud	-	-	-
Noise Kit 38	NTI Audio XL2 Class 1 Sound Level Meter	A2A-23182-E1	12/09/2023	UK-23-104
	Free-field microphone NTI Acoustics MC230A	A25833		
	Preamp NTI Acoustics MA220	13818		
	NTI Audio External Weatherproof Shroud	-	-	-
B&K Type 4231 Class 1 Calibrator		2147411	05/06/2023	UCRT23/1739

Table 2.2 Measurement instrumentation

3.0 RESULTS

The $L_{Aeq:\ 5min}$, $L_{Amax:\ 5min}$, $L_{A10:\ 5min}$ and $L_{A90:\ 5min}$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as a time history in Figure 27750.TH1.

Representative background noise levels are shown in Table 3.1 for daytime and night-time.

It should be noted that the representative background noise level has been derived from the most commonly occurring $L_{A90,5\ min}$ levels measured during the environmental noise survey undertaken on site, as shown in 27750.Daytime L90.TH1 and 27750.Night-time L90.TH1 attached.

Time Period	Representative background noise level L_{A90} dB(A)
Daytime (07:00-23:00)	55
Night-time (23:00-07:00)	39

Table 3.1 Representative background noise levels

On site observations and the available departures and arrivals list shows that there are often significant periods between aircraft movements at the site, so the low background noise levels, measured in 5 minute increments are often unaffected or mostly unaffected by the aircraft movements. The traffic noise from the A27/Shoreham Bypass is more dominant. This was also confirmed by short, concurrent measurements during the site visit, across the river outside the front façade of 192 Old Shoreham Road. These measurements were of a similar level or higher than those at the unattended position, likely caused by the addition of local traffic increasing the noise level consistently. This means that the unattended position is a worst-case low background noise level, and has therefore been used to represent the receiver for this assessment.

Measurement Period	Noise Level Measurement, L_{A90}, dBA	
	Measurement Location 1 (Unattended)	Measurement Location 2 (Attended)
12:16-12:21	52	57
12:21-12:26	55	59
12:26-12:31	53	57

Table 3.2 Manned noise measurements

4.0 NOISE ASSESSMENT GUIDANCE

4.1 Local Authority Guidance

The guidance provided by Adur District Council for noise emissions of new plant in this instance is as follows (from the *Planning Noise Advice Document: Sussex*):

"The rating level of the industrial or commercial sound source should, where practicable, achieve a level no greater than the representative background sound, when measured in accordance with BS 4142:2014 + A1: 2019. There may be instances, for specific sites, where a rating level below background is deemed appropriate. This can be determined through discussion with the Local Planning Authority (LPA). A rating level below background may be required if there are concerns for potential noise creep, for example in a High Street setting."

4.2 Noise Emissions Criterion

As the proposed plant installation could be used at any time of the day or night, the criterion has been set as shown in Table 4.1 in order to comply with the above guidance.

Time Period	Maximum Plant Noise Emissions Criterion at Nearest Residential Receiver
Night-time (23:00 to 07:00)	39 dB(A)

Table 4.1 Proposed noise emissions criterion

5.0 NOISE IMPACT ASSESSMENT

5.1 Proposed Plant Installations

It is understood that the proposed plant installation is comprised of the following air conditioning VRF units:

- VRF Units 1, 2A, 2B and 5 – 1 Panasonic U-8MF3E8 each, 4 total
- Units 2C, 3 – 1 Panasonic U-10MF3E8 each, 2 total
- Units 4 – 1 Panasonic U-14MF3E8

The proposed installation location for the proposed plant installations will be at the walls of the units, as shown in Figure 2.3 above.

The noise emission levels as provided by the manufacturer for the units are shown in Table 5.1.

Unit	Descriptor	Octave Frequency Band (Hz)								Overall (dBA)
		63	125	250	500	1k	2k	4k	8k	
Panasonic U-8MF3E8	SPL@1m (dB)	64	63	56	52	46	39	35	34	54
Panasonic U-10MF3E8	SPL@1m (dB)	61	68	62	54	49	43	38	38	58
Panasonic U-14MF3E8	SPL@1m (dB)	84	72	63	58	52	45	38	32	63

Table 5.1 Plant Units Noise Emission Levels as provided by the manufacturer

The closest noise sensitive receiver to the proposed installation location has been identified as a 1st Floor window on the front façade of 192 Old Shoreham Road – a residential house to the east, across the river, located approximately 280 metres from the closest point of the proposed plant installation location, as shown in Figure 2.2.

5.2 Calculations

Taking all acoustic corrections into consideration, the noise level contribution expected at the closest residential window from the proposed plant installation would be as shown in Table 5.2. Detailed calculations are shown in Appendix B.

Receiver	Criterion	Noise Level at 1m From the Closest Noise Sensitive Window
1st Floor window on the front façade of 192 Old Shoreham Road	39dB(A)	20dB(A)

Table 5.2 Predicted noise level and criterion at nearest noise sensitive location

As shown in Appendix B and Table 5.2, transmission of noise to the nearest sensitive windows due to the effects of the proposed plant installation satisfies the emissions criterion of Adur District Council.

6.0 ANTI-VIBRATION MOUNTING STRATEGY

In the case of all plant units, appropriate anti-vibration mounts should be installed in order to ensure that vibrations do not give rise to structure-borne noise. Appendix C outlines detailed advice in order to ensure that the system installer selects the appropriate anti-vibration mount for the installation.

It is the supplier's responsibility to ensure that all mountings offered are suitable for the loads, operating and environmental conditions which will prevail.

7.0 NOISE MANAGEMENT PLAN

The client is constructing the buildings on site, but will not operate them, and has no information on the manner of their future use. Therefore, in order to control noise from all proposed scenarios, the following general noise management plan would be advised in all instances.

- The site is near to an existing earth bund that obstructs deliveries from line of sight from the nearest residential receivers, so no further screening should be required to reduce noise from deliveries or on-site vehicle movement.
- In order to avoid loud music, or unnecessary noise from cars, clear signage should be installed at the entrance to the commercial park.
- Delivery vehicles, including vans and HGV's should not be allowed to idle on site, and should be provided with clear routes to allow for minimised turnaround times.
- In order to limit the potential effects of tonality in terms of BS4142 penalties, broadband noise sounders should be used in all cases of reversing HGV's and forklifts, as opposed to traditional tonal reversing sounders.
- Tenants of the buildings should be encouraged to assess their operations and provide clear signage and procedures to eliminate excessive noise generation.

8.0 CONCLUSION

An environmental noise survey has been undertaken at Units 1-5, Panattoni Park Brighton, Shoreham-by-Sea, BN43 5FF by KP Acoustics Ltd between 10/01/2024 at 11:30 and 16/01/2024 at 11:00. The results of the survey have enabled criteria to be set for noise emissions.

Using manufacturer noise data, noise levels are predicted at the nearby noise sensitive receivers for compliance with current guidance.

Calculations show that noise emissions from the plant unit installation would meet the guidance of Adur District Council. The proposed plant installation would result in no adverse impact on the closest residential receiver, in accordance with BS4142:2014.

A noise management plan has been produced to reduce the generation of unnecessary noise at the site from moving plant and machinery.

Units 1-5, Panattoni Park Brighton, Shoreham-by-Sea - Position 1
Environmental Time History
10/01/2024 to 16/01/2024

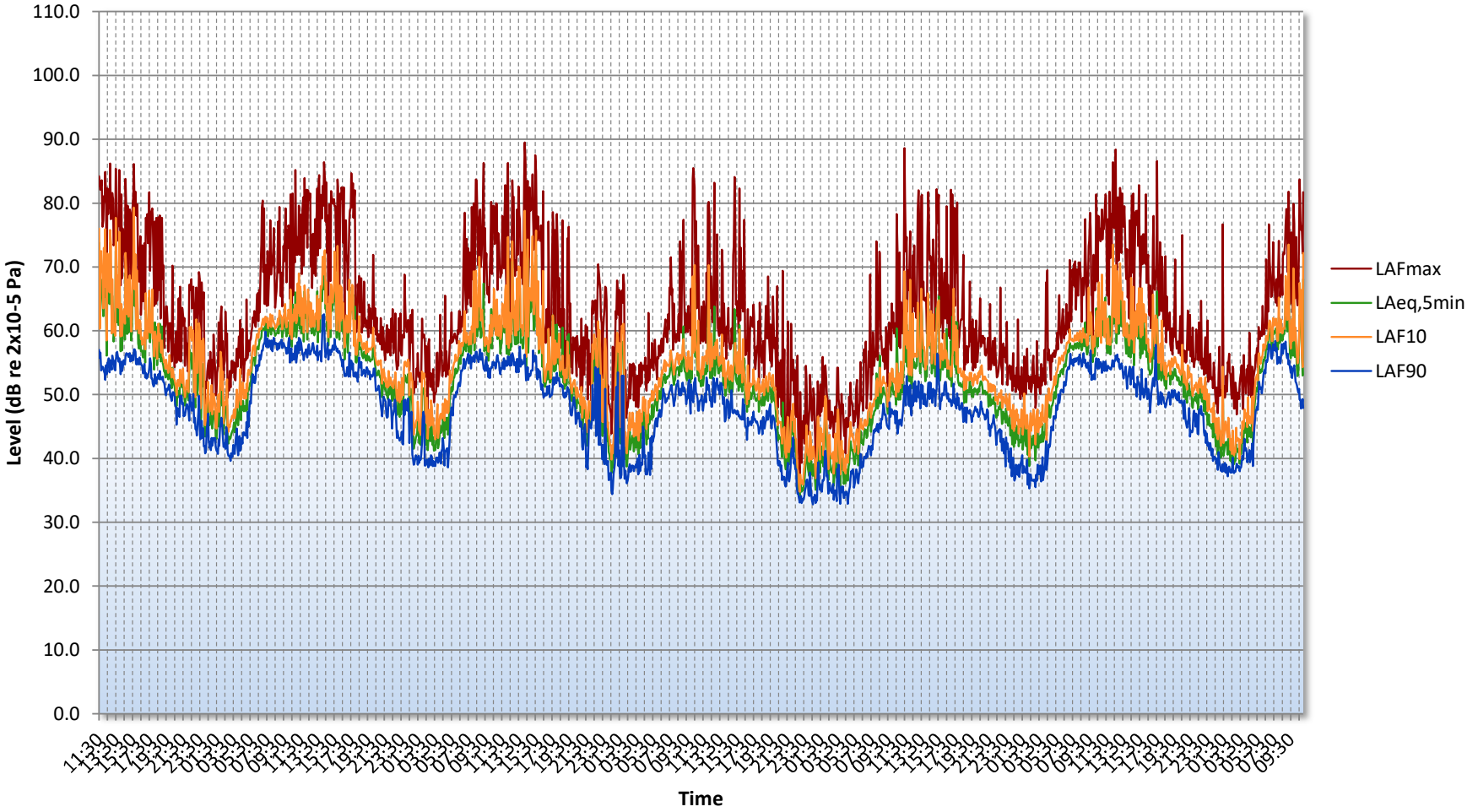

Figure 27750.TH1

Units 1-5, Panattoni Park Brighton, Shoreham-by-Sea - Position 1
Representative Daytime Background Noise Level
10/01/2024 to 16/01/2024

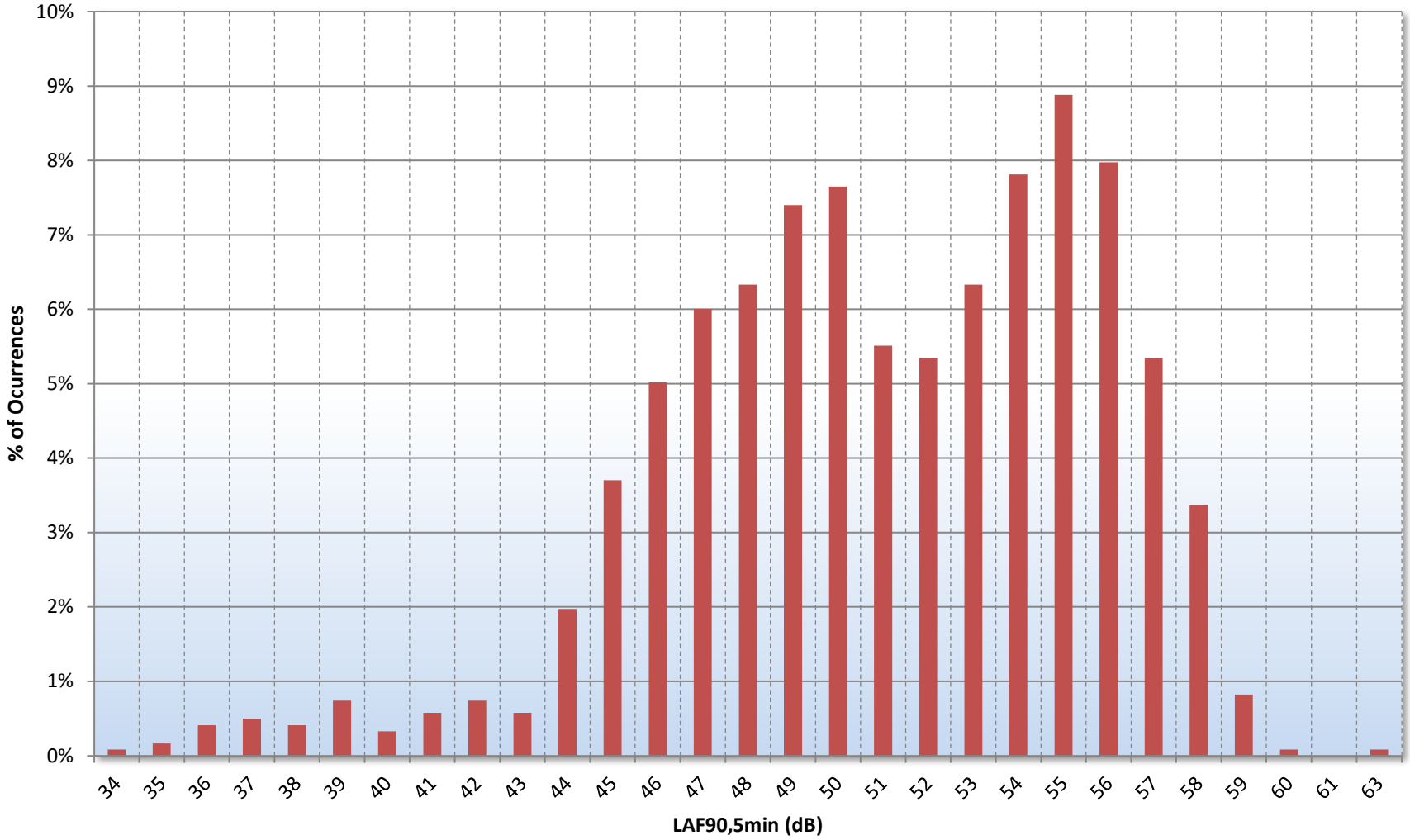

Figure 27750.Daytime

Units 1-5, Panattoni Park Brighton, Shoreham-by-Sea - Position 1
Representative Night-time Background Noise Level
10/01/2024 to 16/01/2024

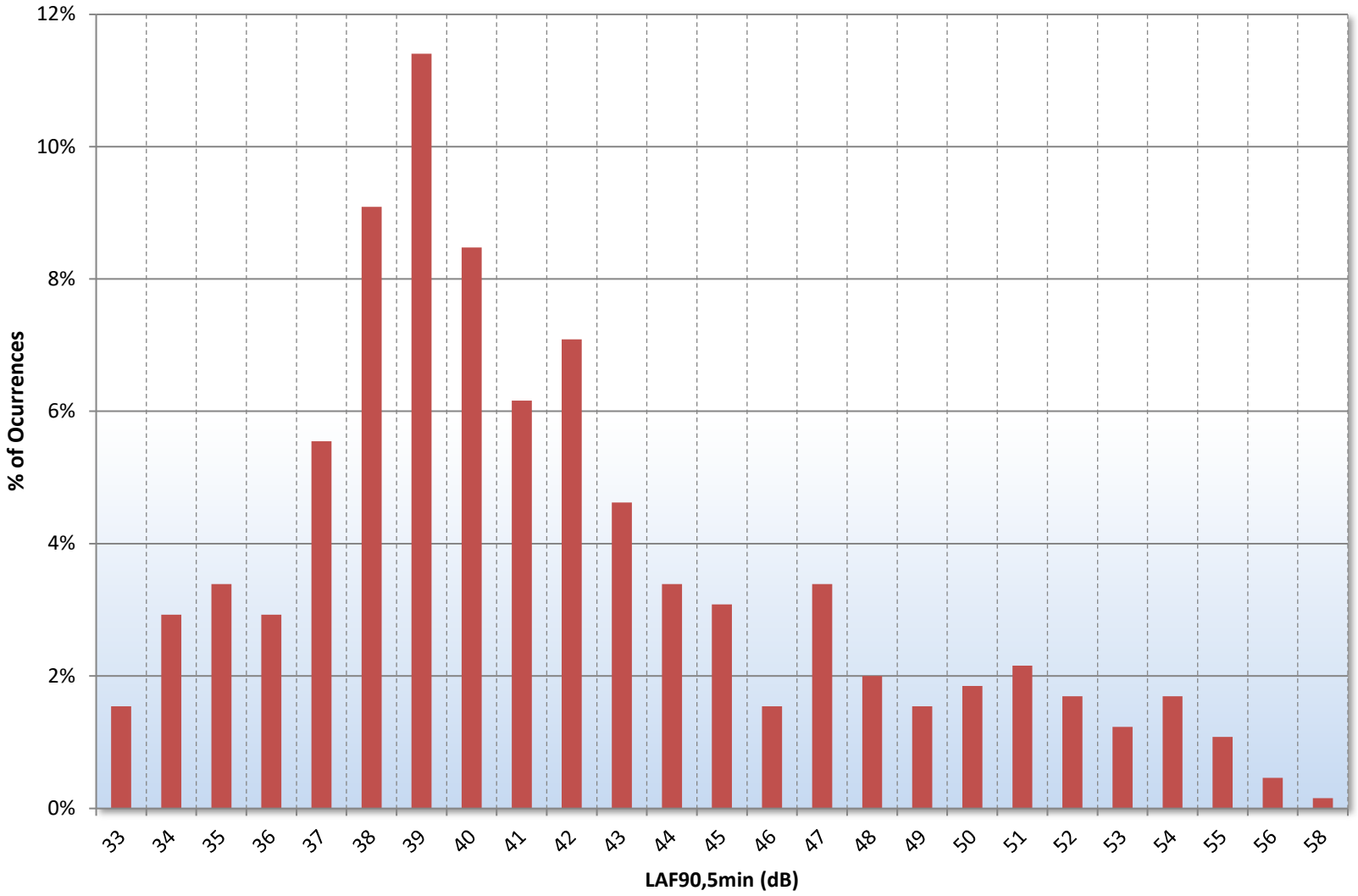

Figure 27750.Night-time L90.TH1

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

APPENDIX B

Units 1-5, Panattoni Park Brighton, Shoreham-by-Sea, BN43 5FF

PLANT NOISE EMISSIONS CALCULATIONS

Source: Units on roof of Panattoni Park **Receiver: 1st Floor window of 192 Old Shoreham Road**	***Frequency, Hz***								***dB(A)***
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	
Panasonic U-8MF3E8 (Sound Pressure Level @1m)	64	63	56	52	46	39	35	34	54
Correction due to surface reflections (1), dB	3	3	3	3	3	3	3	3	
Correction for number of units (4),dB	6	6	6	6	6	6	6	6	
Minimum attenuation provided by distance (280m), dB	-49	-49	-49	-49	-49	-49	-49	-49	
Total Specific Level of above Plant Units at Receiver	24	23	16	12	6	-1	-5	-6	14
Panasonic U-10MF3E8 (Sound Pressure Level @1m)	61	68	62	54	49	43	38	38	58
Correction due to surface reflections (1), dB	3	3	3	3	3	3	3	3	
Correction for number of units (2),dB	3	3	3	3	3	3	3	3	
Minimum attenuation provided by distance (280m), dB	-49	-49	-49	-49	-49	-49	-49	-49	
Total Specific Level of above Plant Units at Receiver	18	25	19	11	6	0	-5	-5	15
Panasonic U-14MF3E8 (Sound Pressure Level @1m)	84	72	63	58	52	45	38	32	63
Correction due to surface reflections (1), dB	3	3	3	3	3	3	3	3	
Minimum attenuation provided by distance (320m), dB	-50	-50	-50	-50	-50	-50	-50	-50	
Total Specific Level of above Plant Units at Receiver	37	25	16	11	5	-2	-9	-15	15
Total Specific Level of all Plant Unit Installations at Receiver	37	29	22	16	11	4	-1	-2	20
BS4142 Acoustic Feature Corrections									
Tonality	0	0	0	0	0	0	0	0	
Impulsivity	0	0	0	0	0	0	0	0	
Intermittency	0	0	0	0	0	0	0	0	
Total Rating Noise Level of all Plant Unit Installations at Receiver	**37**	**29**	**22**	**16**	**11**	**4**	**-1**	**-2**	**20**

Design Criterion	**39**

APPENDIX C

ANTI-VIBRATION MOUNTING SPECIFICATION REFERENCE DOCUMENT

1.0 General

1.1 All mountings shall provide the static deflection, under the equipment weight, shown in the schedules. Mounting selection should allow for any eccentric load distribution or torque reaction, so that the design deflection is achieved on all mountings under the equipment, under operating conditions.

1.2 It is the supplier's responsibility to ensure that all mountings offered are suitable for the loads, operating and environmental conditions which will prevail. Particular attention should be paid to mountings which will be exposed to atmospheric conditions to prevent corrosion.

1.3 All mountings shall be colour coded, or otherwise marked, to indicate their load capacity, to facilitate identification during installation.

Where use of resilient supports allows omission of pipe flexible connections for vibration/noise isolation, it shall be the Mechanical Service Consultant's or Contractor's responsibility to decide whether such devices are required to compensate for misalignment or thermal strain.

2.1 Type A Mounting (Caged Spring Type)

2.1.1 Each mounting shall consist of cast or fabricated telescopic top and bottom housings enclosing one or more helical steel springs as the principle isolation elements, and shall incorporate a built-in levelling device. The housing should be designed to permit visual inspection of the springs after installation, i.e. the spring must not be totally enclosed.

2.1.2 The springs shall have an outside diameter of not less than 75% of the operating height, and be selected to have at least 50% overload capacity before becoming coil-bound.

2.1.3 The bottom plate of each mounting shall have bonded to it a rubber/neoprene pad designed to attenuate any high frequency energy transmitted by the springs.

2.1.4 Mountings incorporating snubbers or restraining devices shall be designed so that the snubbing, damping or restraining mechanism is capable of being adjusted to have no significant effect during the normal running of the isolated machine.

2.1.5 All nuts, bolts or other elements used for adjustment of a mounting shall incorporate locking mechanisms to prevent the isolator going out of adjustment as a result of vibration or accidental or unauthorised tampering.

2.2 Type B Mounting (Open Spring Type)

2.2.1 Each mounting shall consist of one or more helical steel springs as the principal isolation elements, and shall incorporate a built-in levelling device.

2.2.2 The springs shall be fixed or otherwise securely located to cast or fabricated top and bottom plates, shall have an outside diameter of not less than 75% of the operating height, and shall be selected to have at least 50% overload capacity before becoming coil-bound.

2.2.3 The bottom plate shall have bonded to it a rubber/ neoprene pad designed to attenuate any high frequency energy transmitted by the springs.

2.3 Type C Mounting (Rubber/Neoprene Type)

Each mounting shall consist of a steel top plate and base plate completely embedded in oil resistant rubber/neoprene. Each mounting shall be capable of being fitted with a levelling device, and should have bolt holes in the base plate and a threaded metal insert in the top plate so that they can be bolted to the floor and equipment where required.

3.0 Plant Bases

3.1 Type A Bases (A.V. Rails)

An A.V. Rail shall comprise a steel beam with two or more height-saving brackets. The steel sections must be sufficiently rigid to prevent undue strain in the equipment and if necessary should be checked by the Structural Engineer.

3.2 Type B Bases (Steel Plant Bases)

Steel plant bases shall comprise an all-welded steel framework of sufficient rigidity to provide adequate support for the equipment, and fitted with isolator height saving brackets. The frame depth shall be approximately 1/10 of the longest dimension of the equipment with a minimum of 150 mm. This form of base may be used as a composite A.V. rail system.

3.3 Type C Bases (Concrete Inertia Base: for use with steel springs)

These shall consist of an all-welded steel pouring frame-work with height saving brackets, and a frame depth of approximately 1/12 of the longest dimension of the equipment, with a minimum of 100 mm. The bottom of the pouring frame should be blanked off, and concrete (2300 kg/m^3) poured in over steel reinforcing rods positioned 35 mm above the bottom. The inertia base should be sufficiently large to provide support for all parts of the equipment, including any components which over-hang the equipment base, such as suction and discharge elbows on centrifugal pumps.