

Plant Noise Impact Assessment Report for a Retrospective Planning Application

8 Madeira Parade, Madeira Avenue, Bognor Regis, PO22 8DX

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1 INTRODUCTION

ES Acoustics Ltd have been instructed by Mr. Rajeev Gunaratnam to prepare a noise impact assessment in support of a retrospective planning application for the installation of 1 no. new chiller condenser unit at 8 Madeira Parade, Madeira Avenue, Bognor Regis, PO22 8DX.

The structure of this report is as follows:

- A review of site context and details of the chiller installation, including the installation location of the unit, the locations of the closest noise-sensitive receptors relative to the unit, and the noise emissions data;
- A review of national planning policy, local planning policy and acoustic guidance relevant to the proposal;
- Details of the environmental noise survey undertaken on site to determine background noise levels at nearby noise-sensitive receptor locations; and
- The noise impact assessment in accordance with the requirements of BS 4142:2014+A1:2019 *'Methods for rating and assessing industrial and commercial sound'*.

2 SITE CONTEXT AND BACKGROUND INFORMATION

2.1 Site Description

The application site is in a residential area of Bognor Regis within the jurisdiction of the Arun District Council. The site is situated within Madeira Parade, which is broadly comprised of Class E ground floor units, with the upper floors being duplex flats above over first and second floors, as is the case with the application site.

The application site is bounded by Madeira Avenue to the west, an access road to the north with residential properties beyond, residential garages to the east, and residential properties to the south.

The background noise profile is comprised of road traffic noise from the surrounding roads.

2.2 Details of Plant Under Assessment

A Marstair MRC 50+ chiller condenser unit has been installed on the rear elevation of the building to provide cooling to an internal refrigeration unit within the convenience store.

Figure 1 presents a site photograph showing the installation location of the new unit under assessment in red, and the most affected noise-sensitive receptor window relative to the unit in green, and the distance (in metres) between the unit and the receptor window is shown in yellow.

Note that while two other chiller condenser units are pictured, these are understood to have planning consent, and therefore, this assessment only considers the addition of the 1 no. new unit.



Figure 1 Proposed floor and elevation plans (Image Reference: SJM Planning)

The datasheet of the chiller unit is presented in Appendix B. The sound pressure level of the unit is reported to be 33 dB(A) at 10 metres, which is equivalent to 53 dB(A) at 1 metre in free field conditions. As no spectral noise emissions data is provided by the manufacturer, data has been sourced from a similar chiller condenser unit, with the same overall sound level, such that the spectral content of the sound can be considered. This is summarised in Table 1.

Source Assessment Levels	Octave band centre frequency, Hz dB								dB(A) @1m
	63	125	250	500	1k	2k	4k	8k	
Marstair MRC 50+ chiller condenser unit	-	-	-	-	-	-	-	-	53
Spectral noise emissions from a similar unit (J&E Hall JEHR-0170-B2-M-1)	-	54	56	51	47	41	35	28	53

Table 1 Spectral noise emissions of the chiller unit at 1m

3 RELEVANT PLANNING POLICY AND GUIDANCE

3.1 Summary

The following planning policy and good practice guidance documents have been reviewed and considered when preparing this report:

- National Planning Policy
 - National Planning Policy Framework (NPPF)
 - Noise Policy Statement for England (NPSE)
 - National Planning Practice Guidance (NPPG)
- Local and Regional Planning Policy and Guidance
 - The Arun Local Plan 2011-2031
 - Planning Noise Advice Document: Sussex
- Other Acoustic Guidance
 - BS 4142: 2014 +A1:2019 'Methods for Rating and Assessing Industrial and Commercial Sound'
 - World Health Organisation Guidelines for Community Noise (1999)
 - BS 8233: 2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'

A summary of the documents reviewed is provided in Appendix C.

3.2 Report Methodology

Planning Noise Advice Document: Sussex states the following with regard to considerations for new noise sources:

2.6.1 For a new noise source being introduced near existing noise sensitive premises then an ambient and background noise survey (L_{A90}) should cover the times when the proposed development will be in operation. The expected levels and duration of all the potential noise sources likely to be in operation from the proposed development, whether measured or predicted, should be provided with details of tonality, character, impulsivity and/or intermittency of each noise (e.g. BS 4142). Reference shall also be made if a noise source is anticipated to be readily distinctive against the residual acoustic environment. This could also apply to extensions/ alterations to existing development.

2.6.2 To facilitate analysis of acoustic reports it is expected that the raw and processed data is presented in an appropriate electronic format that allows the LPA to perform further calculations without need to re-enter the data. As a minimum it is expected that the results of real time monitoring are presented graphically. In addition, and with BS 4142 in mind, where the LPA considers it appropriate, a graph shall be presented displaying the background and residual sound level as measured for each reference time interval (T_r) (One hour periods between 07:00 to 23:00 and 15 minute periods between 23:00 and 07:00); the rating level, L_{A,r,T_r} shall be determined for the reference time intervals (the specific sound level plus

any adjustment for the characteristic features of the sound) over which the noise source is operational and the representative background sound level as determined by the report author.

3.2.1 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. It is considered that meeting this criterion would avoid adverse noise impacts, in the interests of ensuring a good standard of amenity and protecting human health. Where these criteria are not attainable, the noise report should explain why, and how best practicable means will be implemented to control noise in order to satisfy the LPA that the development is acceptable. At all times the reports shall have regard to the context. Good Acoustic Design will be a consideration for any mitigation proposals.

Based on the above, this report will follow the methodology of BS 4142:2014+A1:2019. A summary of this British Standard is provided in Appendix C, along with additional notes with regard to the contextual aspects of the assessment.

Given the location of the site, ES Acoustics Ltd would consider a Rating Level equal to or less than the background sound level to ensure no adverse impacts upon surrounding residents.

4 ENVIRONMENTAL NOISE SURVEY

4.1 Measurement Location and Procedure

An environmental noise survey was undertaken on site, as shown in Figure 2, with the location considered representative of the closest noise-sensitive receptor windows.



Figure 2 Noise survey measurement location

The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*', with automated monitoring undertaken between 11:30 on Tuesday, 4th November and 11:30 on Wednesday, 5th November 2025.

The key acoustic descriptors measured for this assessment are as follows:

- $L_{Aeq,T}$ (the continuous equivalent A-weighted noise level over a given time period, T); and
- $L_{A90,T}$ (the noise level exceeded for 90% of the measurement period T , referred to as the 'background' noise level).

As the external chiller condenser units serve internal refrigeration units, including dairy and perishable goods, it was not possible to turn the units off for the full duration of the survey. However, the units were switched off between 22:00-08:00 so that residual and background sound levels could be established without the contribution of the units during night-time hours. As the unit under assessment would be operational 24/7, this would ensure that the worst-case scenario is considered.

To establish residual and representative background sound levels during daytime hours, the integration time of the sound level meter was set to 1-minute intervals, which coincided with the cyclical nature of the units such that data could be captured during periods when the units were cycled off (during the site

visit, it was observed that the “off” period of the units ranged from 1 to 5 minutes, so a 1 minute integration would ensure ample periods where the units were not operational). This ensured that the on and off cycle of the units was captured within the noise time history trace, which is clearly shown in Appendix D. By analysing the data in this manner, it is possible to establish both residual and representative background sound levels during daytime, during periods when the units were off.

4.2 Measurement Equipment

Table 2 presents the equipment used for the baseline noise survey. The equipment calibration was verified before and after use, and no abnormalities were observed.

Equipment	Make and Model	Serial Number
Sound Level Meter	Svantek 958A	69072
Microphone Capsule	PCB 377B02	355563
Microphone Preamplifier	PCB 426E01	168159
Calibrator	Svantek SV33 Class 1 Sound Calibrator	125829

Table 2 Noise survey equipment

4.3 Survey Results

An environmental noise time history of the measurement data is presented in Appendix D.

With regards to the background sound level, BS 4142:2014+A1:2019 notes that “...it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.”

In terms of quantifying what background sound levels are typical during particular periods, ESA have undertaken a statistical analysis of the background noise data, as shown in Appendix E. Note that during daytime hours, this analysis only considers periods where the units were cycled off, which is clearly shown in the noise time history trace.

A summary of the measurement results and background sound analysis is presented in Table 3 for daytime and night-time. For the avoidance of doubt, Residual Sound Levels are established when all units were non-operational.

Period	Residual Sound Level $L_{Aeq, T}$ (dB)	Representative Background Sound Levels L_{A90} (dB)
Daytime 07:00-23:00	47	46
Night-time 23:00-07:00	44	40

Table 3 Overall noise survey results

With regard to background sound levels during daytime hours, ESA would consider a level of L_{A90} 46 dB as representative. This value, or a higher value, was present for 75% of the period in question.

With regard to background sound levels during night-time hours, ESA would consider a level of L_{A90} 40 dB as representative. This value, or a higher value, was present for 93% of the period in question.

5 NOISE IMPACT ASSESSMENT

5.1 Unmitigated Noise Levels at the Closest Noise-Sensitive Receptor

The Specific Sound Level of the chiller condenser unit has been assessed at the closest noise-sensitive receptor, considering various factors such as attenuation over distance, local reflections, etc. Full calculations are shown in Appendix F.

To establish the Rating Level as required by BS 4142:2014+A1:2019, appropriate acoustic feature corrections should be applied to the Specific Sound Level. It must be noted that the acoustic feature corrections are applied based on the level at the receptor location, not at the source, as they are reflective of the sound perceived by the receptor.

Note that basic acoustic theory states that when one sound source is 10 dB louder than another, the louder source will mask the quieter sound. Therefore, the Specific Sound Levels calculated at the receptor locations would be considered relative to the background level when applying acoustic feature corrections, i.e. if the Specific Sound Level is sufficiently below the background level, then it would be highly unlikely that acoustic features would be perceptible.

Concerning tonality, the spectral noise content of the chiller unit would be considered broadband in nature, and therefore, no correction would be deemed applicable. This is clearly shown within the calculations presented in Appendix F.

With regard to intermittency, the chiller would cycle on and off depending on internal load requirements. Therefore, a 3 dB correction would be applied for intermittency.

Operational noise emissions from a chiller would not be considered impulsive, and therefore, no correction is applied.

Table 4 compares the Rating Sound Level calculated at each of the receptor locations against the background sound level during daytime and night-time.

Full calculations are presented in Appendix F.

Time	Background Sound Level dB $L_{A90, T}$	Specific Sound Level at Receptor dB $L_s = L_{Aeq, Tr}$	Rating Level at Receptor dB $L_{Ar, Tr}$	+/- compared against the background dB
07:00-23:00	46	39	42	-7
23:00-07:00	40	39	42	+2

Table 4 Summary of the Rating Level at the receptors

BS 4142:2014+A1:2019 notes that a noise source under assessment will have a low impact when the Rating Level of a noise source is less than the existing background noise, and that *“a difference of around +5 dB could be an indication of an adverse impact, depending on the context”*. Given that the Rating Level is above the background sound level by a margin of 2 dB, it would be considered that there is a possibility of an adverse impact, and therefore, mitigation measures are proposed to reduce the likelihood of adverse impacts.

5.2 Noise Mitigation Measures

To reduce noise emissions to the closest noise-sensitive receptor, we would recommend that a barrier be installed to the side of the unit facing the receptor, as well as below. This would reduce noise emissions to the receptor by blocking the line of sight between the chiller and the receptor property. Given the proximity to the adjacent chiller condenser unit, it would be logical to install the barrier around both units for ease of installation, which would in turn have the additional benefit of reducing noise emissions from the existing unit.

The construction of the barrier can be from heavy-duty timber panels with a minimum surface mass of 15 kg/m^3 (or a similar product with the same surface mass, if preferred). To minimise the effects of reflections from the barrier surfaces, the unit facing sides of the barrier should be lined with 50mm Whisper UV polyethylene foam panels (available from CMS Danskin), which would ensure that reflected sound from the hard adjacent surfaces is minimised. Details of the product are provided in Appendix G.

The positioning of the barrier is provided in Figure 3. Note that the barrier should extend outwards by at least the depth of the units.



Figure 3 Proposed barrier positioning

5.3 Mitigated Noise Levels at the Closest Noise-Sensitive Receptor

Repeat calculations have been undertaken with the mitigation implemented to demonstrate its effectiveness.

The table below summarises the predicted worst-case noise levels at the closest receptor during daytime and night-time, with full calculations presented in Appendix F.

Time	Background Sound Level dB $L_{A90, T}$	Specific Sound Level at Receptor dB $L_s = L_{Aeq, Tr}$	Rating Level at Receptor dB $L_{Ar, Tr}$	+/- compared against the background dB
07:00-23:00	46	34	37	-9
23:00-07:00	40	34	37	-3

Table 5 Summary of the Rating Level at the receptors

BS 4142:2014+A1:2019 notes that a noise source under assessment will have a low impact when the Rating Level of a noise source is less than the existing background noise. It is also important to note that

any quantitative assessment results are assessed considering the context in which the sound occurs, which is discussed below.

5.4 Context

As outlined in Section 2.3.1, the three types of contexts which should be considered are:

- *aspects of the absolute level;*
- *aspects of character; and*
- *aspects of the receptor, including physical measures designed to reduce noise.*

Concerning the absolute level, the level in question would be considered low. The 1997 edition of BS 4142 stated that “background noise levels below about 30 dB and Rating Levels below about 35 dB are considered to be very low”. The calculated Specific Sound Level of 34 dB(A) is therefore 1 dB below what BS 4142 considers as low.

BS 8233:2014 and WHO Guidelines note that a suitable internal noise level inside a residential building during night-time hours is 30 dB(A). Both standards note that a partially open window would provide a 10-15 dB reduction from outside to inside. Therefore, the calculated Specific Sound Level outside of the building of 34 dB(A) would be equivalent to an internal level of 19-24 dB(A), which would be well below the recommended internal noise level during night-time hours of ≤ 30 dB(A).

With regard to aspects of character, the immediate area is already exposed to some level of building services noise due to the existing chiller units. Therefore, the noise source in question is not introducing a new type of noise into an area where such a noise does not already exist.

Concerning aspects of the receptor properties, it is likely that in hot summer months, the residents of the properties may open their windows for additional cooling. As noted above, the calculated internal sound level with a partially open window would be at least 6 dB lower than the recommended internal sound level stipulated in BS 8233:2014 during night-time hours. Therefore, in the event that a resident does open their window for additional cooling during hot summer months, noise emissions from the new unit would be well below BS 8233 recommendations. In the event that the window of the receptor property is closed, an additional reduction of at least 30 dB would be expected from outside to inside from the double-glazed window units.

5.5 Assessment of Impacts

Considering the calculated Rating Levels compared to the background sound level and the context in which the sound occurs, it is the professional opinion of ES Acoustics Ltd that the newly installed chiller condenser unit would result in a low likelihood of adverse impact in accordance with BS 4142:2014+A1:2019, providing that the mitigation measures are implemented as detailed within this report.

6 CONCLUSION AND SUMMARY

ES Acoustics Ltd have been commissioned by Mr. Rajeev Gunaratnam to prepare a noise impact assessment in support of a retrospective planning application for the installation of 1 no. new chiller condenser unit at 8 Madeira Parade, Madeira Avenue, Bognor Regis, PO22 8DX.

An environmental noise survey has been undertaken to establish background sound levels representative of the closest noise-sensitive receptor relative to the proposed installation location of the unit.

The manufacturer's noise data of the proposed chiller unit have been used to calculate expected noise levels at the closest noise-sensitive receptors in accordance with BS 4142:2014+A1:2019 for comparison with representative background sound levels.

Considering the calculated Rating Levels compared to the background sound level and the context in which the sound occurs, it is the professional opinion of ES Acoustics Ltd that the proposed chiller installation would result in a low likelihood of adverse impact in accordance with BS 4142:2014+A1:2019, providing that the mitigation measures are implemented as detailed within this report (see Section 5.2).

GLOSSARY OF ACOUSTIC TERMINOLOGY

Decibel scale - dB

The decibel (dB) is a relative unit of measurement used in acoustics. The dB is a logarithmic ratio between a measured level and a reference level of 0 dB (i.e the threshold of human hearing). Simply put, the decibel compresses the wide range of sounds we hear into more manageable numbers.

Addition of noise from several sources

Sound produced by multiple sound sources are added logarithmically e.g. power ratio of 2 = 3dB, power ratio of 10 = 10dB. Therefore, two equally intense sound sources operating simultaneously produce a sound level which is 3dB higher than a single source e.g. 60dB + 60dB = 63dB.

Subjective impression of noise

Human response to sound is highly individualized and often based on psychological factors such as emotion and expectation. Sensitivity to sound typically depends on the loudness, pitch, duration of the occurrence, and time of occurrence (e.g. a sound source could cause annoyance during the night where it would not during the day). The following table is a guide to explain increases or decreases in sound levels for many scenarios.

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

'A' Weighted Frequency Filter - dB(A)

The human ear is not equally sensitive in all frequencies. The A-weighting filter was devised to take this into account when undertaking noise measurements and allows a sound level meter to replicate the human ears response to sound.

$L_{Aeq, T}$

Sound can fluctuate widely over a given period. L_{Aeq} is the A-weighted equivalent continuous sound level, with T denoting the time period over which the fluctuating sound levels were averaged e.g. $L_{Aeq, 16h}$ is the equivalent continuous noise level over an 16 hour period.

L_{A90}

A-weighted sound level exceeded for 90% of the measurement period, calculated via statistical analysis. The L_{A90} descriptor is typically used to establish background sound levels for noise impact assessments

L_{A10}

A-weighted sound level exceeded for 10% of the measurement period, calculated via statistical analysis.

L_{AFmax}

A-weighted sound level maximum sound pressure level that has been measured over a given time period

GLOSSARY OF ACOUSTIC TERMINOLOGY

Octave Bands

The audio or frequency spectrum of the human ear is in the range of 20Hz to 20 kHz. The spectrum tells how the energy of the sound signal is distributed in frequency. Octave bands divides the audio spectrum into 10 equal parts. The International Standards Organisation defines the centre frequency of these bands as 31.5Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1kHz, 2kHz, 4kHz, 8kHz and 16kHz.

Noise Rating (NR) Curves

A method of rating noise using a set of curves relating octave band sound pressure levels. Typically used for building services systems within offices

Airborne sound

Sound radiated from a source into the surrounding air e.g. musical instruments, tv/radio, machinery/equipment. Airborne sound insulation refers to the reduction or attenuation of airborne sound, usually via a solid partition between a source and receiver.

Impact sound

Sound resulting from the impact between colliding objects, e.g. footfall impact upon a floor. Impact sound insulation refers to the resistance of a floor to the transmission of impact sound, typically via the installation of a 'resilient layer'

Flanking sound

The transmission of airborne sound between two adjacent rooms by paths other than via the separating partition between the rooms, e.g. the abutment point of a wall and floor.

Structure-borne noise

Noise caused by the vibration of elements of a structure. This can result in reradiated noise, whereby the vibrating element transmits airborne sound into a space e.g. vibration caused by mechanical plant installed within a plant room which is not adequately isolated from the structure, or construction/demolition work in an adjacent building.

Reverberant sound

Sound in an enclosed space (usually a room), which results from repeated reflections at the boundaries. Reverberation time is the time taken for a steady sound level in an enclosed space to decay by 60dB, measured from the moment the sound source is switched off. A example of a typically reverberant space would be a classic church. Absorptive materials can be used to reduce reflections and reverberation times.

APPENDIX B

MANUFACTURER NOISE DATA

MARSTAIR
REFRIGERATION AND SPECIALIST AIR CONDITIONING

INSTALLATION & TECHNICAL MANUAL



SPECIFICATION DETAILS

MRC+		15	20	30	40	45	50	60	80	90	100	130	150	165	180
Nominal cooling capacity (-10°C evaporating temp & 32°C ambient temp) R404A	kW 1Ph 3Ph	1.1 -	1.4 -	2.0 2.0	2.9 2.9	2.9 2.9	3.9 3.9	4.6 4.6	5.5 5.5	6.4 6.4	7.1 7.1	- 8.1	8.8 8.8	- 10.5	- 11.6
Operating weight kg	1Ph	46	47	48	53	61	64	65	66	76	81	-	103	-	-
	3Ph	-	-	48	53	-	64	65	66	76	81	101	103	103	118
1 Ph (230V 50Hz) compressor load only (at nominal cooling capacity)															
Power (nominal)	kW	0.82	1.12	1.42	2.07	1.43	2.03	2.26	2.61	3.03	3.92	-	4.52	-	-
Starting current LRA	A	23	28	36	50	35	58	61	76	110	114	-	142	-	-
Nominal current FLA	A	5.9	6.9	8.1	10.2	10.0	8.9	9.8	11.5	16.9	20.5	-	32.3	-	-
3Ph (400v 50Hz) compressor load only (at nominal cooling capacity)															
Power (nominal)	kW	-	-	1.42	2.07	-	2.03	2.26	2.61	3.03	3.92	4.46	4.52	5.29	5.82
Starting current LRA	A	-	-	18	22	-	26	32	40	48	51	62	68	71	71
Nominal current FLA	A	-	-	3.6	4.8	-	4.2	4.2	4.9	7.1	7.2	7.7	8.7	9.5	11.9
Sound Pressure Levels (SPL) at 10m distance in free field conditions @ 27°C external ambient.															
Fan speed max	dBA	34	34	34	34	33	33	33	34	37	38	37	37	37	39
	NR	28	28	28	28	27	27	27	27	30	31	30	30	30	32
Condenser fan (1Ph 230V 50Hz)															
Airflow (max speed)	m³/s	0.32	0.32	0.71	0.71	0.91	0.91	0.91	0.91	0.91	0.91	1.85	1.85	1.85	1.85
Fan motor rating	kW	0.065	0.065	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	2x0.13	2x0.13	2x0.13	2x0.13
Nominal current FLA	A	0.4	0.4	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	2x0.6	2x0.6	2x0.6	2x0.6
Fans: No. x diameter	#x mm	1x350	1x350	1x457	1x457	1x457	1x457	1x457	1x457	1x457	1x457	2x457	2x457	2x457	2x457
Fans max speed	r.p.m	940	940	940	940	940	940	940	940	940	940	940	940	940	940

PLANNING POLICY AND RELEVANT ACOUSTIC GUIDANCE REVIEW

1 NATIONAL POLICY

1.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) covers issues relating to noise and planning in England.

The paragraphs relating to noise state:

187. *Planning policies and decisions should contribute to and enhance the natural and local environment by; [...]*
- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans*
198. *Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
- a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; [...]*
200. *Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.*

1.2 Noise Policy Statement for England (NPSE)

The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010. The long-term vision of the Government noise policy is to ‘*Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development.*’

The NPSE vision noted above is supported by the following aims:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

PLANNING POLICY AND RELEVANT ACOUSTIC GUIDANCE REVIEW

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvement of health and quality of life

The NPSE outlines observed effect levels relating to the above, as follows:

- *No observed effect level (NOEL): this is the level of noise exposure below which no effect at all on health or quality of life can be detected;*
- *Lowest observed adverse effect level (LOAEL): this is the level of noise exposure above which adverse effects on health and quality of life can be detected;*
- *Significant observed adverse effect level (SOAEL): This is the level of noise exposure above which significant adverse effects on health and quality of life occur;*

Noise effect levels are not set at absolute noise level targets, but instead vary depending on the context and character of the noise and site-specific factors which may impact on the severity of the effect. The NPSE states:

'It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.'

1.3 National Planning Practice Guidance (NPPG)

The NPPG provides practical guidance on how the NPPF should be applied as well as and guidance on the factors influencing whether noise may be a concern at the planning stage and how adverse effects can be mitigated. The table below summarises the effect levels presented within the NPSE, as follows:

Response	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific Measures required
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate & reduce to a minimum

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Response	Examples of Outcomes	Increasing Effect Level	Action
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 1 Noise exposure hierarchy

2 LOCAL POLICY

2.1 Arun District Council Planning Policy

Policy QE DM1 Noise pollution

2. New noise generating development

Developers proposing new noise generating development must seek advice from an early stage to determine the level of noise assessment required. Proposals will need to be supported by:

- a. Evidence to demonstrate that there are no suitable alternative locations for the development.*
- b. A noise report which provides accurate information about the existing noise environment, and the likely impact of the proposed development upon the noise environment. The report must also demonstrate that the development meets appropriate national and local standards for noise, as set out in Annex 1 of the Planning Noise Advice Document: Sussex, and any mitigation measures required to ensure noise is managed to an acceptable level.*
- c. Evidence to demonstrate that the development will not impact upon areas identified and valued for their tranquillity, including Gaps Between Settlements which are important to the enjoyment of Arun's countryside, its habitats and biodiversity.*

PLANNING POLICY AND RELEVANT ACOUSTIC GUIDANCE REVIEW

3 BEST PRACTICE AND GUIDANCE

3.1 BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

BS 4142:2014+A1:2019 provides a methodology for rating and assessing the impacts of industrial and commercial sound at noise sensitive receptors. In the context of this report, this guidance would be relevant for any new fixed plant installations that might be installed for the scheme.

The methodology involves comparing the Rating Noise Level due to the sound source/s under assessment with the existing background sound level (L_{A90}) when the noise source is not operating to estimate the initial impact, as follows (Typically, the greater this difference, the greater the magnitude of the impact):

- a) *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context*
- b) *A difference of around +5 dB could be an indication of an adverse impact, depending on the context*
- c) *The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact or significant adverse impact. 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 standard notes that a noise source under assessment will have a 'low impact' when the 'rating level' of a noise source is less than the existing background sound. It is also important to note that any quantitative assessment results are assessed considering the context in which the sound occurs.

The standard notes three types of context within Clause 11, which are:

- 1) *The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.*

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 the background. This is especially true at night.

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

- 2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the*

PLANNING POLICY AND RELEVANT ACOUSTIC GUIDANCE REVIEW

way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.

- 3) *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as i. facade insulation treatment, ii. ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation, and iii. acoustic screening.*

The definitions noted above are described below:

- **Specific sound** – sound source being assessed ($L_s = L_{Aeq, T_r}$)
- **Residual sound** – Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound ($L_r = L_{Aeq, T}$)
- **Ambient sound** – totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far ($L_a = L_{Aeq, T}$)
- **Background level** – sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval ($L_{A90, T}$)
- **Rating level** – specific sound level plus any adjustment for the characteristic features of the sound ($L_{Ar, Tr}$)

With regards to background sound levels, BS 4142:2014+A1:2019 notes:

“In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.”

With regards to the ‘rating level’, the adjustments for the characteristic features of the sound are outlined below:

- *Tonality – +2 dB for a tone which is ‘just perceptible’ at the noise receptor, +4 dB where it is ‘clearly perceptible’, and +6 dB where it is ‘highly perceptible’*
- *Impulsivity – +3 dB for a tone which is ‘just perceptible’ at the noise receptor, +6 dB where it is ‘clearly perceptible’, and +9 dB where it is ‘highly perceptible’*
- *Intermittency – +3 dB if the intermittency is readily distinctive against the residual acoustic environment*
- *Other sound characteristics – where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied.*

It must be noted that as the rating level is determined at the closest noise sensitive receptor, the acoustic feature corrections should be applied based on the level at receptor location, not at source. This is particularly relevant when noise propagation characteristics cause differences in sound reduction at various frequency bands.

Note that the assessment reference periods that should be considered for daytime and night-time, as defined within the standard, are:

PLANNING POLICY AND RELEVANT ACOUSTIC GUIDANCE REVIEW

- One hour period for a sound source operating during daytime hours (07:00-23:00 hours)
- Fifteen-minute period for a sound source operating during the night-time (23:00-07:00 hours)

ES Acoustics Notes regarding Context:

The notes presented below are informed by the BS 4142:2014+A1:2019 Technical Note prepared by the Association of Noise Consultant Good Practice Working Group. Assessment context is often misunderstood or applied incorrectly, and the notes are therefore presented to provide a clear picture on what aspects of context should be considered when assessing the overall impact of a particular scenario:

Subclause 11(1)

The second paragraph notes that absolute levels may be as, or more, important than relative outcomes where background and rating levels are low. It is important to note that both background and rating levels would need to be low for this particular caveat to apply.

BS 4142 does not indicate how the initial estimate of impact should be adjusted when background and rating levels are low, only that the absolute levels may be more important than the difference between the two values. It is likely that where the background and rating levels are low, the absolute levels might suggest a more acceptable outcome than would otherwise be suggested by the difference between the values. For example, a situation might be considered acceptable where a rating level of 30dB is 10dB above a background sound level of 20dB, i.e. an initial estimate of a significant adverse impact is modified by the low rating and background sound levels. However, there may be situations where the opposite is true, and it is for the assessor to justify any modifications to the initial estimate of impact.

BS 4142 does not define 'low' in the context of background sound levels nor rating levels. The note to the Scope of the 1997 version of BS 4142 defined very low background sound levels as being less than about 30 dB L_{A90} , and low rating levels as being less than about 35 dB $L_{A_{r,Tr}}$. We would consider that similar values would not be unreasonable in the context of the current edition of BS 4142.

The third paragraph states that "where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts".

In the ordinary application of BS 4142 the residual sound level is not compared with the background sound level to determine the level of impact. The third paragraph is therefore taken to mean that the level of impact caused by the residual level has been determined by professional judgement or with reference to another document, such as the Noise Insulation Regulations 1975 (as amended 1988). Where professional judgement is used, it should be appropriately justified.

Where the residual sound levels are very high, a significant adverse impact might be declared in a situation where the rating level exceeds the background sound level by, say, 4dB, i.e. since the residual sound levels are already considered to cause a significant impact, any worsening of the situation would be considered a significant adverse impact, even if the difference between the rating level and background sound level would not suggest this to be the case.

PLANNING POLICY AND RELEVANT ACOUSTIC GUIDANCE REVIEW

Subclause 11(2)

The second aspect of context described in BS 4142 relates to the character and level of the specific sound. In essence, whether or not the character of the sound is distinguishable from the character of the ambient or residual acoustic environment or is incongruous.

BS 4142 does not provide instruction as to how to treat the assessment outcomes in these circumstances, nor does it explain how to distinguish between this contextual consideration and the process for applying rating penalties. The latter is itself informed by the distinctive characteristics of the specific sound in the context of the residual sound environment.

Where character-based contextual matters are taken into account, the assessor should make it clear how these matters are distinct from those that informed the rating level corrections, and what the implications of these further character assessments should be. For example; new deliveries on an estate entailing rating penalties for reversing alarms and impulsive noise but these types of noise are already present at other existing premises, so contextually the impact is reduced. Conversely, where the residual level is largely comprised of natural sounds, such as the sea or birdsong, so the impact from the specific source might be increased.

Subclause 11(3)

The third contextual matter described in Clause 11 relates to the receptor itself. It is important to note that the reference at the start of this section of BS 4142 to 'the sensitivity of the receptor' refers to a generic receptor type, i.e. a dwelling, and not to the particular attitudes or responses of a particular person (although if the residential receptor type is specific it may have a bearing e.g. student accommodation).

The ANC working group notes that this part of BS 4142 allows the internal noise environment to be considered, despite BS 4142 excluding such matters from its Scope (Subclauses 1.1, 1.2 and 1.3). The working group considers that the consideration of the internal noise environment is only valid in a BS 4142 assessment where it relates to the contextual elements of the assessment.

3.2 World Health Organization (WHO) Guidelines

WHO Guidelines for Community Noise (1999) provides guideline values for community noise in specific environments. This has since been supplemented by WHO Environmental Noise Guidelines for European Region (WHO, Regional office for Europe, 2018).

The WHO guideline values most relevant to new residential development are outlined in the table below:

Specific Environment	Critical Health Effects	L _{Aeq, T} [dB]	L _{Afmax} [dB]	Time Base
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	n/a	07:00-23:00
	Sleep disturbance night-time	30	45	23:00-07:00
Dwelling, outdoors	Sleep disturbance, window open (outdoor values)	45	60	23:00-07:00
Outdoor living area	Serious annoyance, daytime and evening	55	n/a	07:00-23:00
	Moderate annoyance, daytime and evening	50	n/a	07:00-23:00

APPENDIX C

PLANNING POLICY AND RELEVANT ACOUSTIC GUIDANCE REVIEW

The effects of noise in dwellings are typically sleep disturbance, annoyance and speech interference. For bedrooms the critical effect is sleep disturbance. Indoor guideline values for bedrooms at night are 30dB L_{Aeq} for continuous noise and 45dB L_{Amax} for single sound events, but the guidance also notes that lower noise levels may be disturbing depending on the nature of the noise source.

3.3 BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'

Table 4 of BS 8233:2014 (reproduced below) provides guidance on recommended internal ambient noise levels in residential spaces based on World Health Organization (WHO) research.

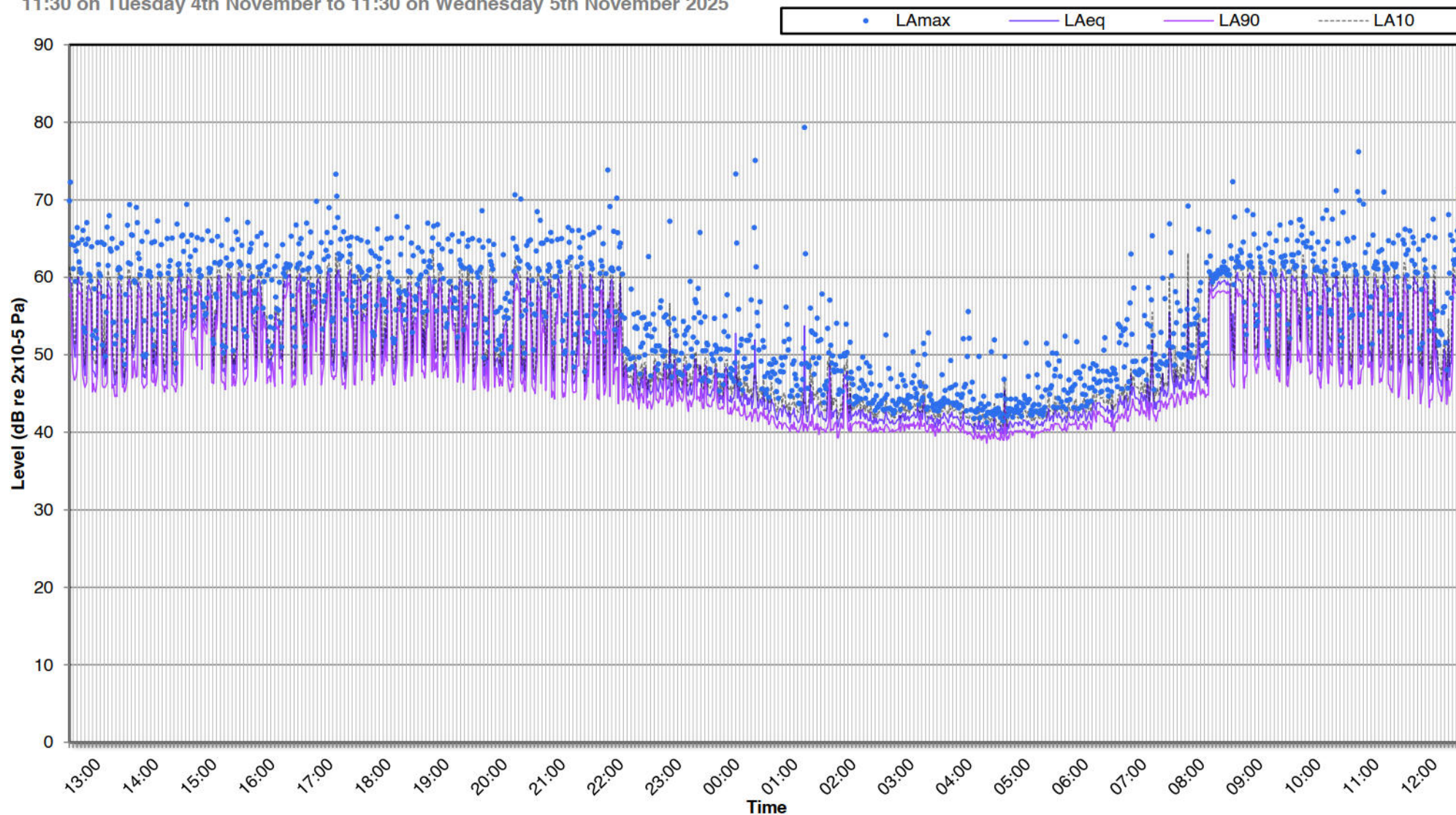
Room	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Living Room	≤ 35 dB $L_{Aeq,16hr}$	N/A
Dining Room	≤ 40 dB $L_{Aeq,16hr}$	N/A
Bedroom	≤ 35 dB $L_{Aeq,16hr}$	≤ 30 dB $L_{Aeq,8hr}$

APPENDIX D

ENVIRONMENTAL NOISE TIME HISTORY GRAPH

22395.NIA-RPT.01

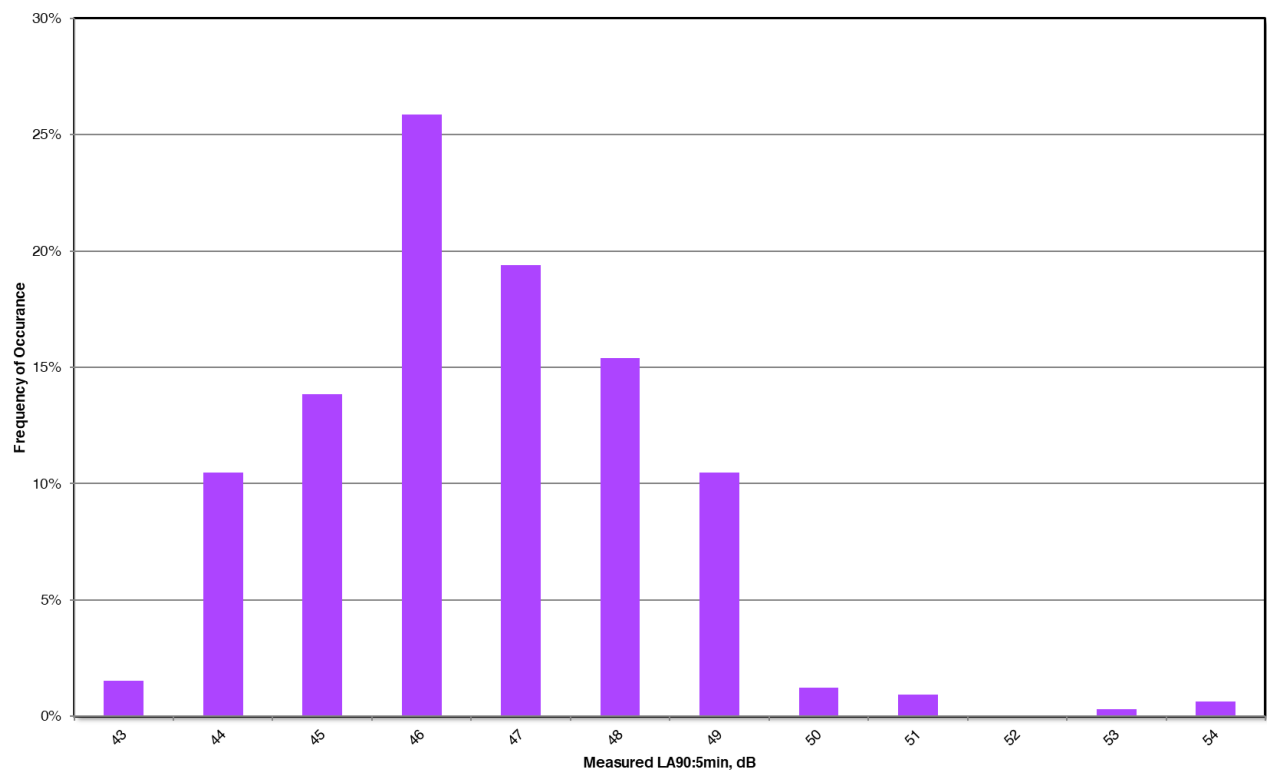
11:30 on Tuesday 4th November to 11:30 on Wednesday 5th November 2025



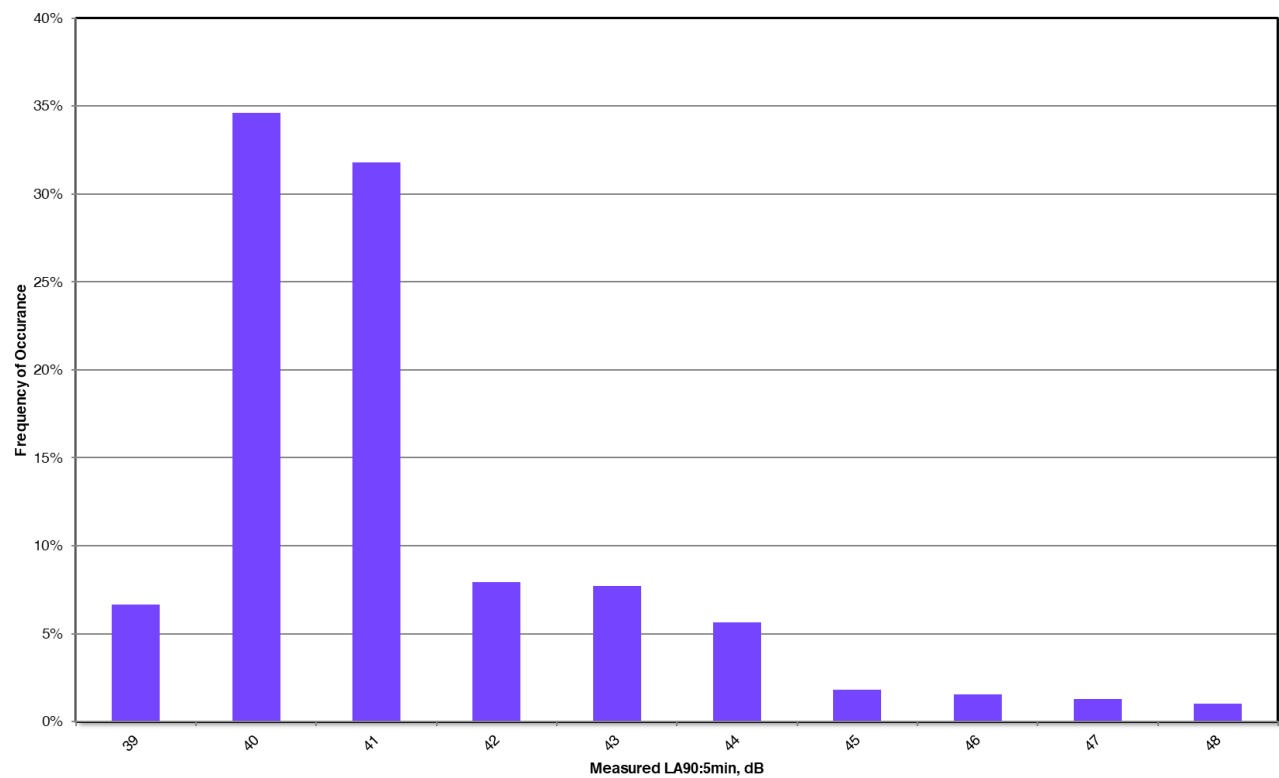
APPENDIX E

STATISTICAL ANALYSIS OF BACKGROUND SOUND LEVELS

22395.NIA-RPT.01
11:30 on Tuesday 4th November to 11:30 on Wednesday 5th November 2025
Daytime Statistical Distribution of Background Levels



22395.NIA-RPT.01
11:30 on Tuesday 4th November to 11:30 on Wednesday 5th November 2025
Night-time Statistical Distribution of Background Levels



es
acoustics

1 no. chiller unit to closest receptor window NSR 1 (with mitigation)	63	125	250	Frequency, Hz					dB(A)
				500	1k	2k	4k	8k	
Marstair MRC 50+ chiller condenser unit, SPL @1m	54	54	56	51	47	41	35	28	53
Correction due to surface reflection (1), dB	3	3	3	3	3	3	3	3	
Minimum attenuation provided by distance (7m), dB	-17	-17	-17	-17	-17	-17	-17	-17	
Minimum attenuation provided by proposed barrier, dB	-5	-5	-5	-5	-5	-5	-5	-5	
Total Specific Sound Level at 1m from Receptor Façade, dB	35	35	37	32	28	22	16	9	34
<u>BS4142 Acoustic Feature Corrections</u>									
Tonality									0
Intermittency									3
Impulsivity									0
Total Rating Level at 1m from Receptor Façade, dB									37

ACOUSTIC ABSORPTION DATASHEET

Whisper® UV Sound Absorbing Polyethylene Foam



Technical Data Sheet

PRODUCT DESCRIPTION

Whisper® UV is an Ultraviolet Resistant closed cell polyethylene foam which uses a high performance honeycomb like structure to absorb noise. This durable material remains acoustically 'soft' eliminating the problem of hard reflective surfaces that contribute to reverberation and echo.

Whisper® UV was formulated for use in outdoor fencing and ground level noise barrier wall applications.

The acoustic properties of Whisper® UV are maintained following exposure to water & moisture retaining 100% of its acoustic performance after draining, with no need for a water barrier, protective film, or perforated metal facing.

FEATURES and BENEFITS

- Resistant to water and humidity
- Superior noise control
- Easy to fabricate
- Quick to install
- Does not support fungal growth
- Non-conductive
- Non-corrosive
- Low dust adhesion
- No need for moisture barriers
- Perforated facings not required
- Fast installation
- Operating Temperature -60°C to +80°C
- Light weight
- Fibre free
- UV resistant

Whisper® UV has been independently tested to over 2000 hours in a QUV accelerated aging chamber. Testing showed that after UV exposure, the material exhibited similar acoustic behaviour to unexposed material.

APPLICATIONS

Whisper® UV sound absorbing panels have successfully helped reduce noise in outdoor conditions since 2013. Used in a wide range of applications from outdoor sports, shooting ranges, hospitality and concert venues, industrial applications, and in road and high speed rail noise barrier walls, which demand a versatile and durable solution for outdoor acoustic absorption.



ACOUSTIC PROPERTIES

Thickness (mm)	Acoustic Class	Transmission loss Rw (dB)
25	D	-
50	A	13
100	A	18

PHYSICAL INFORMATION

Maximum board length	2.4m
Maximum board width	1.2m
Material thickness	25mm, 50mm and 100mm
Colour	Black

Whisper® is a registered trade mark of Sealed Air Corporation (US)

Contact our technical/sales team: 01925 577711 / 01698 356000

APPENDIX G

ACOUSTIC ABSORPTION DATASHEET

TECHNICAL DATA

Physical Properties	Test Method	Typical Physical Properties
Nominal Density	ASTM D3575-08 Suffix W ISO 845	30 Kg/m ³
Compressive Strength Vertical @ 25% Vertical @ 50%	ASTM D3575-08 Suffix D ISO 7214	10 KPa 24 KPa
Compressive Strength 25% (4th compression) 50% (4th compression) 70% (4th compression) (100mm/min compression speed)	ISO 3386-1 DIN 53577	3 KPa 13 KPa 50 KPa
Compression Set	ASTM D3575-08 Suffix B (50% Compression) ISO 1856 (25% compression)	< 30% < 20%
Cell Size	-	< 10 Cells/25mm
Water Pick Up by Diffusion (RH > 95% - after 28 days)	EN ISO 16536	< 3 Kg/m ²
Water Pick Up by Diffusion (RH > 95% - after 28 days)	EN ISO 16536	< 5 Volume %
Thermal Conductivity @ 23°C (73°F) @ -5°C (23 °F)	ASTM D3575-08 Suffix V ISO 8301	0.104 W/mK 0.082 W/mK
Thermal stability (24hrs at 70°C)	ASTM D3575-08 Suffix S ISO 2796	< 3%
Tensile Strength @ Peak	ASTM D3575 Suffix T ISO 1798	130 KPa
Tensile Elongation	ASTM D3575 Suffix T ISO 1798	70%
Airflow Resistance	EN ISO 9053-1	510,000 (25mm) Pa.S/m ³ = Rayls/m ² 2,785,000 (50mm) Pa.S/m ³ = Rayls/m ²
Non-Acoustic Performance	EN 1794-2	Class 1 (fire)

These numerical laboratory fire-test-response characteristics are not intended to reflect hazards presented by this material under actual fire conditions.

Sound Absorption Reverberation Room testing according to EN ISO 354

