Air & Acoustic Consultants

The Gym Group

TGG Salisbury

Noise Impact Assessment

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Executive Summary

Air & Acoustic Consultants Limited have been commissioned by The Gym Group to carry out a noise impact assessment for proposed plant as part of development at Units 1 & 2, Churchill Way West, Salisbury SP2 7TS.

A baseline noise survey, conducted by others in July 2024 established the existing acoustic environment. Operational noise levels of proposed plant were then evaluated using a combination of the monitoring data, acoustic modelling and calculations with all work undertaken in accordance with relevant British Standards, guidance documents, and policy requirements.

The assessment finds that plant noise emissions will be controlled to appropriate levels at surrounding receptors in line with Wiltshire Council's requirements where the risk of impact would be low and no further mitigation would be required.

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1 Introduction

1.1 Brief

1.1.1 Air & Acoustic Consultants Limited have been commissioned by The Gym Group to carry out a noise impact assessment for proposed plant at Units 1 & 2, Churchill Way West, Salisbury, SP2 7TS.

1.2 Site Description

1.2.1 The site is located towards the north of Salisbury within a dedicated retail park bounded to the south by the A36, Churchill Way West. The existing tenanted units within the retail park include a Waitrose supermarket and Sports Direct. The retail park's surrounds consist of a mix of residential and commercial receptors.

1.2.2 Proposals include the installation of heating/cooling fixed plant upon the external flat roof located towards the northern boundary of site. Ducted terminations for air handling plant will also be located at roof level.

1.2.3 Residential receptors are located to the west along Avon Terrace and Ashley Road. The closest, most affected residential receptor is 2 Meadow View, which is approximately 80m away. Given its proximity to the plant, along with line of sight from the first-floor windows, it has been determined that where the plant noise criteria are achieved at this receptor, plant noise criteria is expected to be achieved at all other noise sensitive receptors.

1.2.4 The National Grid Reference for the centre of site is SU 13963 30732 (British National Grid Coordinates E: 413963, N: 130732). The site location, most affected receptor and the surrounding area are shown in Figure 1.1.

Figure 1.1: Site Location

1.3 Assessment Scope

1.3.1 This report assesses the potential noise impact of proposed mechanical plant upon nearby noise-sensitive residential properties.

1.3.2 To assist with the undertaking of this report a definition of acoustic terms is provided in Appendix A.

2 Assessment Requirements

2.1 Local Authority Requirements

2.1.1 From Wiltshire Council's *Planning Consultant Guidance Note* (issued October 2023), it is understood that noise emissions from plant should be assessed in accordance with methodologies presented within BS 4142:2014+A1:2019 *Methods for Rating and Assessing Industrial and Commercial Sound*. It also states the standard criterion for fixed plant as *"The development should be designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location."* The BS 4142:2014+A1:2019 assessment methodology is discussed below.

2.2 Assessment Methodology

BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound[1]

2.2.1 BS 4142:2014+A1:2019 is used to rate and assess sound of an industrial and/or commercial nature including (amongst others):

- Sound from industrial and manufacturing processes; and
- Sound from fixed installations which comprise mechanical and electrical plant and equipment.

2.2.2 The purpose of the assessment procedure is to determine the likelihood and significance of any potential impacts that may result from sound of an industrial and/or commercial nature.

2.2.3 BS 4142:2014+A1:2019 defines noise from industrial sources at the assessment location as the specific sound level and this is the term used in this report to refer to noise which occurs currently or is predicted to occur due to commercial or industrial operations.

2.2.4 Certain acoustic features can increase the significance of impacts over those expected from a simple comparison between the specific sound level and the background sound level. BS 4142:2014+A1:2019 includes allowances for a rating penalty to be added if the specific sound level contains tonal, impulsive or intermittent characteristics. There is also an allowance for features that are neither tonal, impulsive or intermittent but are readily distinctive. After any applicable penalties have been added to the specific noise level the result is termed the rating level.

2.2.5 The difference between the rating level and the background sound level provides an initial assessment of the magnitude of the noise impacts for affected noise sensitive receptors. The assessment criteria given by BS 4142:2014+A1:2019 are as follows:

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source 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.

[1] BSI. *BS 4142:2014+A1:2019. Methods for rating and assessing industrial and commercial sound.*

2.2.6 During the daytime, BS 4142:2014+A1:2019 requires that noise rating levels be assessed over 1-hour periods. However, during the night-time, noise rating levels are required to be assessed over 15-minute periods.

2.2.7 Where the initial estimate of the impact needs to be modified due to context, BS 4142:2014+A1:2019 states that all pertinent factors should be taken into consideration, including:

- The absolute level of sound;
- The character and level of the specific sound; and
- 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 external acoustic conditions.

3 Assessment Approach

3.1 Operational Impacts

3.1.1 The noise impact of the proposed building services scheme is to be assessed following the requirements of Wiltshire Council as outlined in Section 2.

3.2 Assessment Receptors

3.2.1 The receptor considered to be most affected by the proposed fixed plant is detailed in Table 3.1 and illustrated in Figure 3.1.

Table 3.1: Noise Sensitive Receptors Details

Receptor	Description	Receptor Details
R1	2 Meadow View, Avon Terrace	~ 80m from external plant

Figure 3.1: Assessment Receptor Location

3.2.2 Noise decreases with increasing distance from the source; therefore, any receptor that is located at a greater distance from the proposed fixed plant than the identified receptor will experience lower operational noise levels.

4 Baseline Conditions

4.1 Noise Survey

4.1.1 A previous planning application sought retail use of units 1 & 2 (the site), planning application reference *PL/2024/09079*, which was approved by Wiltshire Council with conditions in July 2025.

4.1.2 To support this application, a baseline noise survey was undertaken by others between 26th and 30th July 2024 (document ref. *11557/BL*). As the measurement data was obtained within the last 2 years, and from analysis of the data, monitoring location and methodology, AAC considers this environmental survey data is suitable for use within this assessment. The survey consisted of a single measurement position (L1) as illustrated in Figure 4.1.

Figure 4.1: Noise Measurement Location

4.1.3 All measurements were taken using a class 1 sound level meter. The microphone's measurement position was in the acoustic free field, mounted at approximately 2.5 metres above the ground.

4.2 Noise Survey Results

4.2.1 A summary of the measured sound levels at L1 has been reproduced in

4.2.2 Table 4.1. The data is presented as average levels for the day and night-time periods calculated from 15-minute sound indices.

Table 4.1: Noise Measurement Results - L1, Long Term

Period	Typical $L_{A90,15min}$		Average $L_{Aeq,T}$	
	Mode	Range	Mode	Range
Daytime 07:00 - 23:00	44	39 - 55	52	43 - 68
Night-time 23:00 - 07:00	42	42 - 46	43	42 - 69

4.3 Background Sound Levels

4.3.1 As part of an assessment following the guidance of BS 4142:2014:A1:2019, a representative background sound level must be determined.

4.3.2 Background sound levels have been determined from the modal L_{A90} values at monitoring position L1.

Table 4.2: Background Sound Levels

Measurement Location	Representative Background Sound Levels, $L_{A90,T}$ (dB)	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
L1	44	42

5 Operational Impact Assessment

5.1 Operational Sound: Building Services Plant

5.1.1 Building services plant is proposed to serve the site 24/7 and, therefore, could be operational at any time during in the day and night.

5.1.2 Following Wiltshire Council's requirements as described in Section 2, assessment criterion to control operational sound at the local receptors for both daytime and night-time periods must be set. Limiting criteria of 5dB below the background sound level for both daytime and night-time periods have been adopted for building services noise and presented in Table 5.1.

Table 5.1: Sound Criteria derived from Local Authority requirements

Receptor	Sound Criteria (dB)	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
R1 - 2 Meadow View, Avon Terrace	39	37

5.1.3 The proposed plant scheme has been confirmed as:

- 4no. Mitsubishi PUZ-M250YKA condensing units; and
- 1no. QAHV-N560YA-HPB air source heat pump; and
- 1no. Swegon Gold RX AHU unit.

5.1.4 Manufacturer published plant sound data for the proposed plant is presented in Table 5.2.

Table 5.2: Manufacturer Plant Sound Levels

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000	dB(A)
PUZ-M250YKA (Heating), L_p @ 1m	72	63	62	61	55	53	49	43	62
QAHV-N560YA-HPB(-BS), L_p @ 1m	71	58	59	56	52	49	44	39	58
PUHY-P450YNW-A(-BS) (Low Noise Mode), L_p @ 1m	61	59	56	50	45	44	40	35	53
AHU Exhaust, L_w	84	80	83	75	74	70	64	60	79
AHU Intake, L_w	82	76	64	56	46	42	36	26	63

5.1.5 The sound pressure level on heating mode for the Mitsubishi PUZ-M250 units is greater than cooling mode, therefore heating mode sound data has been used for robust assessment.

5.1.6 The 4no. condensers and air source heat pump (ASHP) will be located externally on a flat roof towards the northern boundary of the site.

5.1.7 The AHU unit will be located within an internal plant room with the intake and exhaust ducted to rooftop level. Contribution from AHU casing breakout is therefore negligible.

5.1.8 There is a direct line of site from receptor R1 to the externally located plant along with rooftop terminations. No screening losses have, therefore, been applied.

5.1.9 The AHU exhaust duct will be attenuated. The insertion losses of the proposed acoustic attenuator are presented in Table 5.3, which are indicative of a 50% free area, 600mm length attenuator.

Table 5.3: Attenuator Insertion Losses

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Insertion Losses	1	2	7	10	11	9	8	7

5.1.10 The location of external plant and rooftop terminations is presented in Figure 5.1 below.

Figure 5.1: Fixed Plant Location

5.1.11 Calculations of plant sound levels at the most sensitive residential receptor has been conducted, accounting for plant operational modes, distance propagation, attenuator insertion losses, duct end reflections and directivity corrections, where appropriate. The results of the calculations are presented in Table 5.4.

Table 5.4: Predicted Specific Level at Sensitive Receptor

Receptor	Specific Sound Level, $L_{Aeq,T}$	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
R1 - 2 Meadow View, Avon Terrace	31	31

5.1.12 Summary of calculations are shown in Appendix B.

5.1.13 Following the guidance within BS 4142:2014+A1:2019, it may be appropriate to apply character corrections to the calculated specific sound levels to provide a 'Rating' sound level at the receptors. Penalties account for distinctive characteristics that may make a sound more prominent than the existing

noise environment and can be added for tonality, impulsivity, intermittency, or other characteristics not captured in the three defined classes.

5.1.14 It is considered that noise emissions from the proposed plant will not contain such characteristics as tonality, impulsivity or intermittency and due to the surrounding existing commercial and retail uses it is considered that low level plant noise emissions would not be incongruous with the pre-existing sound climate.

5.1.15 It has also been demonstrated that noise would be controlled to below the existing background (L_{A90}) at the closest surrounding receptors at times of its operation. It is, therefore, considered that characteristic penalties would not be appropriate as the sound would likely go unnoticed and remain unremarkable against the existing sound climate.

5.1.16 With no characteristic penalties applied, the Rating Levels against the existing background and criterion is presented in Table 5.5.

Table 5.5: Predicted Rating Level at the receptor against sound criteria

Receptor	Period	Rating Level $L_{Aeq,Tr}$ (dBA)	Local Authority Sound Criteria (dB)	Existing Background Sound Levels $L_{A90,15min}$ (dB)
R1	Daytime 07:00 - 23:00	31	39	44
R1	Night-time 23:00 - 07:00	31	37	42

5.1.17 Predictions demonstrate that noise emission will be controlled to below Local Authority sound criteria during both daytime and night-time periods.

5.1.18 When assessing based on measurement position L1, criteria set for plant noise emissions in line with Wiltshire Council's requirements have been met at the most affected residential receptor.

5.1.19 It should be noted that, the previous acoustic report issued by others (document ref. *11557/BL*) indicated that sound levels at the receptor location may be quieter than the levels recorded at monitoring position L1.

5.1.20 This is determined from simultaneous attended measurements in close proximity to receptor R1 between 12:30 and 13:06. The report suggests that the noise level at the receptor location is 9 dB lower than at measurement position L1 and applies a universal correction factor of -9 dB. There are, however, no measurements to indicate if this difference is applicable to more sensitive periods such as night-time or evenings where retail activity is expected to be lower when compared to more consistent residential activity, and therefore this assumption may be inappropriate, expected to be onerous.

5.1.21 Where this correction could be considered representative for all periods, the daytime Rating Level will 4dB lower than the corrected background level, and the night-time Rating Level will be 2dB lower than the corrected background level. When assessed in accordance with BS 4142:2014:A1:2019 this would still be an indication of the specific sound source having a "low impact", depending on the context.

5.1.22 Furthermore, it has been necessary to conduct this assessment based on a worst-case scenario, whereby condensers would be operating at maximum capacity (for a given operational mode), at the same time, constantly during the operational period. The likelihood of this actually happening is low

where it is expected that noise from typical operations would be lower, further reducing the risk of any impact.

5.1.23 AAC is therefore satisfied that the scheme satisfies local authority's intention to protect amenity and operation should be considered low impact even if it were appropriate to consider the more onerous corrections applied during day-time use.

5.1.24 Results of the assessment indicate the cumulative noise level from the proposed building services plant would result in a low to negligible impact.

5.1.25 No further mitigation should be required.

6 Conclusion

6.1.1 Air & Acoustic Consultants Limited have been commissioned by The Gym Group to carry out a noise impact assessment for proposed plant as part of development at Units 1 & 2, Churchill Way West, Salisbury, SP2 7TS.

6.1.2 A baseline noise survey was undertaken by others in July 2024 to characterise the existing noise environment used within this report to assess the potential impacts of the proposed fixed plant upon the nearby noise-sensitive receptors.

6.1.3 The assessment finds that plant noise emissions will be controlled to appropriate levels at surrounding receptors to satisfy Wiltshire Council's requirements and demonstrates a low risk of impact in line with BS 4142:2014+A1:2019 guidance.

6.1.4 On this basis, no further mitigation measures are considered necessary.

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Appendices

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Appendix A – Definition of Terms

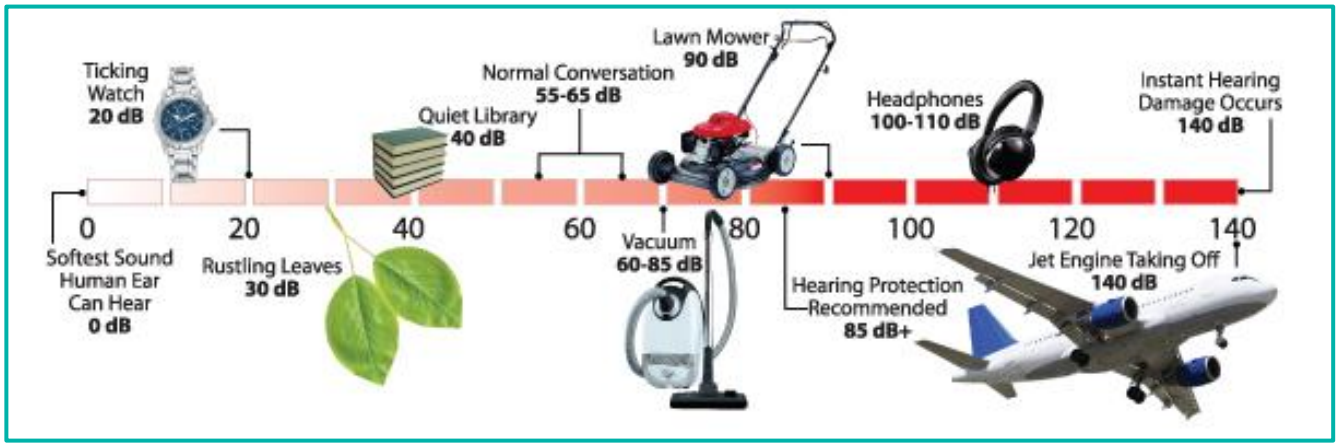
Sound Pressure - Sound, or sound pressure, is a fluctuation in air pressure over static ambient pressure.

Sound Pressure Level - The sound level is the sound pressure relative to a standard reference pressure of 20 μ Pa ($2x10^{-5}$ Pascals) on a decibel scale.

Decibels dB - Noise is commonly defined as unwanted sound. The range of audible sound is from 0 dB to 140 dB, which is taken to be the threshold of pain. The sound pressure detected by the human ear covers an extremely wide range. The decibel (dB) is used to condense this range into a manageable scale by taking the logarithm of the ratio of the sound pressure and a reference sound pressure.

The decibel scale is logarithmic and therefore when two noise sources are present together, they must be combined logarithmically, therefore, when two sound sources of the same sound pressure level are combined the resultant level is 3 dB(A) higher than the single source. However, in subjective terms, the ear can distinguish a difference in 'loudness' between two simple noise sources when there is a 3 dB(A) difference between them. For simple sources, when two sounds differ by 10 dB(A) one is said to be twice as loud as the other.

Figure A.1: Examples of Typical Noise Levels



Noise Level Indices - Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so several different noise indices have been defined, according to how the averaging or statistics are carried out.

A-Weighted Decibels dB(A) - The frequency response of the ear is usually taken to be about 18Hz (number of oscillations per second) to 18,000Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than at the lower and higher frequencies, and because of this, the low and high-frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise-measuring instrument. The weighting which is most used, and which correlates best with the subjective response to noise, including that of music, is the dB(A) weighting. This electronic filter matches the variation in the frequency sensitivity of the meter to that of the human ear. This is an internationally accepted standard for noise measurements.

Table A.2: Other Standard Noise Units:

Symbol	Name	Definition
$L_{Aeq,T}$	Equivalent Continuous Sound Level	The A-weighted sound pressure level of a steady sound that has, over a given period, the same energy as the fluctuating sound under investigation. The L_{Aeq} provides a single value to express the average sound energy over the measurement period and is the most widely used indicator for environmental noise.
$L_{Amax,T}$	maximum 'A' weighted noise level	This is the maximum 'A' weighted noise level recorded during the measurement period, (T).

Symbol	Name	Definition
$L_{A90,T}$	the 'A' weighted noise level	This is the 'A' weighted noise level exceeded for 90% of the measurement period (T). This is normally used to describe the background noise.
L_S	Specific noise level.	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.
$L_{Ar,Tr}$	Rating noise level	The specific noise level plus any adjustments for characteristic features of the noise.
NOEL	No Observed Effect Level	Noise Policy Statement for England (2010) - The noise level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
LOAEL	Lowest Observed Adverse Effect Level	Noise Policy Statement for England (2010) - The noise level above which adverse effects on health and quality of life can be detected.
SOAEL	Significant Observed Adverse Effect	Noise Policy Statement for England (2010) - The noise level above which significant adverse effects on health and quality of life occur.

APPENDIX B – SUMMARY OF ACOUSTIC CALCULATIONS

Plant Sound to 2 Meadow View (Daytime)		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
External plant (Roof)										
PUZ-M250YKA (heating)	Lp @ 1m	72	63	62	61	55	53	49	43	62
Number of	4no	6	6	6	6	6	6	6	6	
Screening Loss		0	0	0	0	0	0	0	0	
Distance Loss	79m	-38	-38	-38	-38	-38	-38	-38	-38	
	Subtotal	40	31	30	29	23	21	17	11	30
QAHV-N560YA-HPB(-BS), Lp @1m	Lp @ 1m	71	58	59	56	52	49	44	39	58
Screening Loss		0	0	0	0	0	0	0	0	
Distance Loss	77m	-38	-38	-38	-38	-38	-38	-38	-38	
	Subtotal	33	20	21	18	14	11	6	1	20
Mechanical Ventilation Terminations (Roof)										
AHU Exhaust, Lw	Lw	84	80	83	75	74	70	64	60	79
Lw to Lp @ 1m	Q = 2	-8	-8	-8	-8	-8	-8	-8	-8	
Attenuation Loss	50-600	-1	-2	-7	-10	-11	-9	-8	-7	
Directivity		0	0	0	0	-4	-7	-7	-7	
End Reflection		-8	-4	-1	0	0	0	0	0	
Screening Loss		0	0	0	0	0	0	0	0	
Distance Loss	87m	-39	-39	-39	-39	-39	-39	-39	-39	
	Subtotal	28	28	28	18	12	7	2	-1	22
AHU Intake, Lw	Lw	82	76	64	56	46	42	36	26	63
Lw to Lp @ 1m	Q = 2	-8	-8	-8	-8	-8	-8	-8	-8	
Directivity		0	0	0	0	-4	-7	-7	-7	
End Reflection		-8	-4	-1	0	0	0	0	0	
Screening Loss		0	0	0	0	0	0	0	0	
Distance Loss	87m	-39	-39	-39	-39	-39	-39	-39	-39	
	Subtotal	27	26	16	9	-5	-12	-18	-28	13
Cumalative specific sound level at receptor	Leq 1hr	41	34	33	30	24	22	18	12	31

Plant Sound to 2 Meadow View (Night-time)		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
External plant (Roof)										
PUZ-M250YKA (heating)	Lp @ 1m	72	63	62	61	55	53	49	43	62
Number of	4no	6	6	6	6	6	6	6	6	
Screening Loss		0	0	0	0	0	0	0	0	
Distance Loss	79m	-38	-38	-38	-38	-38	-38	-38	-38	
	Subtotal	40	31	30	29	23	21	17	11	30
QAHV-N560YA-HPB(-BS), Lp @1m	Lp @ 1m	71	58	59	56	52	49	44	39	58
Screening Loss		0	0	0	0	0	0	0	0	
Distance Loss	77m	-38	-38	-38	-38	-38	-38	-38	-38	
	Subtotal	33	20	21	18	14	11	6	1	20
Mechanical Ventilation Terminations (Roof)										
AHU Exhaust, Lw	Lw	84	80	83	75	74	70	64	60	79
Lw to Lp @ 1m	Q = 2	-8	-8	-8	-8	-8	-8	-8	-8	
Attenuation Loss	50-600	-1	-2	-7	-10	-11	-9	-8	-7	
Directivity		0	0	0	0	-4	-7	-7	-7	
End Reflection		-8	-4	-1	0	0	0	0	0	
Screening Loss		0	0	0	0	0	0	0	0	
Distance Loss	87m	-39	-39	-39	-39	-39	-39	-39	-39	
	Subtotal	28	28	28	18	12	7	2	-1	22
AHU Intake, Lw	Lw	82	76	64	56	46	42	36	26	63
Lw to Lp @ 1m	Q = 2	-8	-8	-8	-8	-8	-8	-8	-8	
Directivity		0	0	0	0	-4	-7	-7	-7	
End Reflection		-8	-4	-1	0	0	0	0	0	
Screening Loss		0	0	0	0	0	0	0	0	
Distance Loss	87m	-39	-39	-39	-39	-39	-39	-39	-39	
	Subtotal	27	26	16	9	-5	-12	-18	-28	13
Cumalative specific sound level at receptor	Leq 1hr	41	34	33	30	24	22	18	12	31

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