



ACOUSTIC
CONSULTANTS LTD

Noise Impact Assessment

**Renal Dialysis Centre
Stationary House, Port Talbot**

Reference: 11938/JA

Client

Sandycroft Projects Limited



Document Control

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The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above. The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

The report limits itself to addressing solely on the noise, acoustic, and vibration aspects as included in this report. We provide advice only in relation to noise, vibration and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g. CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment. It should be noted that noise predictions are based on the current information as we understand it and, on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.

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1. Introduction

Sandycroft Projects Limited appointed Acoustic Consultants Limited to undertake a noise impact assessment in relation to the granted planning permission for a dialysis units at Stationery House, Acacia Avenue, Port Talbot, SA12 7DP.

This report is provided to fully assess finalised plant systems in terms of noise impact, with the aim of addressing conditioned plant operating hours (Condition 20) from the granted permission. The restricted hours of use were as previously assessed in an initial noise impact assessment (NIA), ref: 10927/FD/JA which was based on typical plant installed at similar schemes.

Plant noise limits are taken from the initial NIA (10927/FD) as noted in Condition 22 of the Decision Notice. The assessment is undertaken in accordance with British Standard 4142:2014+A1:2019 (BS4142).

This report aims to discharge Condition 20 in respect of restricted hours of plant use, to align the opening hours of the dialysis unit with the allowance of fixed plant.

This author of this report is a full Member of the Institute of Acoustics (MIOA) with over 7 years' experience in the field of acoustics. The report has been reviewed and approved by a director of the company who is a Member of the Institute of Acoustics (MIOA) with nineteen years of experience

2. The Site

2.1. General Proposals

Proposed redevelopment of Stationary House, including the part demolition of existing factory building and rebuilding work, change of use from vacant factory (Use Class B1 & B8) to form a Satellite Dialysis Unit (Use Class D1), including alterations to the existing building, with associated car parking, landscaping, refuse storage and engineering works.

Proposals are for the site to operate between 06.00- and 23.00-hours Monday to Saturday.

Based on an initial assessment of plant noise, the resultant planning condition (20) does not align with these opening hours, and this report will address this restriction, seeking to discharge it.

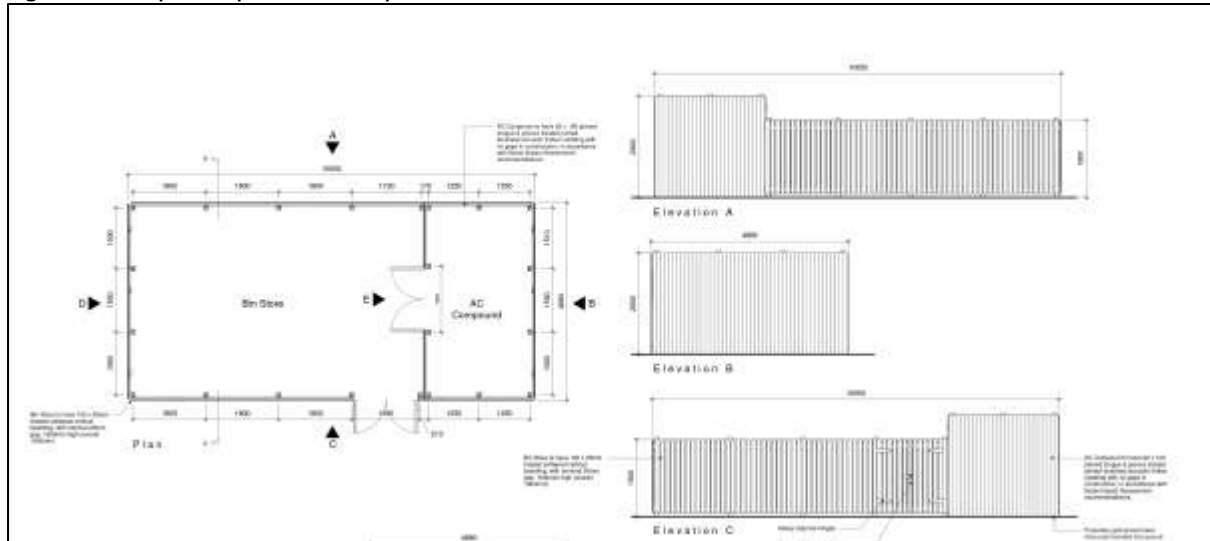
New plant associated with the proposals is understood to be located within a dedicated plant area on the north corner of the site.

The proposed layout plan is provided below.

Figure 1: Proposed site plan



Figure 2: Proposed plant area layout



Since initial discussions, the design team have altered the layout of the plant area to shield the access door to the plant, from direct line of sight to the nearest noise sensitive receivers (NSRs). The height of the fence surrounding the plant is 2.5m.

The nearest NSRs to the plant are residential dwellings to the south-west of the site, highlighted in the figure below.

Figure 3: Site & NSRs



2.2. Proposed Plant

The proposed external plant is as follows.

The manufacturer's stated sound power levels for the plant at both duties are as follows:

Table 1: Proposed plant noise levels

Make and Model	Quantity	Sound Power Level / dB(A)
Mitsubishi, VRF: PURY-EP700YSNW	1	86
Mitsubishi Heat Pump: PUZ-ZM71VHA	1	67

This is the main external plant that is required for assessment.

3. Planning Conditions

From application number P2024/0597, the following noise related conditions have been applied to the use of the site.

3.1. Condition 20

"The external heating and ventilation plant located to the north of the application site shall not be operated outside of the hours 06.30 and 20.30 Monday to Saturday, with no use on Sundays and Bank Holidays, unless an updated Noise Impact Assessment is submitted to and approved in writing by the Local Planning Authority, with any necessary mitigation measures and identified hours of operation which have been assessed within the Noise Impact Assessment. The development shall then be undertaken in accordance with the approved Noise Impact Assessment."

3.2. Condition 22

"The noise from the hereby permitted external plant to the nearest noise sensitive receptor must be below the background level as measured in the Acoustic Consultants Limited, Noise Impact Assessment, dated 29th July 2024, Reference: 10927/FD/JA."

From this initial assessment, plant noise limits will be used to assess the finalised plant proposals.

4. Assessment Criteria

British Standard 4142:2014 entitled 'Method for rating and assessing industrial and commercial sound' use outdoor sound levels to assess the likely effects of sound upon people who might be inside or outside a dwelling or other premises used for residential purposes. The principle is that of establishing the 'difference' between the 'rating level' and the 'background sound level'.

The 'rating level' is the 'specific sound level' of the source over a period of one hour during the day (07:00 to 23:00 hours) and over a period of 15 minutes during the night (23:00 to 07:00 hours).

Section 9 entitled 'Rating Level' states: *"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level."*

An acoustic character correction should be added to the 'specific sound level' if it exhibits any tonality, impulsivity, other specific characteristics and/or intermittency at the assessment location. The value of the character correction varies, dependent on the prominence of the character of the sound source at the assessment location.

In Section 11 of the Standard, entitled 'Assessment of the Impacts', it states: *"Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause 8) from the rating level (see Clause 9) and consider the following."*

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *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.*
- *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."*

In all instances the context needs to be considered when determining the overall impact. In terms of context BS 4142:2014 states: *"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following."*

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

NOTE 3 Consideration ought to be given to evidence on human response to sound and, in particular, industrial and/or commercial sound where it is available. A number of studies are listed in the "Effects on humans of industrial and commercial sound" portion of the "Further reading" list in the Bibliography.

- 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) *façade 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."*

In terms of good internal acoustic conditions, the most relevant criteria and methodology is provided in BS8233:2014. This is in accordance with a March 2020 Technical published by the ANC Working Group, which provided comments and guidance to clear any ambiguity in BS414:2014+A1:2019.

The March 2020 Technical Note later states:

"Whilst BS 4142 can be used to assist in the determination of the likelihood of an adverse or significant adverse impact, guidance on internal design criteria and mitigation is provided elsewhere. BS 8233:2014, for example, provides guidance on indoor ambient noise levels."

We are not aware of any local authority requirement to achieve a more onerous criterion than that provided in BS4142.

5. Baseline Noise Survey

A baseline noise survey was undertaken at the site between the 12th and 16th of July 2024.

5.1. Monitoring Equipment

Sound Pressure Levels were measured using a Class 1 sound level meter with a half-inch condenser microphone, using the 'fast' setting. The equipment is checked regularly using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2017 "General requirements for the competence of testing and calibration laboratories"; in accordance with British Standard EN 10012:2003 "Measurement management systems. Requirements for measurement processes and measuring equipment"; and traceable to the National Standards.

This equipment was checked and calibrated as noted below and the certificates are available for inspection.

Table 2: Monitoring equipment

Equipment Description	Serial Number	Date of Calibration	Calibration Certification Number
SLM, Svantek, 977A	69510	15/03/2024	1508101-1
Pre-Amplifier, Svantek, SV12L	73650	15/03/2024	1508101-1
Microphone, ACO Pacific, 7052E	90933	15/03/2024	1508101-1
Calibrator, Larson Davis, CAL200	17892	15/03/2024	1508101-1

The measuring systems were checked for calibration before and after the tests and no significant drift was detected.

5.2. Weather Conditions

Below were the weather conditions over the duration of the survey at the monitoring location.

Table 3: Weather conditions during the survey period

Date	Wind Speed Range (m/s)	Wind Direction	Temperature (°C)	Precipitation Time (hrs)	Cloud cover (%)
12 th July 2024	≤4	W	12 - 17	0	50
13 th July 2024	3 - 4	N	10 - 19	0	--
14 th July 2024	2 - 4	E	7 - 17	0	--
15 th July 2024	≤3	E	10 - 17	0	--
16 th July 2024*	7 - 8*	NW	14 - 21	0	40

*High winds during this period – data obtained omitted from the assessment dataset

5.3. Monitoring Procedure

The microphone was situated in a free field position, mounted on a tripod, at an approximate height of 1.5 metres. Traffic on the surrounding road network formed the baseline noise climate. The location is representative of the NSRs.

The monitoring location is provided in the figure below.

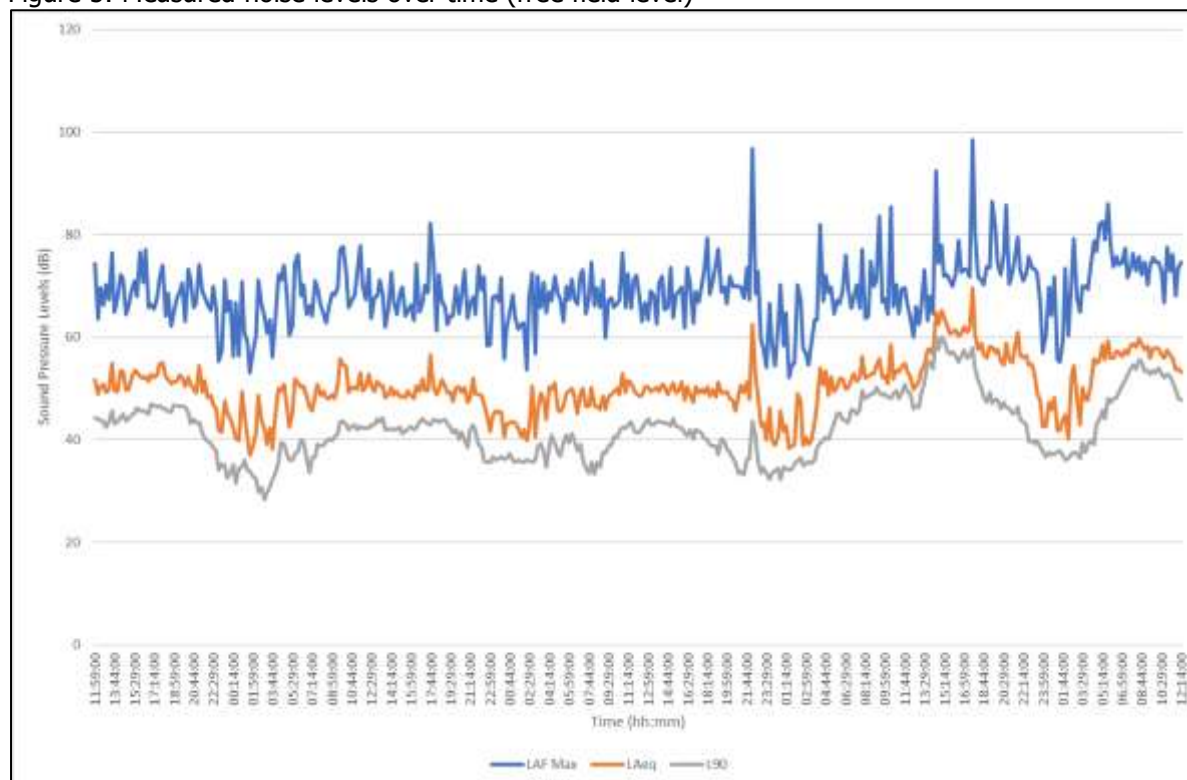
Figure 4: Monitoring location



5.4. Measured Noise Levels

The chart below details the measured maximum (L_{AFmax}), equivalent (L_{Aeq}) and background (L_{A90}) noise levels measured over the survey period. Measurements below are detailed in 15-minute intervals.

Figure 5: Measured noise levels over time (free field level)



The table below details the measured 15-minute daytime and night time background and residual noise levels, representative of existing residential receivers.

Table 4: Measured representative residual and background noise levels (free field)

Period	Background, dB $L_{A90,15minutes}$		Equivalent, dB $L_{Aeq,15minutes}$	
	Range	Mode	Range	Mode
Daytime, 0700 – 2300hrs	32 – 60	42	40 – 70	49
Weekday Operating Period 0630 – 2030hrs	34 – 60	42	46 – 70	50
Saturday Operating Period 0630 – 2030hrs	34 – 44	42	46 – 57	49
Design Target, Worst-Case Period 0600 – 0700hrs	34 – 40	37	46 – 51	46

6. Plant Assessment

We base the following assessment on the plant details noted above.

6.1. Noise Modelling

6.1.1. Noise Modelling Parameters

A noise modelling exercise has been undertaken, based on the supplied information, to address the impact of plant noise as it affects the NSRs. Noise level predictions have been carried out using the noise modelling software CadnaA by DataKustik. The software calculates its predictions on the International Standard ISO 9613-2 entitled 'Acoustics – Attenuation of sound during propagation outdoors', published in 2024. The following parameters have been assumed in the noise model:

- The building heights are based on Google satellite imagery and on-site observations.
- The 'max. Order of Reflection' is considered to be 3.
- The ground across the site and surrounding area is considered hard and reflective ($G=0$).
- Buildings are considered to be reflective.
- The plant noise levels are as detailed in Section 2.2.
- All plant is operating continuously and simultaneously.
- The topography of the site is presumed to be flat as a worst-case.
- The predicted noise grid is at a height of 4.5 metres.
- The predicted building evaluation receivers are given at the worst case per façade, across all floors.
- The external plant units are proposed to be within a plant area that the client advises will be constructed with solid, closed boarded fencing.
 - We advise the fence is constructed to a height of 2.5m with materials comprising a minimum surface mass of 10kg/m^2 .
 - There must be no gaps in the construction.
 - The access doors to the plant area must be as noted in the compound drawings.

6.1.2. Noise Modelling Results

The below figure shows the predicted cumulative specific sound level of the plant operating simultaneously.

Figure 6: Predicted cumulative specific sound level



As can be seen from the above model, the highest cumulative noise level due to the proposed plant is 31 dB $L_{Aeq, T}$.

6.2. Initial Estimate of Impact

A British Standard 4142:2014 assessment of the impact of plant noise has been undertaken at a location representative of the NSRs.

6.2.1. Specific Sound Level

Based on the above modelling results the specific sound level at the worst-case NSR is 31 dB $L_{Aeq, T}$. This is the level at the NSR without any character correction.

6.2.2. Background Sound Level

From the measured data we have determined the design background sound level as 37 dB $L_{A90, 15mins}$.

6.2.3. Character Corrections

BS4142:2014 states that character corrections should be added to the 'specific sound level' if it exhibits any *tonality, impulsivity, other specific characteristics and/or intermittency* at the assessment location.

Based on our site visit and knowledge of such plant units, corrections to be applied are as follows:

- **Tonality** – As we do not have third-octave band noise data for the plant, the tonality of the plant cannot be accurately predicted. It is the supplier's/installer's responsibility to ensure that no tonality is present at the NSR.
- **Impulsivity** – Plant such as this is not normally impulsive. No correction applied.
- **Intermittency** – The plant has the potential to be intermittent. A +3dB correction is applied.
- **Other Sound Characteristics** – Fixed plant noise is present at the site due to other industrial and commercial premises, as such no character correction for other sound characteristics should be applied.

6.2.4. Initial Estimate of Impact

The following table shows the comparison of the rating sound level (including character corrections) against the plant noise limits.

Table 5: British Standard 4142:2014 initial estimate.

Parameter	Period	
	Weekday Operating Period (06.00 to 23.00 hours)	Saturday Operating Period (06.00 to 23.00 hours)
Background Sound Level	37 dB $L_{A90,T}$	37 dB $L_{A90,T}$
Specific Sound Level	31 dB $L_{Aeq,T}$	31 dB $L_{Aeq,T}$
Character Correction	+3 dB	+3 dB
Rating Level	34 dB $L_{Aeq,T}$	34 dB $L_{Aeq,T}$
Assessment Difference	-3 dBA	-3 dBA

As can be seen above, the cumulative level of plant noise at NSR is below background for the day and night periods. As such, the external plant associated with the development is considered acceptable, achieving the requirements of .

Context in terms of BS4142 would not change the outcome of the assessment.

7. Summary & Conclusions

Sandycroft Projects Limited appointed Acoustic Consultants Limited to undertake a noise impact assessment for proposed new plant associated with the redevelopment of Stationery House, Acacia Avenue, Port Talbot.

This report provides an assessment of finalised plant noise in aim of discharging planning condition 20, as noted above.

Plant information is provided above, with the proposed layout of a fence compound as provided by the client. The fencing must be 2.5m high, comprising material with a minimum surface mass of 10kg/m². The access doors to the plant units are shielded from direct line of sight to the NSRs, which should remain.

The proposed plant noise is expected to be below the background noise level during both the day and night periods of the proposed opening hours between 06.00 to 23.00 hours, Monday to Saturday.

The predictions indicate that the requirements of planning condition 20 and 22 can be achieved, and the hours of plant use can be extended to align with the proposed opening hours of 06.00 to 23.00 hours, Monday to Saturday.

8. Appendix 1 – Glossary of Acoustic Terminology

A-weighted sound pressure p_A – value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network.

A-weighted sound pressure level, L_{pA} – quantity of A-weighted sound pressure given by the following formula in decibels (dBA)

$$L_{pA} = 10 \log_{10} (p_A/p_0)^2$$

where:

p_A is the A-weighted sound pressure in pascals (Pa);
 p_0 is the reference sound pressure (20 μ Pa)

Background sound level, $L_{A90,T}$ – A-weighted sound pressure level that is exceeded by the residual sound assessment location for 90% of a given time interval, T, measured using weighting F and quoted to the nearest whole number of decibels

Break-in - noise transmission into a structure from outside.

Decibel (dB) – The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ – value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

$$L_{Aeq,T} = 10 \log_{10} \left[(1/T) \int_{t_1}^{t_2} [p_A(t)^2/p_0^2] dt \right] \quad (1)$$

where:

p_0 is the reference sound pressure (20 μ Pa); and
 $p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t

NOTE The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.

Facade level – sound pressure level 1 m in front of the façade. Facade level measurements of L_{pA} are typically 1 dB to 3 dB higher than corresponding free-field measurements because of the reflection from the facade.

Free-field level – sound pressure level away from reflecting surfaces. Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source).

Octave and Third Octave Bands – The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example, two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example, third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

Sound pressure level – Sound pressure level is stated on many of the charts. It is the amplitude of the acoustic pressure fluctuations in a sound wave, fundamentally measured in Pascals (Pa), typically from 20 micro-Pascals to 100 Pascals, but commonly simplified onto the decibel scale.

Sound reduction index, R – laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,T_r}$ – equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .

Structure-borne noise – audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements.

Rating level, L_{A,r,T_r} – Specific sound level plus any adjustment for the characteristic features of the sound.

Reverberation Time, T – The reverberation time is defined as the time taken for a noise level in an enclosed space to decay by 60 dB from a steady level once the noise source has stopped. It is measured in seconds. Often a 60 dB decay cannot be measured so the reverberation time is measured over a lesser range and corrected back to the time for a 60 dB drop assuming a constant decay rate. Common parameters are T20 (time taken for a 20 dB decay multiplied by three) and T30 (time taken for a 30 dB decay multiplied by two).

Vibration Dose Value, VDV – measure of the total vibration experienced over a specified period of time.

Estimated Vibration Dose Value, $eVDV$ – estimation of the total vibration experienced over a specified period of time. This is usually based on the number of events and shortened measurement data.

Weighted sound reduction index, R_w – Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. The weighted sound reduction index is used to characterize the insulation of a material or product that has been measured in a laboratory (see BS EN ISO 717-1).



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