

Project

Cefn-Mawr, Wrexham
Acoustic Assessment for Planning

Prepared for

Anwyl Partnerships

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PI	04/05/2021	Issued report	Jody Tan BEng(Hons) MIOA

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Summary

SRL has been commissioned by Anwyl Partnerships to provide a noise assessment to discharge planning condition 28 of planning application reference 'P/2020 /0627' for a proposed development of 33 new-build residential properties at a site in Cefn-Mawr, Wrexham. Planning condition 28 states:

“28. No part of the development shall commence until a noise survey in order to determine noise levels for both day and night has been carried out, and a detailed report of the survey findings together with a detailed scheme of noise attenuation and/or noise insulation measures has been submitted to and approved in writing by the Local Planning Authority. The measures as are approved shall be fully implemented prior to the first occupation / use of the development.”

I completed a noise survey at the site using attended and unattended measurement positions to determine the typical daytime and night time noise levels that will affect the proposed residential properties.

Noise measurements were taken during the COVID-19 pandemic, however guidance from the Welsh Government at the time of our noise survey was such that people could leave their homes for non-essential reasons. As the main noise source across the site identified during our noise survey was due to plant noise from the sewage treatment works, it is unlikely that noise from this facility would be different in 'normal' circumstances. Therefore, it is expected that noise levels measured during our survey are representative of 'normal' conditions and have not amended.

Noise from the nearby sewage works is shown to have a significant adverse impact in accordance with BS 4142:2014+A1:2019 'Methods for Rating and Assessing Industrial and Commercial Sound'. However, with the recommended building envelope acoustic performance specifications given in this report, the internal noise levels set-out in BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' are capable of being achieved in all habitable rooms of the proposed properties during the daytime and night time.

My assessment shows that planning condition 28 can be discharged if the recommendations given in this report are implemented.

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1.0 Introduction

SRL has been commissioned by Anwyl Partnerships to provide a noise assessment to discharge planning condition 28 of planning application reference 'P/2020 /0627' for a proposed development of 33 new-build residential properties at a site in Cefn-Mawr, Wrexham.

The development site is currently brownfield land. The site is bounded to the north by existing residential properties, to the east by Wrenbury Way, to the south by a sewage treatment facility and to the west by gardens and grassland. An existing residential property sits within the site boundary.

Figure 1 shows the site plan of the development in context of the surrounding area.

Figure 1 – Site Plan in Context



2.0 Criteria

2.1 Planning Condition 28

Planning condition 28 of planning application reference 'P/2020 /0627' relates to noise and states:

"28. No part of the development shall commence until a noise survey in order to determine noise levels for both day and night has been carried out, and a detailed report of the survey findings together with a detailed scheme of noise attenuation and/or noise insulation measures has been submitted to and approved in writing by the Local Planning Authority. The measures as are approved shall be fully implemented prior to the first occupation / use of the development.

Reason: To protect the amenities of the occupiers of nearby properties in accordance with Policy GDPI of the Wrexham Unitary Development Plan."

Planning application reference 'P/2020 /0627' also states that:

"The development site is in close proximity to a sewage treatment works and the developer is therefore required to carry out a noise survey in connection with condition no. (28) in order to determine noise levels for both day (0700 - 2300 hours) and night (2300 - 0700 hours) having regard to Planning Guidance (Wales), Technical Advice Note (TAN) 11 - Noise. The report of the noise survey findings shall include:

- a) Noise levels arising from day/night time activities in the vicinity of the proposed development site and the impact upon the proposed accommodation, and*
- b) A detailed scheme of noise insulation and / or attenuation measures so designed to safeguard the amenity of the future occupants of the proposed accommodation hereby approved."*

2.1.1 Wrexham Unitary Development Plan

Planning condition 28 references policy GDPI of the Wrexham Unitary Development Plan. Point F of Wrexham Unitary Development Plan policy GDPI relates to noise and states the following:

"Policy GDPI All new development should:-

- f) Ensure the safety and amenity of the public and safeguard the environment from the adverse effects of pollution of water, land or air, hazards from industry and quarrying, and associated noise, odour or vibration arising from development."*

2.1.2 Planning Guidance (Wales), Technical Advice Note (TAN) 11 - Noise

Section B17 of 'Planning Guidance (Wales), Technical Advice Note (TAN) 11 - Noise' relates to noise from industrial sources and states:

"B17. The likelihood of adverse impacts arising from noise of an industrial and/or commercial nature can be assessed, where the application of BS 4142:2014 is appropriate, using the guidance set out in that standard. Tonal or impulsive characteristics of the noise are likely to increase the scope for adverse effects and this is taken into account by the "rating level" defined in BS 4142. This rating level should be used when stipulating the level of noise that can be permitted. The significance of sound of an industrial and/or commercial nature typically depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and also the context in which the sound occurs. BS 4142:2014 states that as an initial estimate: "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." However, this initial estimate of the impact may need to be modified due to the context, and determining whether this is the case should include consideration of absolute sound levels, the character and level of the residual sound compared to the specific sound, the sensitivity of the receptor, and good building design. Since background sound levels vary throughout a 24-hour period it will usually be necessary to assess the acceptability of sound levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development. Similar considerations apply to developments that will emit significant noise at the weekend as well as during the week. In addition, general guidance on acceptable sound levels within buildings can be found in BS 8233:2014. Noise conditions can often be attached to environmental permits issued under the Environmental Permitting (England and Wales) Regulations 2010 (as amended). This will be particularly relevant when dealing with sites where the operator is working with the benefit of a planning permission not subject to a noise condition. Local planning authorities and environmental permitting authorities should consult closely at an early stage when considering the need for specific noise controls to be imposed by appropriate conditions in any planning permission or in the subsequent environmental permit."

In response to this, I have based my assessment of noise at the site on the guidance in BS 8233:2014 and BS 4142:2014.

2.2 BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'

The proposed development will achieve the internal noise level limits given in BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'. The adopted criteria are detailed in Table 1:

Table 1 – BS 8233 Internal Noise Limit Criteria

Activity	Location	Daytime (07:00-23:00)	Night time (23:00-07:00)
Resting	Living room	$L_{Aeq,16hr}$ 35dB	-
Dining	Dining room	$L_{Aeq,16hr}$ 40dB	-
Sleeping (daytime resting)	Bedroom	$L_{Aeq,16hr}$ 35dB	$L_{Aeq,8hr}$ 30dB

It is worth noting that the recommended indoor ambient noise levels in Table 1 apply to noise sources without the presence of any anonymous noise. BS8233 states where industrial noise affects residential areas, the methods for rating noise in BS4142 should be applied.

2.3 BS 4142:2014+A1:2019 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS4142)

BS 4142 provides a way of assessing noise from existing noise sources against the new receptors. BS 4142 requests that where possible, background noise levels be measured at the assessment location. The guidance points out that *"the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods"*.

BS 4142 defines the noise source assessed as the 'specific' noise. When comparing the specific noise against existing background levels, BS 4142 highlights that certain acoustic features (tonality, impulsivity, intermittency etc.) can increase any significance of impact and penalties should be applied to the specific noise level, in accordance with the guidance in BS 4142, to provide the 'Rating Level' of the noise source.

Comparison of the Rating Level to background noise level indicates the significance of the new noise source at the receptor under assessment. If the Rating Level is higher than the background noise level, then there may be an 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. 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.

BS 4142:2014 recommends that *"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"*.

3.0 Noise Survey

3.1 Noise Survey Procedure

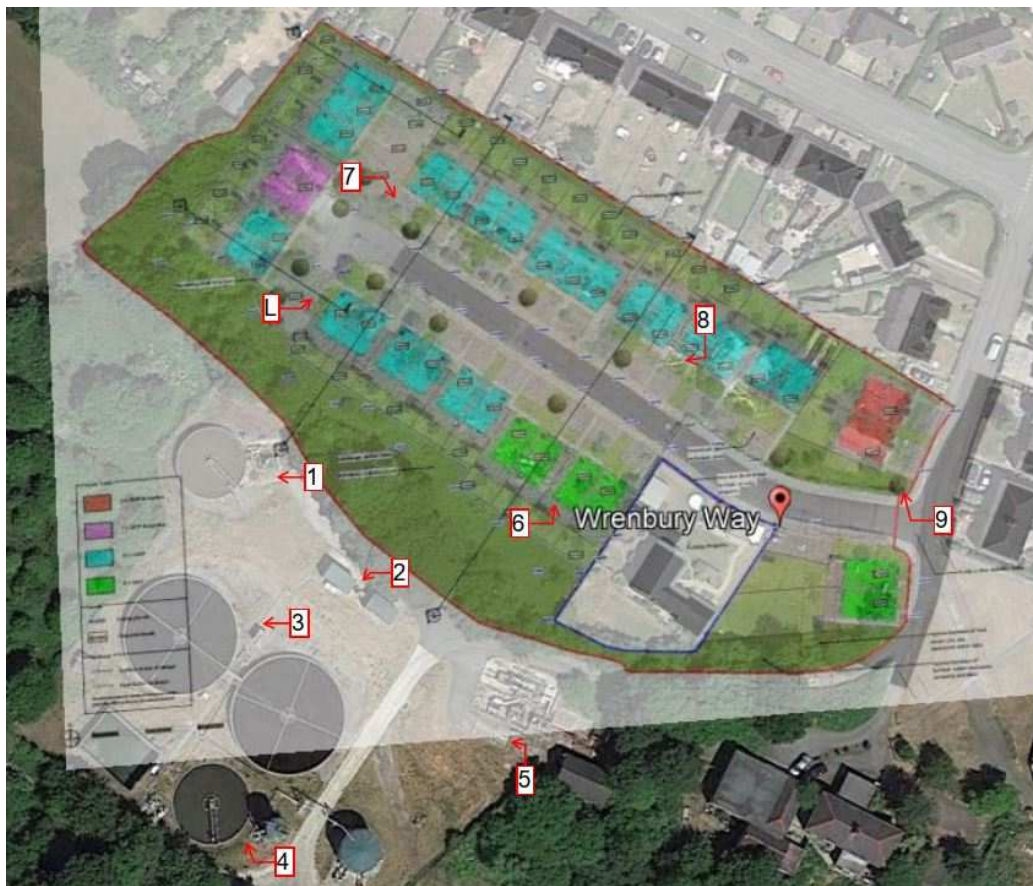
I measured noise at the site on 12 April and 13 April 2021. Noise measurement locations are shown in Figure 2.

I measured noise inside the sewage treatment works compound at positions 1-5 during the daytime. Measurements were taken of the noisiest pieces of equipment until the L_{Aeq} stabilised and was consistent. 10-minute measurements were taken during the daytime at positions 6-9. Two 5-minute measurements were taken at position 9 during the night time. An unattended noise logger was deployed at position 'L' which ran continuously from 12:00 12 April - 12:00 13 April.

For all measurements, the microphone was fixed to a tripod at least 1.5m above the ground and 3m from any other reflective surfaces.

The sewage treatment plant was audible at all measurements position, other noise sources include distant road traffic and noise from passing distant trains.

Figure 2 - Noise measurement locations



3.2 Noise Survey Results

Table 2 gives a summary of the measured noise levels at position 1-5 inside the sewage treatment compound.

Table 2 – Sewage Treatment Work Noise Levels

Position	Noise Source	Sound pressure level at 3m ($L_{Aeq,T}$, dB)
1	Low frequency churning sound of sewage treatment plant	60
2	Two fill points and emergency shower dripping	56
3	Two rotating sprinklers	54
4	Low frequency churning sound of sewage treatment plant	55
5	Water running underground	60

Table 3 gives a summary of the attended noise measurement results at positions 6-9 across the site.

Table 3 – Attended Noise Measurement Results

Position	Daytime ambient noise level ($L_{Aeq,10min}$, dB)	Daytime background noise level ($L_{A90,10min}$, dB)	Night time ambient noise level ($L_{Aeq,5min}$, dB)
6	51	42	-
7	42	37	-
8	42	38	-
9	43	37	34 ⁽¹⁾

⁽¹⁾Night time ambient noise level presented is the logarithmic average of the two 5-minute measurements taken at this position.

During the night time, noise from the sewage treatment works was more apparent, the noise source is characterised by a low frequency chugging with a clear tonality and impulsivity.

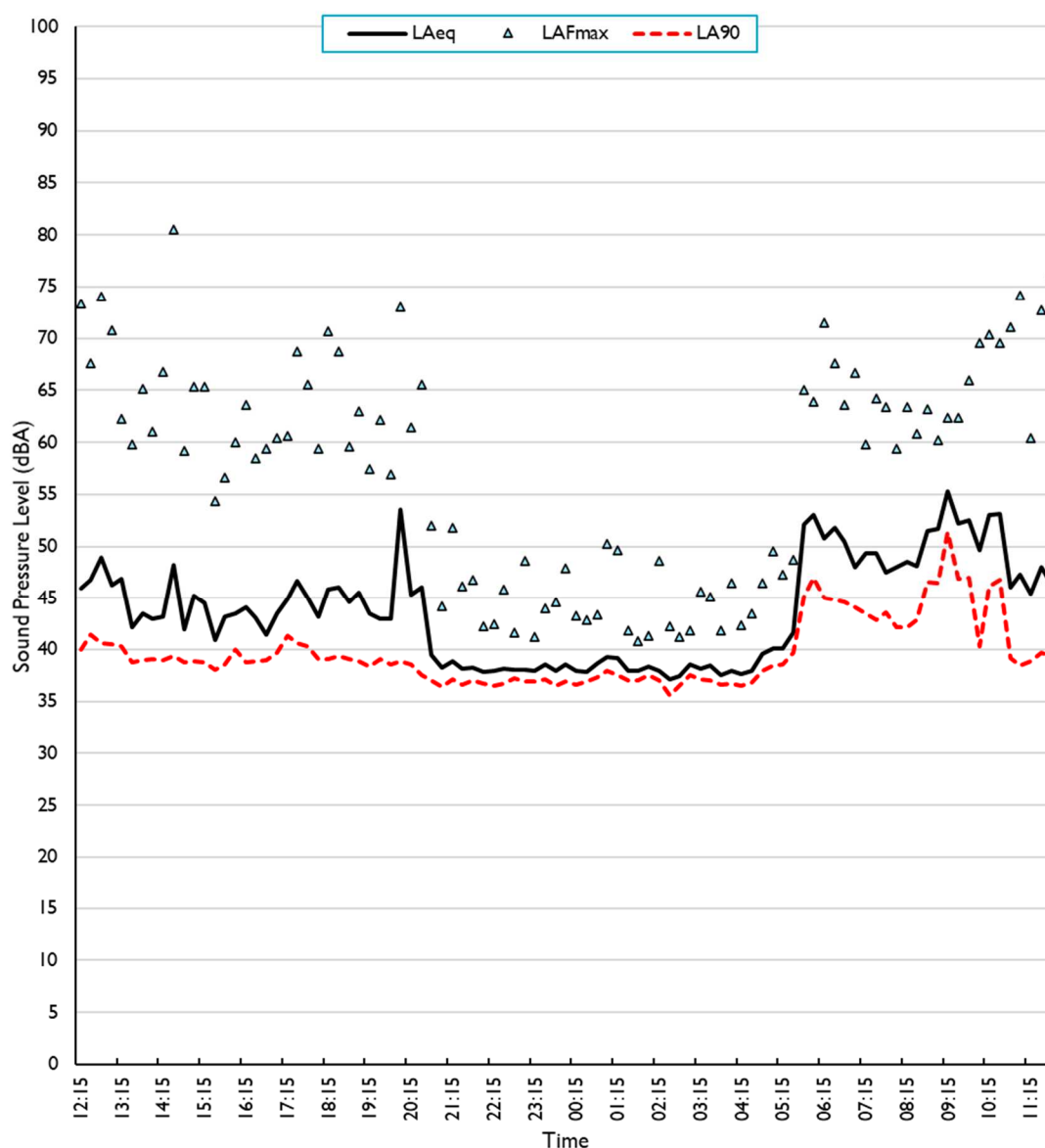
Table 4 presents a summary of the daytime and night time noise levels measured by the unattended noise logger. Ambient noise levels presented are the logarithmic average of the 15-minute measurement periods. Background noise levels presented are the most commonly measured L_{A90} of the 15-minute measurement periods.

Table 4 – Unattended Noise Logger Measurement Results

Position	Daytime ambient noise level (L _{Aeq,16hr} , dB)	Daytime background noise level (L _{A90,15mn} , dB)	Night time ambient noise level (L _{Aeq,8hr} , dB)	Night time background noise level (L _{A90,15mn} , dB)
L	47	39	45	37

Figure 3 presents the noise levels measured by the unattended noise logger during the survey period.

Figure 3 – Noise Levels Measured by the Unattended Noise Logger



The noise levels recorded by the unattended noise logger indicate that between the hours of 05:45-10:45, the sewage treatment plant could be running at a higher duty and this has led to an increase in the measured noise level between this period.

3.3 Effect of COVID-19 Pandemic

Our noise survey was completed during the COVID-19 pandemic. At the time of the noise survey the Welsh Government's advice was that you could leave your home for non-essential reasons. The main noise source across the site identified during our noise survey was due to the sewage treatment works, it is unlikely that noise from this facility would be different in 'normal' circumstances.

With this in mind, I believe that the noise levels measured are typical of 'normal' circumstances and deemed to be representative of the noise climate at the proposed site.

4.0 Noise Assessment

4.1 Acoustic Feature Correction

As previously mentioned, BS 8233 references BS 4142 when assessing sites that contain certain acoustic features (tonality, impulsivity, intermittency etc.). These acoustic features should be applied to the specific noise level, in accordance with the guidance in BS 4142, to provide the 'Rating Level' of the noise source.

Based on my onsite observations I suggest that a +7dB correction (+4dB for tonality and +3dB for intermittency) be applied to the noise levels given in Tables 3 and 4 to account for the character of noise across the site due to the sewage treatment works. Table 5 gives the rating noise level across the site which will be used in my noise assessment.

Table 5 – Rating noise level across site

Position	Daytime rating noise level ($L_{Ar,T}$, dB)	Night time rating noise level ($L_{Ar,T}$, dB)
L	54	52
6	58	56 ⁽²⁾
7	49	47 ⁽²⁾
8	49	47 ⁽²⁾
9	50	41

⁽²⁾Estimated night time noise level based on measurements at position L

4.2 Indoor ambient noise levels

Based on the predicted external rating noise levels presented in Table 5, I have determined example façade specifications which are capable of achieving L_{Aeq} 30 dB in bedrooms at night as well as L_{Aeq} 35 dB during the day in living rooms and bedrooms and L_{Aeq} 40 dB in kitchens and dining rooms.

It is assumed that external façades will be a masonry or cladding outer leaf with internal plasterboard linings. This construction is likely to be sufficient acoustically, and it will be the windows and any ventilator which will be the weakest elements acoustically.

I have based my on calculations on the room dimensions and glazing areas given in the drawings 'HBCM-TACP-XX-00-DR-A-100/101/102/103/104/105-A' and 'HBCM-TACP-XX-ZZ-DR-A-200/201/202/203/204/205-A'. Shown below in Figures 4 and 5 is the required glazing and ventilators that are capable of achieving the internal ambient noise level criteria for BS 8233 in living rooms, kitchens, dining rooms and bedrooms, given in Table 1 of this report. A key is shown in Table 6.

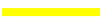
Figure 3 – Façade specification for living rooms and kitchen/dining rooms



Figure 4 – Façade specification for bedrooms



Table 6 – Mark-up Key

Façade Mark-up	Minimum glazing requirement	Minimum trickle ventilation requirements ($D_{new}+C_{tr}$ dB)
	Open windows	
	Standard thermal double glazing e.g. 4/12/4 (R_w+C_{tr} 27dB)	Standard non-acoustic trickle vents
		34
		39

The calculations are based on one open ventilator per living room and bedroom. The number of ventilators required will depend on your ventilation strategy/design. If more ventilators are required, the minimum sound reduction for each ventilator will be higher. If fewer ventilators are needed, then the performance will be less. Alternatively, where possible, ventilators should be placed on the quieter façade.

The sound reduction performance of the glazing must be achieved by both the frame and the glass when combined and tested in a laboratory as a single unit. The suitability of the glazing and ventilation selected will depend on the performance in each octave band frequency as well as the single overall figure.

As most noise comes in via both the windows and the vents, it is necessary to balance these two elements. Selecting better glazing means you can have lower performance acoustic vents and vice versa.

Figures 4 and 5 show that bedrooms which are closest to the sewage treatment works will require the highest ventilator performance. Therefore, where possible, internal layouts should be design so that bedrooms of houses in the southern portion of the site are north-facing.

4.3 Plant noise assessment

I have assessed the impact of noise associated with the sewage treatment works in line with BS 4142. Table 7 shows my assessment.

Table 7 – BS 4141 Assessment

Plant noise Specific Noise level at Source, L_{Aeq} (dB)	60
Acoustic Character Correction (dB)	+7dB (4dB for a tone where it is perceptible at the noise receptor and 3dB for intermittency)

Distance Correction to Nearest NSR, 30m	-20
Plant Noise Rating Level at Receptor $L_{Ar,Tr}$ (dB)	47
Typical measured night time background noise level at position L, L_{A90} (dB)	37
Difference (dB)	+10

Table 7 shows that plant noise associated with the sewage treatment works is likely to have a significant adverse impact, in accordance with BS 4142. However, the internal noise levels will be within the criteria given in BS8233, taking into account the acoustic features of the plant. Indoor ambient noise levels have been designed to meet 7 dB (acoustic feature) below the criteria given in Table 1.

BS4142 recommends the assessment to be in context with the surrounding area. On this site, the context is that the potential residents will be moving into an area with full awareness of the existing sewage plant. In addition to that, noise level from the plant is relatively low (compared to the recommendations in BS8233 of ≤ 55 dB $L_{Aeq,T}$ for noise at external amenity areas).

Appendix A - Survey Details

A1. Location of Survey

Wrenbury Way, Cefn-mawr, Wrexham

A2. Date & Time of Survey

10:30 12 April 2021 – 12:30 13 April 2021

A3. Personnel Present During Survey

Lewis Bullivant (SRL)

A4. Weather Conditions during Survey

Sunny, still, dry

A5. Instrumentation

HE3

Description	Make	Model	Serial no.	SRL no.
Sound Level Meter (HE3)	Brüel & Kjaer	2250	2559287	519
Pre-amp	Brüel & Kjaer	ZC0032	8088	869
Microphone	Brüel & Kjaer	4189	2471146	868
Calibrator	Brüel & Kjaer	4231	2564290	520

HL4

Description	Make	Model	Serial no.	SRL no.
Sound Level Meter (HL4, Brown)	Norsonic	Nor 140	1404737	799
Calibrator (93.8dB)	Norsonic	Brüel & Kjaer	1739193	184
Pre-amp	Norsonic	Type 1209	13927	799
Microphone	Norsonic	Type 1225	128683	799

A6. Check Calibration Procedure

Before and after the survey the measurement apparatus was check calibrated to an accuracy of ± 0.3 dB using the type 4231 Sound Level Calibrator. The Calibrator produces a sound pressure level of 93.8 dB re 2×10^{-5} Pa at a frequency of 1 kHz.

Appendix B – Measured Noise Levels

Attended Noise Measurements

Position	Date & Time	Measurement Duration	LAeq
1	12/04/2021 10:38	00:02:07	60
2	12/04/2021 10:41	00:02:04	56
3	12/04/2021 10:44	00:02:01	54
4	12/04/2021 10:47	00:02:00	55
5	12/04/2021 10:51	00:02:00	60
6	12/04/2021 12:12	00:10:01	51
7	12/04/2021 12:24	00:10:00	42
8	12/04/2021 12:39	00:10:00	42
9	12/04/2021 23:03	00:05:00	33
9	12/04/2021 23:08	00:05:00	34
9	13/04/2021 11:38	00:10:00	43

Appendix C – Noise Measurement Parameter Definitions

- L_{Aeq} - The "A" weighted equivalent continuous sound pressure level. A representation of a continuous sound level containing the same amount of sound energy as the measured varying noise, over the measurement period. It can be considered as the "average" noise level.
- $D_{n,ew}$ - The weighted sound insulation value of small building elements
- R_w - The weighted sound reduction index, measured in a laboratory.

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