ACOUSTIC CONSULTANTS LTD

Noise Impact Assessment

New Industrial Unit
Proposed Industrial Development

Reference: 10793/NEW/BL

Client:
Dyfed Steel

Document Control

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2.0	Comments	27/06/24	Blake Lucas	James Abbass	James Abbass

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1. Introduction

Dyfed Steel appointed Acoustic Consultants Limited to undertake a noise assessment for the proposed industrial development at their established site in Llanelli. The client is applying to construct a new industrial unit on the existing site.

A site noise survey was undertaken to determine the existing noise levels at the sensitive receivers along with operational noise levels to inform the assessment.

Relevant assessment criteria have been identified including British Standard 4142:2014+A1:2019, which is used to achieve planning aims in Planning Policy Wales (PPW) and Technical Advice Note 11 (TAN11).

The author of this report is a Member of the Institute of Acoustics with over 16 years of experience in the field of noise and is suitably qualified to undertake this assessment.

2. The Site & Proposals

2.1. The Site

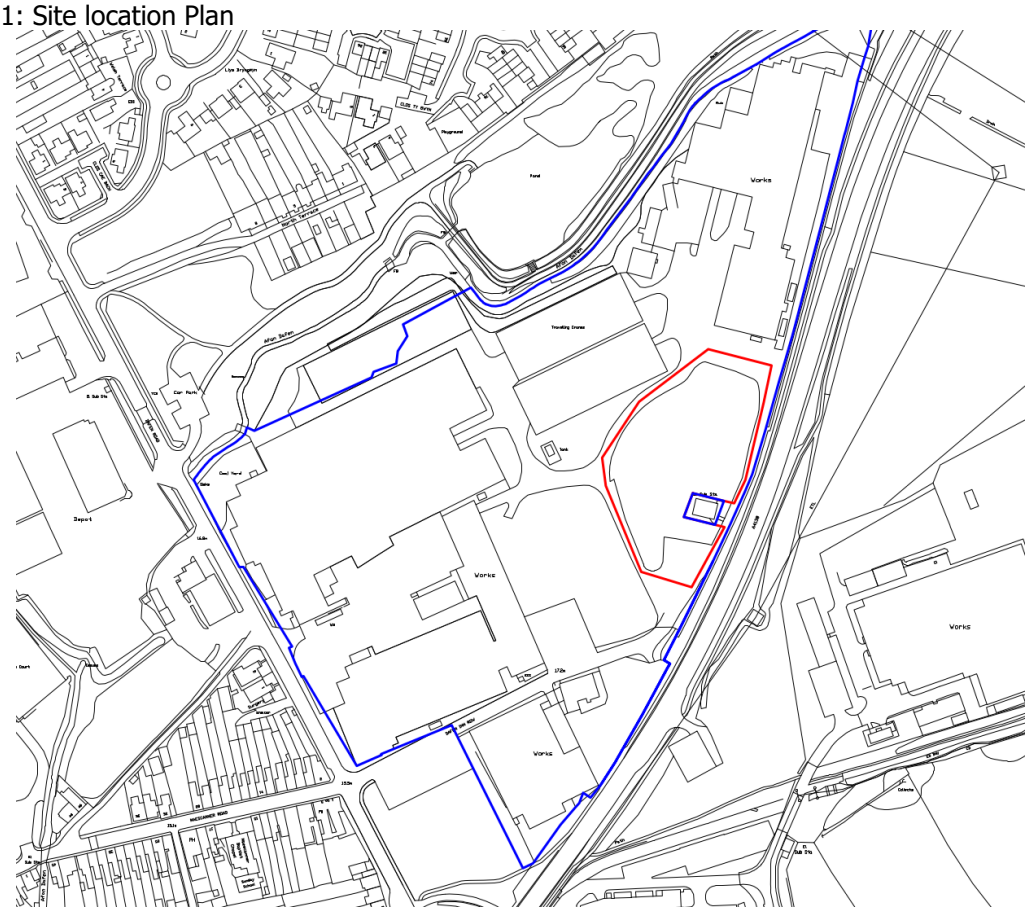
The application site is located within Dafen, a village situated in the east of Llanelli. The site is adjacent to the A4138 which links the M4 corridor to the town of Llanelli. The site lies within an established employment area, with similar neighbouring uses to all sides.

In respect of wider surroundings, the Dyfed Steel site is situated in an area that can be characterised as 'mixed-use', however predominantly led by established employment land uses found to the north, east and west. A number of residential properties are situated in the wider locality north of the site at Clos Cilsaig & North Terrace with the most sensitive being those off of Dafen Road to the west.

The noise climate affecting these dwellings is considered mixed and include both local and distant road traffic and existing established industrial noise from Dyfed Steel.

The figure below shows the site location plan:

Figure 1: Site location Plan



2.2. Operational Information

The site is situated within the operational curtilage of the Dyfed Steel site and can be accessed from the main entrance off Dafen Road (via an internal route through the site) or alternatively from Dafen Inn Row to the south.

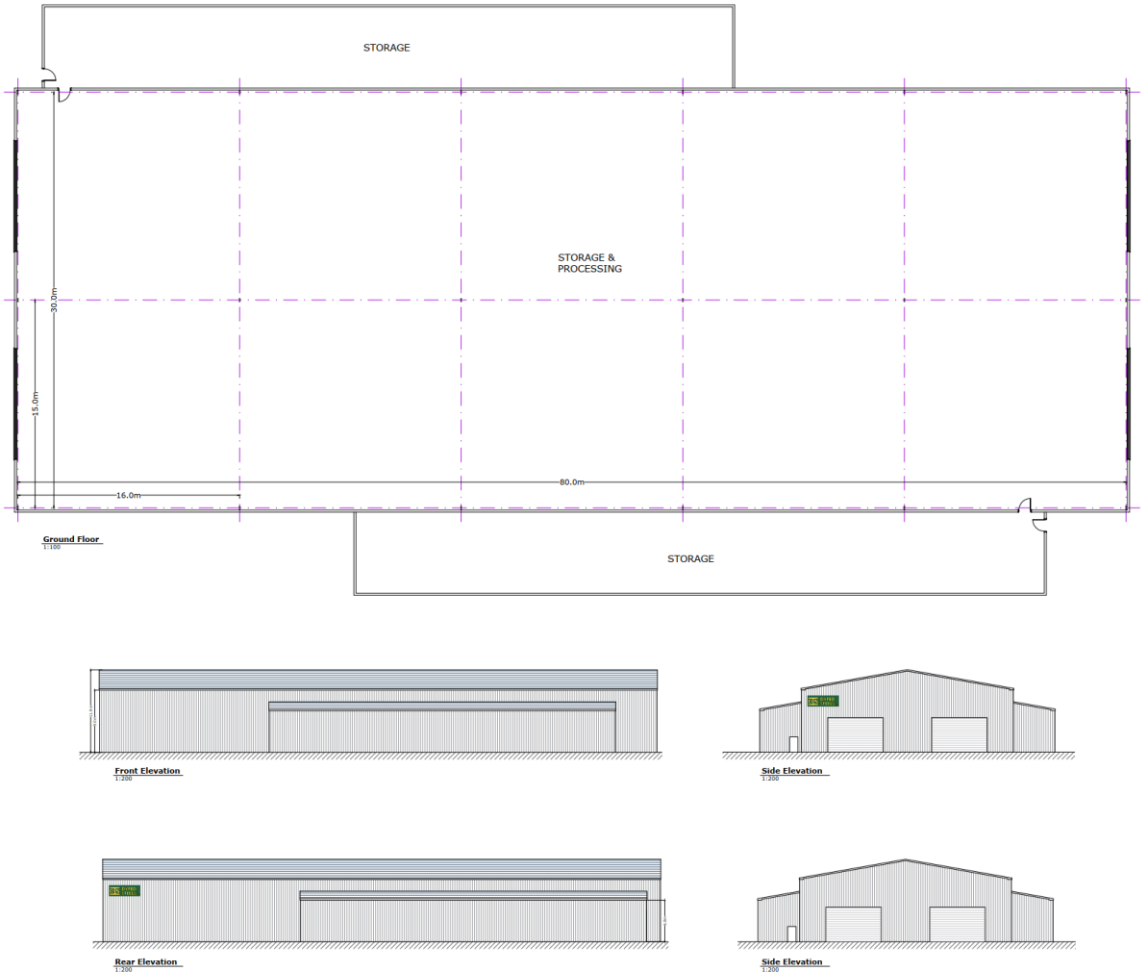
The proposed site is positioned in the east of the existing Dyfed Steel site, a short distance from the A4138. The client proposes to construct a new building to be used primarily for stocking areas, with laser and sawing machines and gantry crane.

The client has provided the following information with regards to the operations within the building:

- Proposed working hours are 24 hours a day, with a working week beginning on 6am on Sunday and finish at 4pm Saturday. This aligns with the current site.
- Deliveries will be between 6am and 1pm.
- The materials will arrive at the building via Dafen Road (via an internal route through the site) or alternatively from Dafen Inn Row to the south and moved to the building either through the entrance on the southern or northern elevation and unloaded within the building itself.
- The materials will be unloaded with the gantry crane internally.
- The operations within the building will be primarily stocking areas together and will also include laser and sawing machines.
- The proposed plant within the building will include BLM LT 8 Laser Machine and Behringer saw model 430. There will also be gantry cranes.
- Once the goods are processed they will be removed via the entrance on the northern or southern elevation with the loading taking place internally using the gantry crane and HGV.

The proposed floor plan and elevations are provided below:

Figure 2: Floor Plan and Elevations



3. Planning & Noise

3.1. Planning Policy Wales (PPW)

Planning Policy Wales (PPW) Edition 12 dated February 2024 sets out the land use planning policies of the Welsh Government. Section 1 states:

1.1 Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. PPW, the TANs1, MTANs2 and policy clarification letters comprise national planning policy.

The most relevant statements for noise affecting a residential use are provided in Section 6.7 and summarised below:

"6.7.1 Clean air and an appropriate soundscape, contribute to a positive experience of place as well as being necessary for public health, amenity and well-being. They are indicators of local environmental quality and integral qualities of place which should be protected through preventative or proactive action through the planning system. Conversely, air, noise and light pollution can have negative effects on people, biodiversity and the resilience of ecosystems and should be reduced as far as possible."

6.7.4 The planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air and noise pollution alongside action to tackle high pollution hotspots. In doing so, it should consider the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment and identify and pursue any opportunities to reduce, or at least, minimise population exposure to air and noise pollution, and improve soundscapes, where it is practical and feasible to do so.

6.7.5 In taking forward these broad objectives the key planning policy principle is to consider the effects which proposed developments may have on air or soundscape quality and the effects which existing air or soundscape quality may have on proposed developments. Air Quality and soundscape influence choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing development and its surrounding area and its potential to exacerbate or create poor air quality or inappropriate soundscapes. The agent of change principle says that a business or person responsible for introducing a change is responsible for managing that change. In practice, for example, this means a developer would have to ensure that solutions to address air quality or noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable.

6.7.6 In proposing new development, planning authorities and developers must, therefore:

- *address any implication arising as a result of its association with, or location within, air quality management areas, noise action planning priority areas or areas where there are sensitive receptors;*
- *not create areas of poor air quality or inappropriate soundscape; and*
- *seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes.*

6.7.7 To assist decision making it will be important that the most appropriate level of information is provided and it may be necessary for a technical air quality and noise assessment to be undertaken by a suitably qualified and competent person on behalf of the developer."

6.7.8 Good design, for example setting back buildings from roads to avoid canyon effects and using best practice in terms of acoustic design to ensure the appropriate and intended acoustic environment of completed developments should be incorporated at an early consideration in the design and planning process. Other mitigation measures must be capable of being effectively implemented for their intended purpose, and could include those related to:

- *traffic management and road safety;*
- *ensuring progress towards a shift to low or zero emissions means of road transport, such as electrical charging points;*
- *supporting low or zero emissions public transport;*
- *providing active travel infrastructure; and*
- *incorporating green infrastructure, where it can improve air quality by removing air pollution and aiding its dispersal, reduce real or perceived noise levels by absorbing and scattering noise and introducing natural sounds to soften man-made noise, provide areas of relative tranquillity, and reduce exposure by putting a buffer between sources of pollution and receptors.*

6.7.14 Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission.

6.7.19 The health imperative of good air quality and appropriate soundscapes in contributing to the overall character and quality of places and the health and well-being of people and wildlife should be fully recognised. It will not be appropriate to locate sensitive uses, such as hospitals, schools, care homes and housing adjacent to busy roads or other transport routes, where there are no connectivity benefits to be gained and where health and amenity impacts associated with increased exposure of people to pollution will be unacceptable. Whilst some uses may be appropriate with the aid of good design air quality and soundscape considerations can be overriding factors, especially for sensitive uses, if they cannot be adequately mitigated and impacts minimised.

6.7.20 Where sensitive developments need to be located close to existing transportation infrastructure for sustainable movement and access they should be designed, as far as practicable, to limit harmful substances and noise levels within and around those developments both now and in the future. This may include employing the principles of good acoustic design and the inclusion of active travel or travel management measures as part of development proposals. Such development, however, should preferably be located away from existing sources of significant noise, which may include aircraft noise or roads, particularly new roads or those with programmed route improvements.

6.7.21 Regard should be paid to current air quality and noise levels and the quality of the existing soundscape and account taken of any relevant local air quality action plan, noise action plan and/ or local or regional air quality strategy as part of development strategies and proposals in development plans and before determining planning applications.

6.7.24 The potential impacts of noise pollution arising from existing development, be this commercial, industrial, transport related or cultural venues (such as music venues, theatres or arts centres), must be fully considered to ensure the effects on new development can be adequately controlled to safeguard amenity and any necessary measures and controls should be incorporated as part of the proposed new development. This will help to prevent the risk of restrictions or possible closure of existing premises or adverse impacts on transport infrastructure due to noise and other complaints from occupiers of new developments. It will be important that the most appropriate level of information is provided and assessment undertaken.

PPW does not provide any quantifiable criteria and directs you to the Technical Advice Notes (TAN 11).

3.2. Technical Advice Note (Wales) - Noise

Planning Policy Wales (PPW) Edition 12 sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes. The relevant planning criteria for proposed residential development is in Technical Advice Note (Wales) 11 entitled "Noise" which was published in October 1997. The introduction states:

"This note provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. It outlines some of the main considerations which local planning authorities should take into account in drawing-up development plan policies and when determining planning applications for development which will either generate noise or be exposed to existing noise sources".

For noise from industrial and commercial developments, such as plant noise, TAN 11 states:

"B17. The likelihood of complaints about noise from industrial development can be assessed, where the Standard is appropriate, using guidance in BS 4142: 1990. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints 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 likelihood of complaints is indicated by the difference between the noise from the new development (expressed in terms of the rating level) and the existing background noise. The Standard states that, 'A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance'. Since background noise levels vary throughout a 24-hour period it will usually be necessary to assess the acceptability of noise 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 noise levels within buildings can be found in BS 8233: 1987."

4. Assessment Criteria

For industrial noise, the relevant guidance is within British Standard 4142:2014+A1:2019 entitled 'Method for rating and assessing industrial and commercial sound' uses 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.

Section 11 of the British Standard, entitled 'Assessment of the Impacts', 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."*

5. Site Noise Survey

A baseline and operational noise survey was undertaken at the site between the 24th and 30th April 2024.

5.1. Monitoring Equipment

Sound Pressure Levels were measured using three Class 1 sound level meters with half-inch condenser microphones, 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 shown in Table 1 and the certificates are available for inspection.

Table 1: Equipment and Calibration Status

Equipment Description / Manufacturer / Type	Serial Number	Date of Calibration	Calibration Certification Number
SLM, Cirrus Research, CR:171C	G071684	07/12/2023	204425
Microphone, Cirrus Research, MK224	211710D	07/12/2023	204425
Calibrator, Cirrus Research, CR:515	73217	08/12/2023	204428
SLM, NTI, XL3	A3A-00416-D1	28/11/2022	UK-22-122
Pre-Amp, NTI, MA220	11239	28/11/2022	UK-22-122
Microphone, NTI, MC230A	A23729	28/11/2022	UK-22-122
Calibrator, Larson Davis, CAL200	16799	18/12/2023	1507407-1

5.2. Weather Conditions

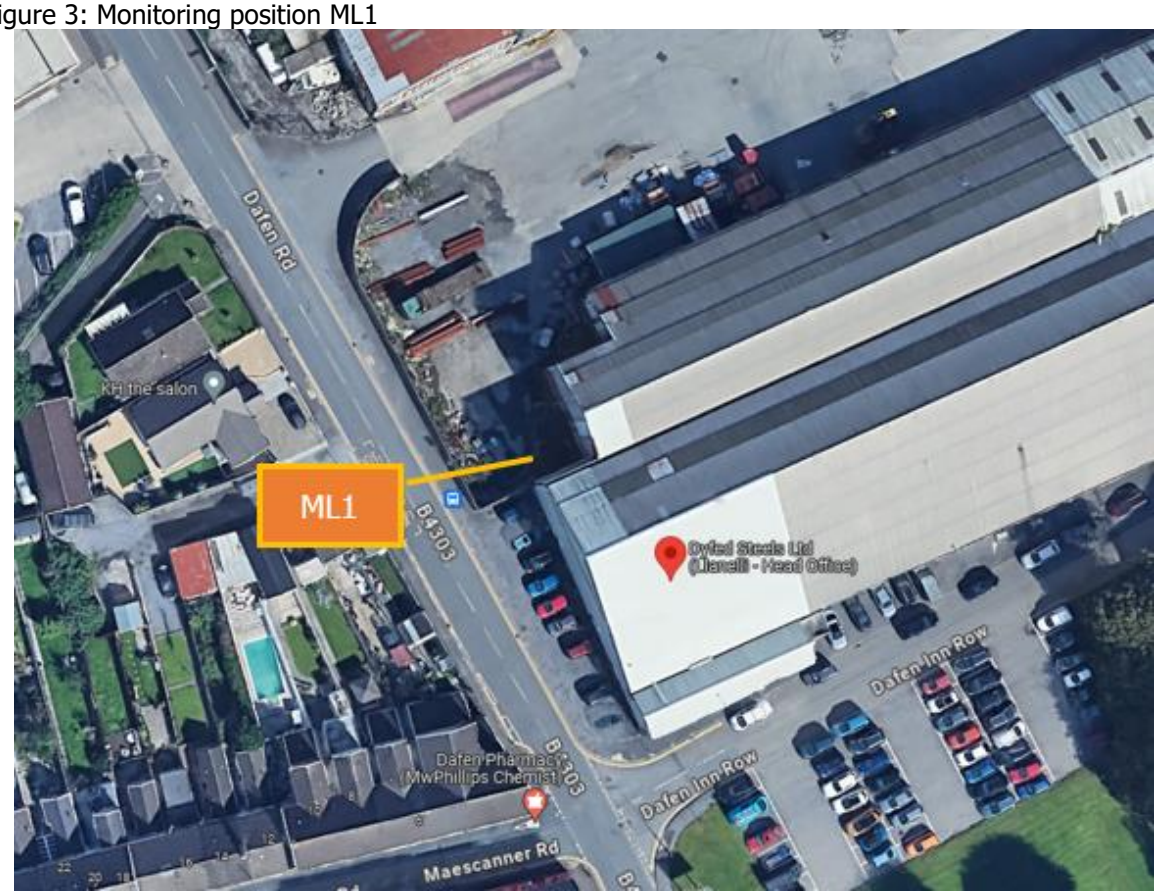
During the survey the weather was generally dry and calm with wind speeds below 5 m/s, this is considered suitable and not adversely affected the baseline noise levels.

5.3. Monitoring Procedure

5.3.1. Baseline Noise Levels

The existing baseline noise climate was monitored adjacent to Dafen Road in a free-field location. The monitoring position is provided in the figure below. The principal noise sources included road traffic on surrounding highways. The survey location was set behind the existing industrial building and therefore shielded from the majority of existing noise from Dyfed Steels. The location is representative of the nearby dwellings.

Figure 3: Monitoring position ML1



5.3.2. **Operational Noise Levels**

Operational noise levels were measures across the site of equipment that is to be used in the new building. This included:

- Gantry cranes moving goods
- Behringer saw model 430

It was not possible to measure the BLM LT 8 Laser Machine during the site visits as it was not operational.

Attended short term measurements were completed, along with a long-term measurement within an existing storage building where a gantry crane was in regular use moving steels.

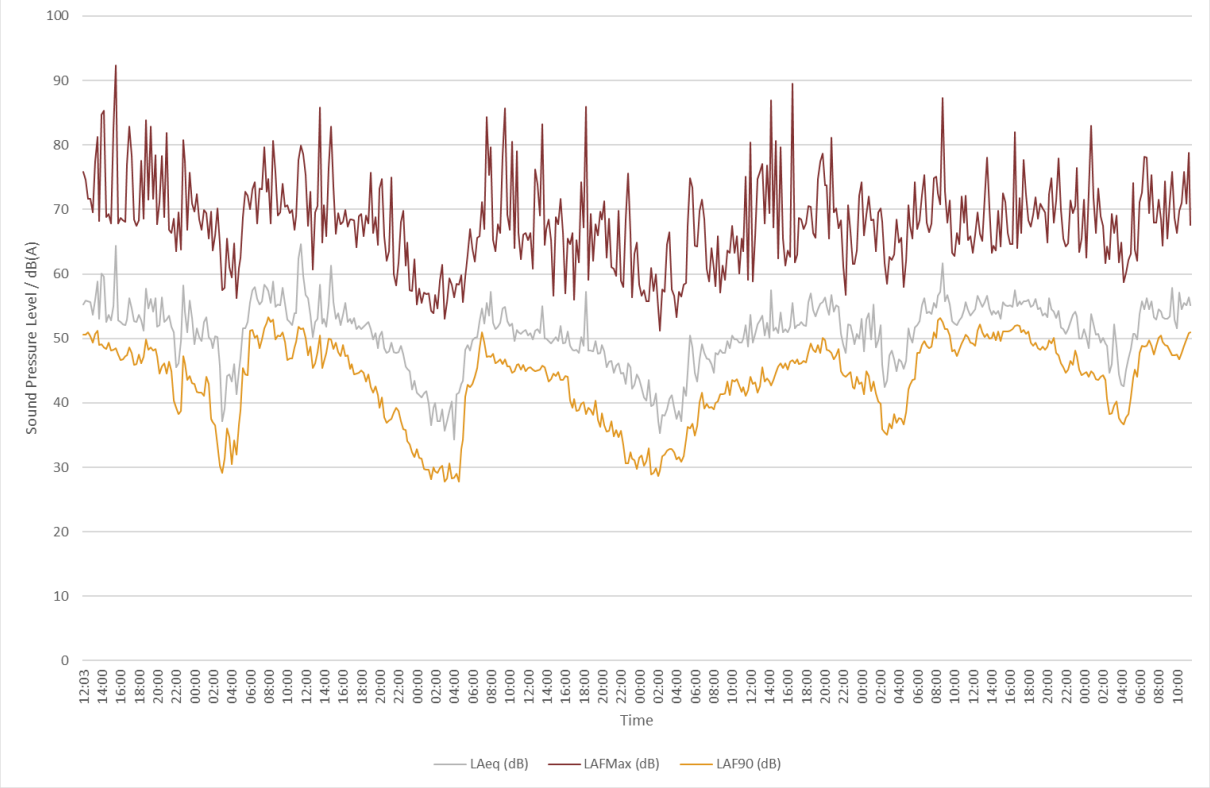
All measurements were internal and reverberant in nature. Measurements were completed over third octaves.

5.4. Noise Monitoring Data

5.4.1. Monitoring Position 1

A chart detailing the measured equivalent ($L_{Aeq,\ 15\ minutes}$), maximum ($L_{AFmax,\ 15\ minutes}$) and background ($L_{A90,\ 15\ minutes}$) noise levels over the survey period is provided below.

Chart 1: Measured levels over time at MP1 (free-field levels)



The table below details the measured 15-minute background (L_{A90}) and equivalent (L_{Aeq}) noise levels measured at MP1.

Table 2: Measured 15-minute noise levels at MP1 (free- field levels)

Date	Period	$L_{A90,15min}$		$L_{Aeq,15min}$	
		Range	Mode	Range	Mode
Full Data Set	Day (07:00 - 23:00)	31 - 53	49	43 - 65	52
	Evening (19:00 - 23:00)	31 - 50	48	43 - 58	48
	Night (23:00 - 07:00)	28 - 51	44	34 - 58	50
Thursday 25/04/2024	Day (12:60 - 23:00)	38 - 51	48	46 - 64	53
	Evening (19:00 - 23:00)	38 - 49	45	46 - 58	52
	Night (23:00 - 07:00)	29 - 51	44	37 - 58	50
Friday 26/04/2024	Day (07:00 - 23:00)	36 - 53	50	46 - 65	52
	Evening (19:00 - 23:00)	36 - 43	39	46 - 52	48
	Night (23:00 - 07:00)	28 - 49	28	34 - 53	42
Saturday 27/04/2024	Day (07:00 - 23:00)	31 - 51	45	43 - 57	51
	Evening (19:00 - 23:00)	31 - 40	36	43 - 50	46
	Night (23:00 - 07:00)	29 - 42	32	35 - 50	41
Sunday 28/04/2024	Day (07:00 - 23:00)	39 - 50	43	45 - 58	52
	Evening (19:00 - 23:00)	44 - 50	48	48 - 57	55
	Night (23:00 - 07:00)	35 - 50	42	42 - 56	47
Monday 29/04/2024	Day (07:00 - 23:00)	45 - 53	51	51 - 62	54
	Evening (19:00 - 23:00)	45 - 50	49	51 - 56	54
	Night (23:00 - 07:00)	37 - 49	44	43 - 56	49
Tuesday 30/04/2024	Day (07:00 - 11:15)	47 - 51	49	52 - 58	53

Form the survey data we have determined a typical baseline background noise level to be as noted on the Sunday period:

- 43 dB $L_{A90(1hr)}$ during the daytime period
- 42 dB $L_{A90(15min)}$ during the night-time period

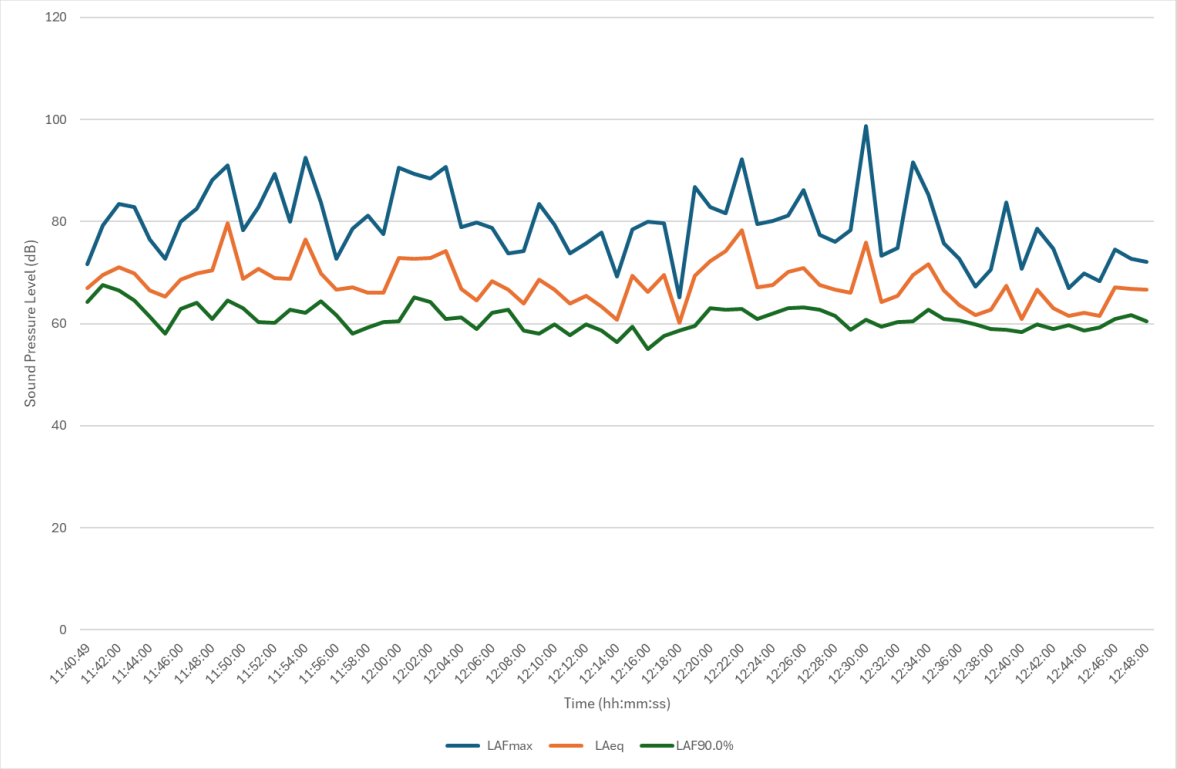
5.5. Operational Noise Levels

5.5.1. Gantry Crane Ambient Level

The measured levels include the operation of the crane, moving of steels and operators noise including low level radio. The operations within the building were generally consistent and regular.

A chart detailing the measured equivalent ($L_{Aeq,\ 1\ minute}$), maximum ($L_{AFmax,\ 1\ minute}$) and background ($L_{A90,\ 1\ minute}$) noise levels over the survey period is provided below.

Chart 2: Measured levels over time within existing building with Gantry Crane (reverberant levels)



The octave band noise level of the gantry crane operation is as follows:

Table 3: Measured Gantry Crane Octave Band Noise Levels (dB $L_{eq(1hr)}$)

dB $L_{eq(1hr)}$ at Frequency (Hz)								dB(A)
63	125	250	500	1000	2000	4000	8000	
65	67	66	64	65	64	61	58	70

5.5.2. Behringer Saw

The measured levels include the operation of a gantry crane moving steels to the saw, and the saw in use cutting materials. The operation was generally consistent and regular. The octave band noise level of the saw is as follows:

Table 4: Measured Behringer Saw Octave Band Noise Levels (dB $L_{eq(1hr)}$)

dB $L_{eq(1hr)}$ at Frequency (Hz)								dB(A)
63	125	250	500	1000	2000	4000	8000	
65	70	69	68	69	69	65	56	74

6. Operational Noise Modelling

Noise modelling has been undertaken to assess the impact of the proposed building operations.

6.1. Noise Model Parameters

6.1.1. Model Parameters

To determine noise levels across the site, noise modelling has been undertaken using computer modelling package Cadna:A by DataKustik and the parameters below.

- Building heights (proposed & existing) are based on drawings, our site visit, and Google satellite imagery.
- All buildings are reflective, a third order of reflections are programmed.
- The surrounding ground is hard and reflective (G=0).
- The topography of the site is considered to be flat, as a worst-case scenario.
- The internal operations are based on the measured reverberant levels above, assumed levels below.
- The predicted level is at a height of 4.5m
- All noise sources are assumed to be operating continuously over the worst-case assessment period (night-time 15-minute period). This is a worst-case level.

6.1.2. Operational Noise Levels

For the internal operational noise levels we have calculated the cumulative internal level based on the measured levels stated in Table 3 and Table 4, this is as follows:

Table 5: Assumed Internal Operational Levels (dB $L_{eq(1hr)}$)

dB $L_{eq(1hr)}$ at Frequency (Hz)								dB(A)
63	125	250	500	1000	2000	4000	8000	
68	72	71	70	71	70	66	60	75

6.1.3. Façade Reduction

We have assumed the façade has the following attenuation:

- Walls and Roof – 4mm Corrugated steel
- Doors – open to north east and south west elevations

The façade is assumed to achieve the following sound reduction:

Table 6: Assumed Façade Sound Reduction (dB R)

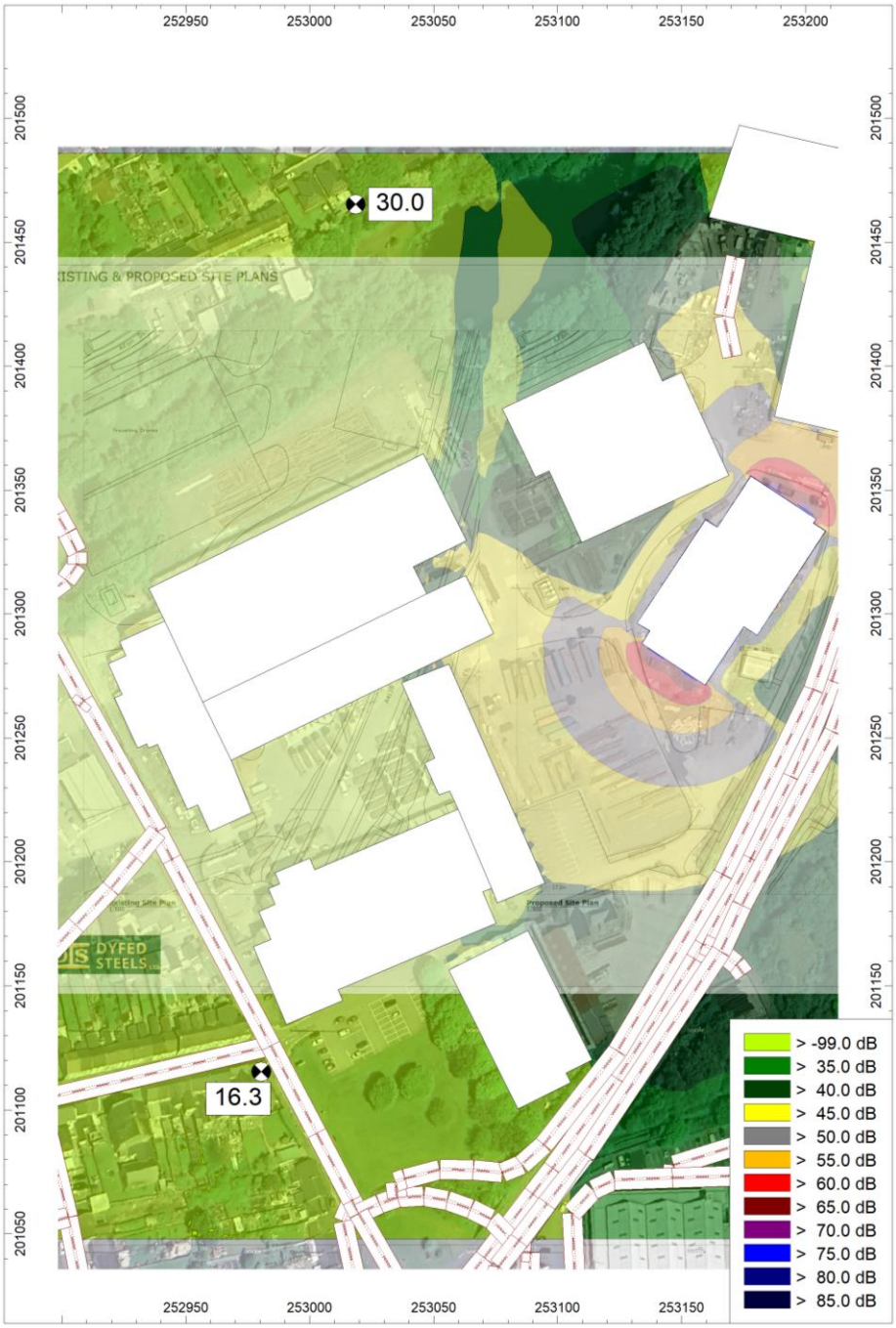
Type	dB R at Frequency (Hz)								R_w
	63	125	250	500	1000	2000	4000	8000	
Walls/Roof	10	14	16	20	25	29	23	23	25
Access Doors	0	0	0	0	0	0	0	0	0

6.2. **Noise Modelling Results**

The following noise map provides the predicted noise emission due to plant operating continuously over day and night assessment periods (1-hour and 15-minutes respectively).

From the noise modelling undertaken, the worst-case cumulative noise level at the façade of the NSRs is 30 dB $L_{Aeq,T}$ at a location representative of the worst-case receivers (Clos Cilsaig to the north).

Figure 4: Noise Prediction Map of Operations, $L_{Aeq,T}$ - 1m grid, 4.5m high



7. Noise Assessment

A noise impact assessment at the sensitive receivers around the site is provided in accordance with BS4142:2014+A1:2019.

7.1. Initial Estimate

7.1.1. Background Sound Levels

From our measured survey data provided above we have determined the following existing background sound levels at the site.

- 43 dB $L_{A90(1hr)}$ during the daytime period
- 42 dB $L_{A90(15min)}$ during the night-time period

7.1.2. Specific Sound Level

The specific sound level due to operating plant is 30 dB $L_{Aeq,60minutes}$ during the day, and 30 dB $L_{Aeq,15minutes}$ during the night. This is the level determined at the NSRs without any character corrections applied.

7.1.3. Character Corrections

Character corrections should be added to the 'specific sound level' if it exhibits any *tonality, impulsivity, other sound characteristics and/or intermittency* at the assessment location. Based on our site visit the character corrections to be applied are as follows:

- ***Tonality*** – these sources of noise exhibited no tonality during the measurements, and due to the distances involved any tonality if present is not expected to be audible at the nearest dwellings.

- ***Impulsivity*** – these sources of noise exhibited impulsivity during the measurements, however due to the distances and line of sight to the dwellings, any impulsivity is not expected to be audible at the nearest dwellings or distinguishable from other impulsive sources already present in the permitted noise climate.

- ***Intermittency*** – The sources of noise are assumed to be operating continuously and no correction is applied for intermittency. In addition, due to the distances involved any intermittency is not expected to be audible at the nearest dwellings or distinguishable from other intermittent sources already present in the permitted noise climate.

- ***Other Sound Characteristics*** – A character correction is not necessary for other sound characteristics and a correction was not applied.

7.1.4. Initial Estimate Assessment

Therefore, the British Standard 4142:2014 initial estimate of the noise impact at the most sensitive location for the two noise models created above, are as follows:

Table 7: British Standard 4142:2014 Initial Estimate at worst case receiver to the west

Parameters	Assessment Period	
	Daytime 07:00 to 23:00	**Night-time 23:00 to 07:00**
Background Sound Level, $L_{A90\ (T)}$ dB	43	42
Specific Sound Level, $L_{Aeq\ (T)}$ dB	30	30
Acoustic Character Correction, dB	0	0
Rating Sound Level $L_{Ar\ (T)}$ dB	30	30
Difference between rating and background, dB	-13	-12

Where *T* is 1-hour for daytime assessments, and 15-minute for night-time assessments.

This means the rating noise level will result in a British Standard 4142:2014 assessment difference of -13 dB during the day, and -12 dB during the night at the most sensitive receivers.

This means the rating level is low, however context should be considered.

7.2. Context

7.2.1. Absolute Levels

> *"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.*

With regard to 'absolute levels', the most relevant guidance is British Standard 8233:2014 and WHO 1999. Internally to a dwelling during the day should not exceed 35 dB $L_{Aeq,16hour}$ and 30 dB $L_{Aeq,8hour}$ during the night.

The internal level is approximately 15 dB(A) quieter than the external free-field level (as stated by the WHO) allowing for the attenuation of a partially open window. Therefore, based on the above, the worst-case absolute level assessment is follows.

Table 8: Absolute level assessment

Time Period	Predicted External Level	Open Window Correction dB(A)	Predicted Internal Level $L_{Ar,T}$ dB	Within Criteria
Day	30 $L_{Ar,60minute}$ dB	-15	15	YES
Night	30 $L_{Ar,15minute}$ dB	-15	15	YES

As can be seen from the table above, the rating sound level of the installed plant is comfortably within the BS8233:2014 criteria for acceptable levels during the day and night.

7.2.2. Residual Levels

We should also consider the residual noise climate. British Standard 4142:2014 also states:

> *"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."*

We have compared the typical residual noise climate to the specific sound level. The lowest measured residual noise levels at a location representative of the most sensitive NSR are 52 dB $L_{Aeq,\ 1\ hour}$ during the day and 47 dB $L_{Aeq,\ 15\ minutes}$ during the night. The rating sound level, L_r, at the façade of the NSR is 30 dB $L_{Ar,T}$.

The L_r falls significantly below the measured residual noise climate during both the day and night, by 22 dB and 17 dB respectively. As such operational noise is not expected to be clearly audible or distinguishable at the noise sensitive receivers.

7.3. Noise Assessment Summary

The assessment indicates that operational noise will fall below existing background sound levels during both day and night periods.

With context also considered, absolute levels within a dwelling fall far below the indoor ambient noise level criteria in terms of relevant BS8233 criteria. When compared to the existing residual sound levels at the site, the operational noise levels fall below both day and night-time residual sound levels at the NSRs. This clearly indicates operational noise will be acceptable and a low impact in terms of BS4142 and Planning Policy Wales.

8. Summary and Conclusions

Dyfed Steel appointed Acoustic Consultants Limited to undertake a noise assessment for the proposed industrial development at their established site in Llanelli. The client is applying to construct a new industrial unit on the existing site.

A site noise survey was undertaken to determine the existing noise levels at the sensitive receivers along with operational noise levels to inform the assessment.

Relevant assessment criteria have been identified including British Standard 4142:2014+A1:2019, which is used to achieve planning aims in Planning Policy Wales (PPW) and Technical Advice Note 11 (TAN11).

The assessment indicates that operational noise will fall below existing background sound levels during both day and night periods.

With context also considered, absolute levels within a dwelling fall far below the indoor ambient noise level criteria in terms of relevant BS8233 criteria. When compared to the existing residual sound levels at the site, the operational noise levels fall below both day and night-time residual sound levels at the NSRs.

This clearly indicates operational noise will be acceptable and a low impact in terms of BS4142 and Planning Policy Wales.

9. Appendix 1 – Glossary of Acoustic Terminology

A-weighted sound pressure pA – 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 µPa)

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 = t2 – t1, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

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

where:

p_0 is the reference sound pressure (20 µPa); 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, $L_s = L_{Aeq,Tr}$ – 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, $L_{Ar,Tr}$ – 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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