

PEAK acoustics



Noise Impact Assessment

Client:	James Kelly
Site:	Former Heritage Caravan Park, Walpole Street, Rochdale, OL16 2AU.
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Executive Summary

A Noise Impact Assessment has been undertaken at the former 'Heritage Caravan Park', Walpole Street, Rochdale, OL16 2AU, in relation to the proposed development of 3 industrial units.

The nearest or most-affected Noise Sensitive Receptors were identified as the nearest boundaries of the adjacent 'Roch Vale Caravan Park'. Reception points in calculations included the nearest or most exposed points on the site boundaries to the proposed unit.

Using the measured background noise survey data, a representative daytime background sound level of 47dB L_{A90} was derived for the assessment.

Measurements of the prevailing background noise climate were undertaken from 1 pm to 3 pm on 8th March 2023 at a location representative of the identified Noise Sensitive Receptors (NSRs).

Acoustic modelling software, SoundPLAN, was utilised to calculate external sound propagation from the site using ISO-9613-2 - *Attenuation of sound during propagation outdoors*. Library data for a Metal Workshop has been utilised to represent a worst-case industrial use for the units.

A BS4142:2014 Initial Impact Assessment of the predicted daytime noise impact indicated the potential for a '*Significant Adverse Impact*' at both NSR locations, with Rating Levels 20dB above the representative daytime background sound level.

A further Contextual Assessment was undertaken where noise levels from the site have been assessed to the existing noise climate along with other relevant factors and it was deemed appropriate for mitigation to be investigated in the form of uprated building elements.

The subsequent mitigated impact assessment determined that noise levels at NSR 1 and 2 would be a maximum of 2 dB above the daytime background noise level, achieving a '*Low Impact*' in accordance with BS4142 and corresponding to the achievement of '*NOEL – No Observed Effect Level*' in the NPSE.

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1. Introduction

Overview

A Noise Impact Assessment has been undertaken at the former 'Heritage Caravan Park', Walpole Street, Rochdale, OL16 2AU, in relation to the proposed development of 3 industrial units.

The units will be for industrial use. As a worst-case, the internal noise levels within the units will be based on library data for a Metal Workshop. No external plant is proposed to be installed as part of the current proposals.

An assessment of the noise impact from the operations of the units is to be undertaken to determine whether nearby residents are likely to suffer a loss of amenity as a result of noise from the proposed development. Mitigation will be given should any potential loss of amenity be indicated.

Scope & Objectives

The scope of the noise assessment can be summarized as follow:

- Baseline sound monitoring survey to evaluate the prevailing background sound levels at the Noise Sensitive Receptor ('NSR') in accordance with BS7445 - *'Description and Measurement of Environmental Noise'*;
- Detailed sound modelling, acoustic calculations and analysis to predict sound levels at the NSR using industry-standard acoustic modelling software 'SoundPLAN'. This software uses ISO-9613-2 - *Attenuation of sound during propagation outdoors*;
- A contextual assessment for the suitability of the site, in accordance with relevant standards in respect of sound from the proposed sources; and
- Recommendation of mitigation measures where necessary, to comply with the requirements of the National Planning Policy Framework (2021), Noise Policy for England (2010) and British Standard BS 4142:2014+A1:2019 – Methods for rating and assessing industrial and commercial sound.
- Rochdale Borough Council have written to the client requesting a noise impact assessment. No local guidance or criteria have been requested and so the assessment will be based on the BS4142 standard.
- Further information on the legislation can be found in **Appendix I**.

2. Environmental Noise Survey

Measurement Methodology

To establish the existing environmental noise levels on site, an attended noise survey was conducted from 1 pm to 3 pm on the 8th of March 2023. Measurements of $L_{Aeq,T}$ and $L_{A90,T}$ were logged in 1-minute intervals in accordance with BS7445 - *'Description and Measurement of Environmental Noise'*.

The attended monitoring location (M1) was positioned on the eastern boundary of the site at a height of approximately 2.5 metres. The monitoring location was chosen in regard to the security of the measurement equipment.

The monitoring position is deemed representative of sound levels at 'NSR 1' during the typical operational periods of the proposed development.

Further detail of the measurement along with site pictures are given in **Appendix A**.

Measurements were obtained using Class 1 instrumentation. Full equipment details are given in **Appendix B**.

Equipment was calibrated before and after use and no significant drift occurred during measurements. Up-to-date calibration certification can be provided upon request. Full calibration details are provided in **Appendix C**

Daytime temperatures during the survey were noted as between 0 - 1°C with wind speeds of 5 m/s; deemed suitable for conducting environmental noise monitoring. Detailed meteorological information can be found in **Appendix D**.

The site, proposed noise source and NSR locations are shown in **Figure 1**.

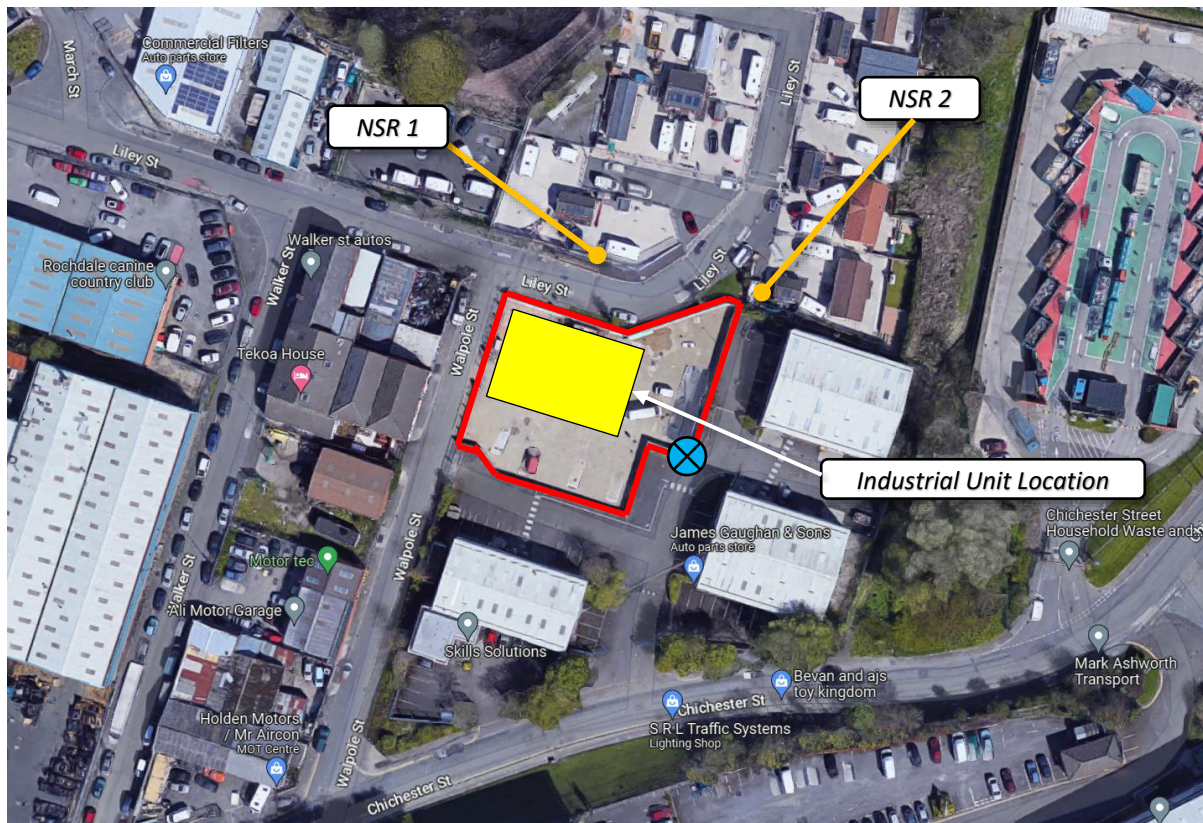


Figure 1: Site, Source & NSR Locations - <https://google.co.uk/maps>

-  Site Boundary (Approx.)
-  Proposed Industrial Unit Location (Approx.)
-  Noise Sensitive Receptors (NSRs)
-  Background Monitoring Location M1 (Approx)

Site Description

The site is on the corner of Walpole St and Liley Street within the 'Heritage Business Park' area. The site is surrounded by Industrial and Commercial units to the South, East and West sides. Further to the East, there is a household waste disposal site. To the North of the site, on the opposite side of Liley Street is the Roch Vale Caravan Park. This includes a mix of mobile homes and semi-permanent dwellings.

Context and Subjective Noise Climate

Noise Source	Description	Time of Observation	Photo
Road	Road noise including cars, vans and lorries, passing the site and accessing the adjacent household waste site.	Intermittent throughout the site visit.	
Household Waste Site	Large grab machine operating on site. Trucks entering and leaving.	Intermittent throughout the site visit.	
Forklifts	Forklift trucks loading and unloading at buildings within 'Heritage Park'.	Intermittent throughout the site visit.	
Caravan Park	Vans and cars accessing the caravan park.	Intermittent throughout the site visit.	

Table 1: Subjective Summary of Noise Sources

Non-Representative Noise Sources

During the survey, no noise events occurred which would be deemed as atypical of the site location.

Noise Sensitive Receptors

The nearest or most-affected Noise Sensitive Receptors (NSR) have been identified as the 2 nearest boundaries of 'Roch Vale Caravan Park'. The boundaries will be considered as specific reception points in calculations.

3. Environmental Noise Survey Results

Measurement Results

The Industrial Units are proposed to operate during normal daytime working hours.

The daytime background sound levels from measurement M1 are summarised below.

Measurement	Date(s)	Period	$L_{Aeq,T}$	$L_{A90,T}$
M1	08/03/2023	Daytime (13:00 – 15:00)	66	47

Table 2: M1 Background Noise Survey Results

A full-time history of the survey data is shown in **Appendix E**.

For the derivation of a representative daytime background sound level, the data from the measured period has been statistically analysed.

A graph of the statistical analysis for M1 data is given below.

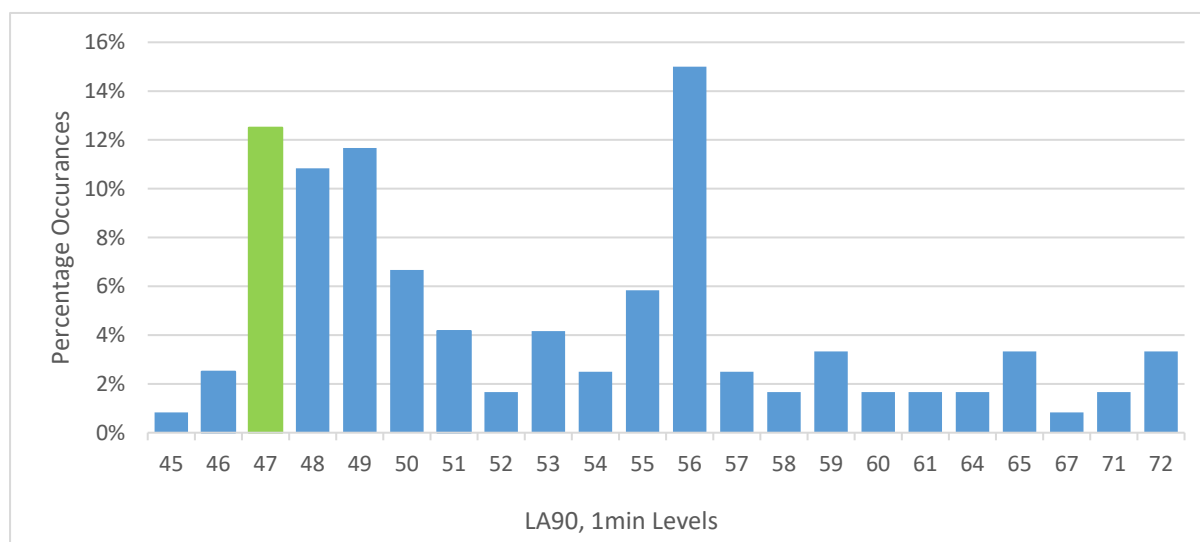


Figure 2: M1 Background Statistical Analysis

From the statistical analysis of the M1 measurement, **47dB L_{A90}** has been selected as the representative background sound level for the BS4142:2014 assessment at the NSR locations.

4. BS4142:2014 Initial Impact Assessment

Noise Modelling

External sound propagation from the site has been calculated using industry-standard acoustic modelling software 'SoundPLAN'. This software uses ISO-9613-2 - *Attenuation of sound during propagation outdoors* and the model takes into account the following key factors:

- *Aerial Imagery & Terrain Data sourced from Google Maps/Elevations*
- *Geometric divergence of sound*
- *Atmospheric absorption of sound*
- *Ground absorption*
- *A light downwind correction toward the NSRs*
- *Surrounding structures and objects which may reflect or block sound toward the NSRs*
- *The height of the NSRs (i.e., First/second-floor reception point)*
- *Operational schedule of equipment*

The following input parameters were used in the noise model:

Parameter	Input
Reflection Order	3
Ground Absorption Factors	G = 0.2 (Hard Ground)
Air pressure	1013.3 mbar
Relative Humidity	70.0 %
Temperature	10.0°C

Table 3: Calculation Input Parameters

Source Noise Levels

The future occupants of the industrial units are not yet known. As a representation of a worst-case scenario, internal noise levels have been modelled based on library data for the interior of a Metal Workshop, including Hammering, Sanding and other associated sounds.

The modelled internal sound pressure levels are given below.

Unit	Para.	63	125	250	500	1k	2k	4k	8k	dBA
Metal Workshop	Lp	80	85	90	100	100	100	95	85	105

Table 4: Modelled Internal Noise Levels

To account for a worst-case scenario, all 3 units will be modelled to be operating simultaneously during the daytime, this is an unlikely occurrence as actual uses may be significantly different and/or quieter than those used within the noise model.

The noise model does not account for deliveries to and from the site or the effect of environmental features such as low boundary walls and fences.

Building Specification

The design and access statement provided by the client states that the building will be similar to those surrounding it and of brick construction with cladding and minimal glazing.

The following building specification has been modelled:

Element	Type	63	125	250	500	1k	2k	4k	8k	Rw
External Walls	Brick & Block	23	40	53	57	73	83	93	83	61
Roof	Insulated Cladding Panel	13	16	21	24	20	25	42	42	24
Large Roller Doors	1mm Corrugated Steel	10	14	16	20	25	29	23	20	25
Rear Fire Escape Doors	Steel Security Door	29	33	38	42	39	42	50	45	42

Table 5: Building Specification

Roller Shutter Doors

The assessment of noise impact is based on the roller shutter doors being kept closed during operations within the industrial units. Operations with the roller shutter doors open have been calculated to cause a 'Significant Adverse Impact' with no mitigation thought to be available other than to keep the doors closed. A grid noise map of the open-door scenario is provided in **Appendix F**.

Specific Sound Levels

The Specific Sound Level is denoted L_{A5} and is the A-weighted, equivalent noise level at the NSR locations. Specific Sound Levels have been calculated from the noise model and the levels at the worst affected floors of receptors are given below.

Location	Specific Sound Level, dB L_{A5}
NSR 1	60
NSR 2	61

Table 6: Specific Sound Levels

Rating Levels

In accordance with BS4142, the Specific Sound Levels may be corrected for characteristics that make the sound more noticeable at the NSR location such as tonality, impulsivity and intermittency. Section 9.2 of BS4142:2014 gives commentary on these characteristics and appropriate penalties:

"Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering

both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

NOTE 2 Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

The noise arising from industrial use, such as a Metal Workshop, will include sources such as power tools, hammering and sanding. As such, noise from this type of industrial source is deemed to be both tonal and impulsive. A 4 dB rating penalty will be applied for tonality, which is likely to vary in perceptibility depending on what other sources are operating in the area, and a further 3 dB penalty will be applied for impulsivity which will be perceptible at the NSR. As the noise environment from the surrounding area includes similar sources of noise, no further penalties are appropriate.

The resultant Rating Levels are summarised below:

Location	Specific Sound Level, dB L_{As}	Total BS4142 Character Corrections	Rating Level, dB L_{Ar}
NSR 1	60	+ 7	67
NSR 2	61	+ 7	68

Table 7: Rating Levels

Rating Levels Vs Background

The Rating Levels are to be compared to the representative background sound level to determine the noise impact in accordance with BS4142.

A Sound Rating Level at or below the background noise level is indicative of Low Impact;

A Sound Rating Level that exceeds the background noise level by around +5dB is likely an indication of Adverse Impact, depending on the context;

A Sound Rating Level that exceeds the background noise level by around +10dB is likely an indication of Significant Adverse Impact, depending on the context;

The indicated noise impact at the identified Noise Sensitive Receptors is summarised below:

Location	Rating Level, dB L _{ar}	Background Sound Level, dB L _{A90}	Difference, dB	Noise Impact
NSR 1	67	47	+ 20	Significant Adverse Impact
NSR 2	68		+ 21	Significant Adverse Impact

Table 8: Noise Impact

The noise impact at all receptor positions is indicative of a ‘Significant Adverse Impact’ in accordance with BS4142:2014.

5. BS4142:2014 Contextual Assessment

Aspects of absolute level

The daytime background sound level measured at the site at position M1 during the day ranged from 45 – 72 dB L_{A90}. The calculated specific noise level at NSR 2 is up to 16 dB above the lowest measured background level.

In context, there are multiple other sources of industrial and commercial noise which affect the NSRs and the figure of 45dB accounts for just 1% of measured background noise levels.

The most frequently occurring background noise level measured on site was 56dB L_{A90} at which the rating level only exceeds the background by 10dB rather than 20dB.

Aspects of character

Industrial noise would not be considered a ‘new’ type of source for the area, given the existing operations of surrounding sites. The noise produced by the existing uses is likely to subjectively reduce the impact of noise from the proposed new industrial unit. The 6 dB rating penalty for tonality and impulsivity is however deemed appropriate.

Aspects of the receptor

As the dwellings based at the Caravan Park are not permanent, the receptors selected for the assessment are the closest boundaries of the caravan park, rather than specific windows of dwellings. The actual receptors are likely to be several meters further away from the site, within the boundary.

Existing occupants of the Caravan Park will be accustomed to a high level of industrial noise from the surrounding businesses and the adjacent household waste disposal site.

Taking guidance from BS8233:2014 for external amenity spaces, a desirable guideline of 50 dB_{L_{Aeq},16hr} and an acceptable guideline of 55 dB_{L_{Aeq},16hr} for noisier environments is deemed appropriate. Existing noise levels at the site are measured to be 66 dB_{L_{Aeq}}, which is 11 dB above the 'acceptable' guideline for external amenity space. Levels from the proposed development are calculated to be 5dB below the measured L_{Aeq} level.

Guidance is also taken from 'Appendix C' of the 'Acoustics Ventilation And Overheating: Residential Design Guide–January 2020' to specify an outside-to-inside level difference of approximately 13 dB through an open window. When this is applied to the predicted daytime levels relating only to the proposed site, at all NSR locations, internal levels within the dwellings are up to 18 dB over the guidelines of BS8233:2014.

Contextual recommendations

After analysis of the proposed site use, it is appropriate that mitigation be investigated to achieve a BS4142 outcome of 'Low Impact'. An uprated building specification will be investigated in order to achieve this.

6. Mitigation

Mitigation in the form of an uprated roof and roller door specification has been investigated.

For the roof, an improved specification to include internal insulation and internal plasterboard mounted to resilient rails has been modelled using 'Insul' sound insulation modelling software. Sound insulation performance has been improved from 24dB Rw to 43dB Rw. A specification is provided within **Appendix G**

The roller shutter door specification has also been uprated from 25dB Rw to 31dB Rw based on the use of a 'Soundroll' system from 'Safe-Door'. A specification sheet is provided in **Appendix G**.

Re-calculation of the noise model using this data provides the following outcome.

Location	Rating Level, dB L _{ar}	Background Sound Level, dB L _{A90}	Difference, dB	Noise Impact
NSR 1	49	47	+ 2	Low Impact
NSR 2	48		+ 1	Low Impact

Table 9: Mitigated Impact Assessment Outcome

The noise impact at all receptor positions with the improved roof and roller door specifications is indicative of a 'Low Impact' in accordance with BS4142:2014.

Grid noise maps displaying the propagation of noise with the investigated mitigation options are given in **Appendix F**.

7. Conclusion

A Noise Impact Assessment has been undertaken at the former 'Heritage Caravan Park', Walpole Street, Rochdale, OL16 2AU in relation to the proposed development of 3 industrial units.

Measurements of the background noise climate were undertaken from 1 pm to 3 pm on 8th March 2023 at a position deemed representative of the identified Noise Sensitive Receptors (NSRs).

The nearest or most-affected Noise Sensitive Receptors were identified as the nearest boundaries of the adjacent 'Roch Vale Caravan Park'.

A BS4142:2014 Initial Impact Assessment of the predicted daytime noise impact indicated the potential for a '*Significant Adverse Impact*' at both NSR locations, with Rating Levels 20 dB above the representative daytime background sound level.

A further Contextual Assessment was undertaken where noise levels from the site have been assessed to the existing noise climate along with other relevant factors and it was deemed appropriate for mitigation to be investigated in form of uprated building elements.

The subsequent mitigated impact assessment determined that noise levels at NSR 1 and 2 would be a maximum of 2 dB above the daytime background noise level, achieving a '*Low Impact*' in accordance with BS4142 and corresponding to the achievement of '*NOEL – No Observed Effect Level*' in the NPSE.

8. Uncertainty

The background monitoring equipment is subject to a 1dB error margin, however, calibration before and after measurements allows the drift within the margin to be monitored and thus demonstrates that minimal drift occurred throughout the measurements.

Uncertainty can arise in the prediction of noise propagation from and around flat reflective surfaces, such as the surrounding structures present on site. This has been reduced to a minimum by utilising an acoustic modelling software that uses the validated method, ISO-9613-2, as described in BS4142.

Uncertainty in the calculated specific sound levels is further reduced by utilising manufacturer-given sound power levels.

APPENDIX A - Measurement Details

Measurement	Kit	Start Date	Start Time	End Date	End Time
M1	A7	08/03/2023	13:00	08/03/2023	15:00

Table 10: Measurement Dates



Figure 3: Site Location Measurement Pictures

APPENDIX B - Equipment Details

Kit	Equipment	Make	Model	Class	Serial Number
A7	Sound Meter	Svantek	977A	1	69273
A7	Pre-Amp	Svantek	SV12L	1	71601
A7	Microphone	ACO	7052E	1	68217
3	Calibrator	Svantek	SV33	1	43086

Table 11: Measurement Equipment Details

APPENDIX C - Calibration Details

Measurement	Calibrator Ref Level (dB)	Deviation Before (dB)	Deviation After (dB)
M1	113.8	0.78	0.87

Table 12: Calibration Details

APPENDIX D - Meteorology Details

Past Weather in Rochdale — Graph

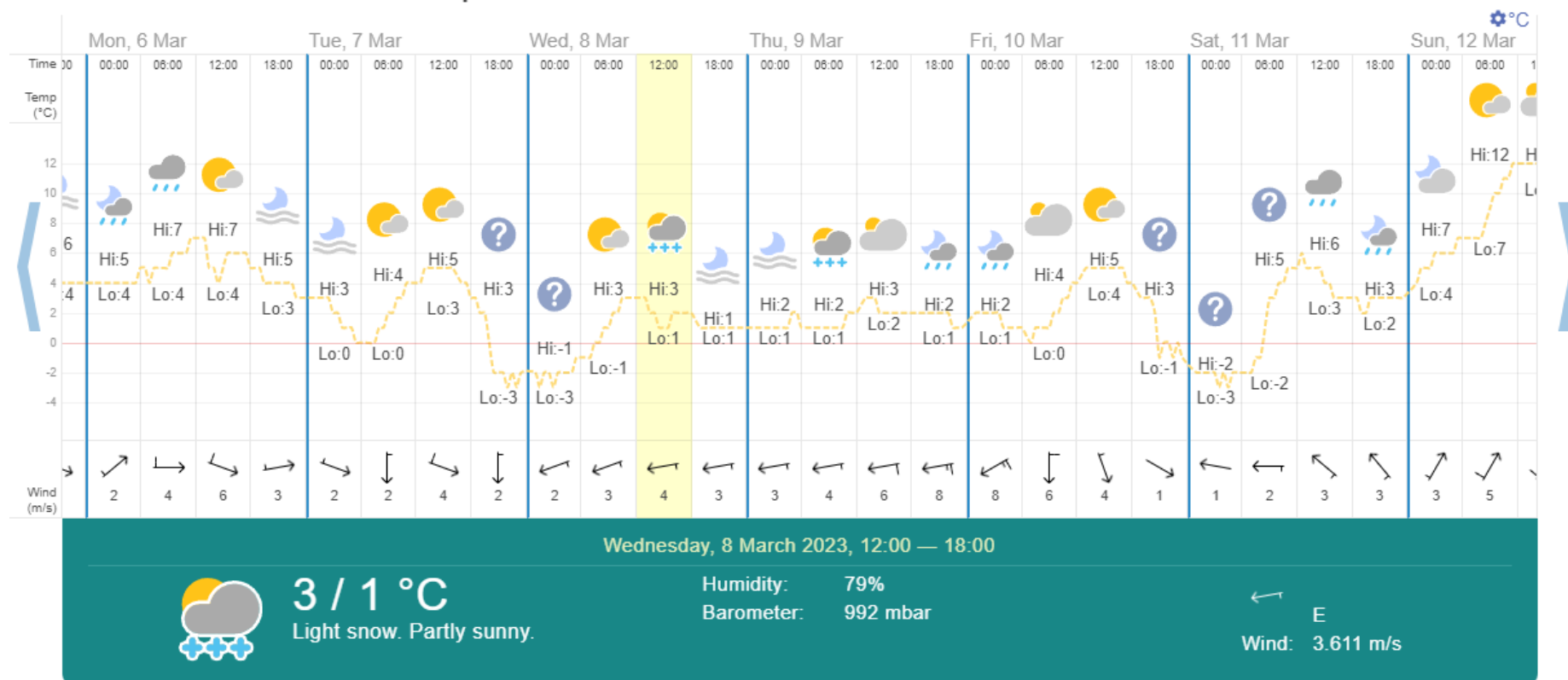


Figure 4: Meteorology Data - <https://www.timeanddate.com/weather>

APPENDIX E - Noise Survey Results

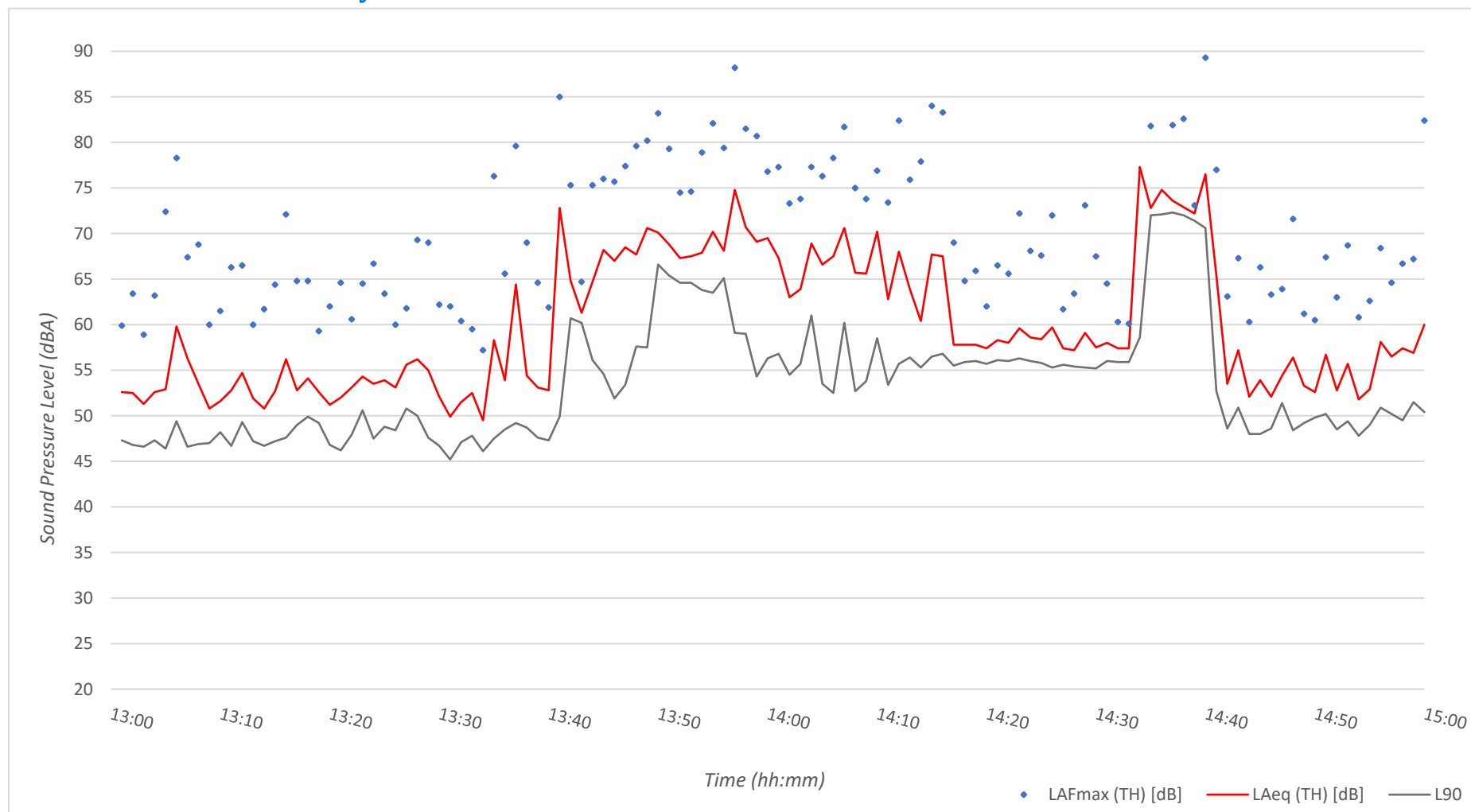


Figure 5: Measured Background Sound Levels Time History (M1): 13:00 – 15:00 - 8th March 2023

APPENDIX F - Grid Noise Maps

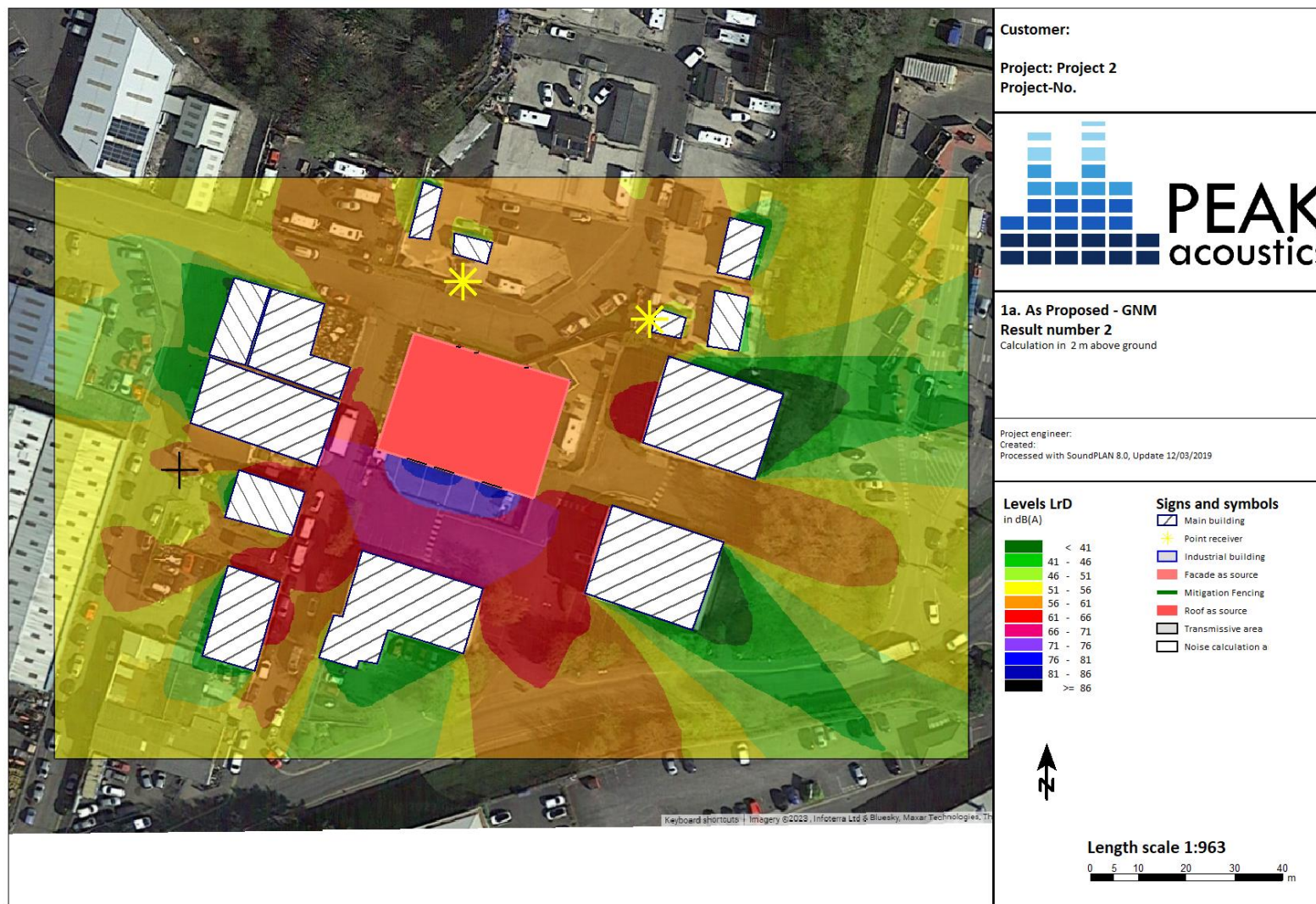


Figure 6: 2D Grid Noise Map of daytime Initial Impact Assessment

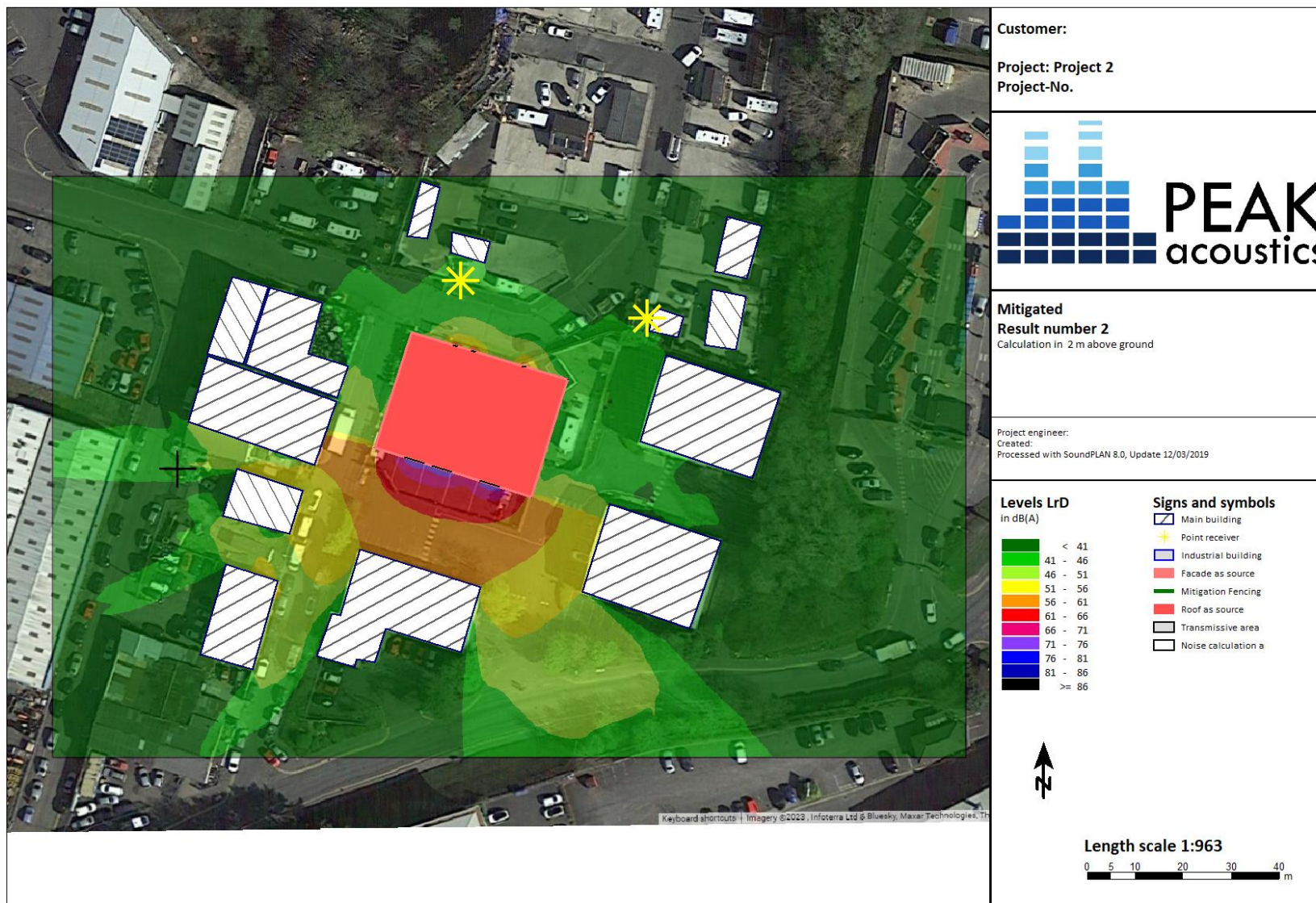


Figure 7: 2D Grid Noise Map of daytime Mitigated Impact Assessment

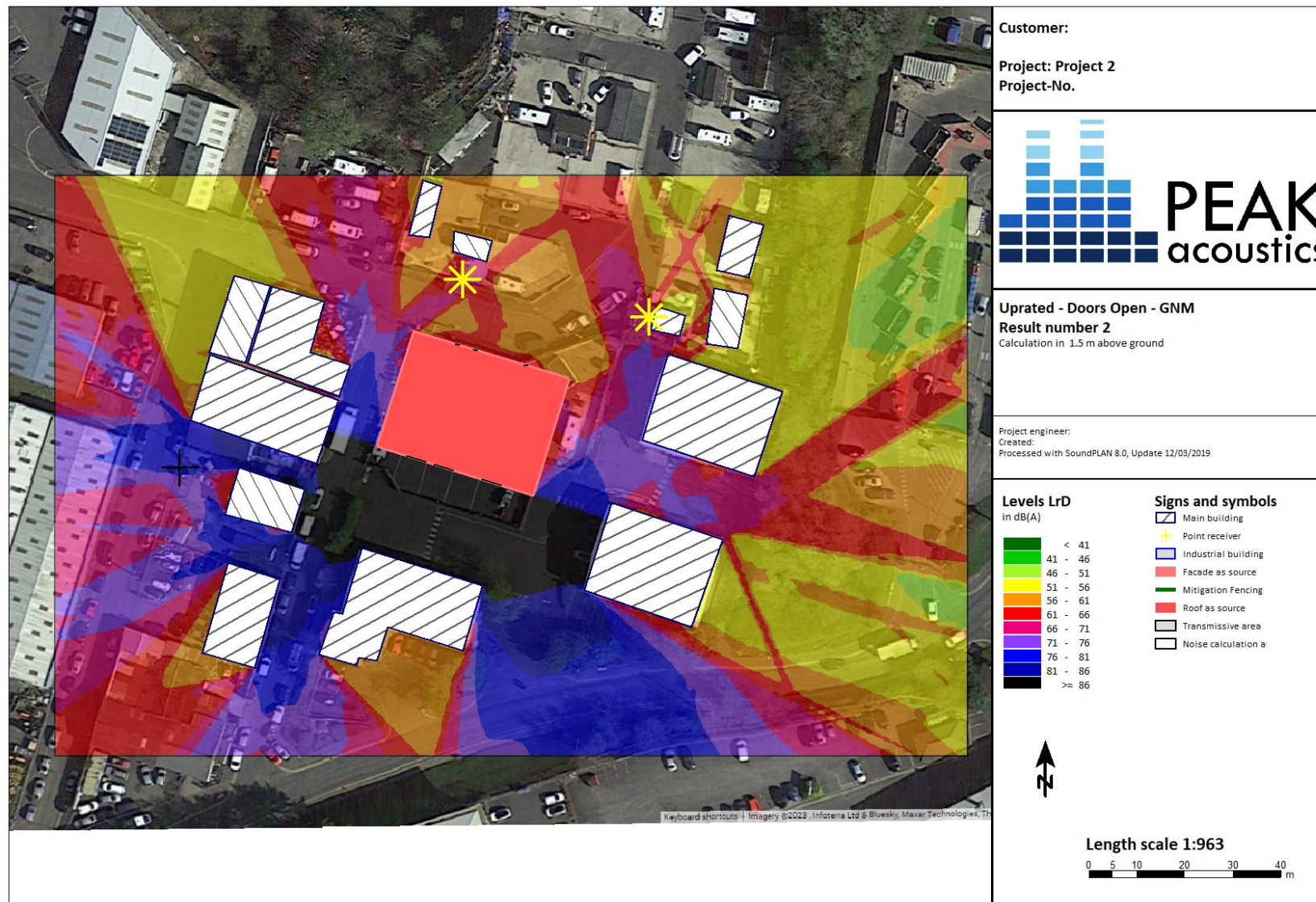


Figure 8: 2D Grid Noise Map of Industrial Units with Roller Shutter Doors Open

APPENDIX G – Building Element Specifications

Roof Specification

Sound Insulation Prediction (v9.0.24)

Program copyright Marshall Day Acoustics 2017

Margin of error is generally within $R_w \pm 3$ dB

Key No. 2539

Job Name:

Job No.:

Date: 15/03/2023

File Name: 2_Insul - Up rated Roof v13.kxl

Initials: Tom Brown



Notes:



R_w 43 dB
 C -4 dB
 C_{tr} -12 dB

Mass-air-mass resonant frequency = 86 Hz

Panel Size = 2.7 m x 4.0 m

Partition surface mass = 18.7 kg/m²

System description

Panel 1 : 1 x 75.9 mm Kingspan KS1000 RW 80/100/120mm

Frame: Steel Stud + resl. rail (78 mm x 38 mm), Stud spacing: 600 mm; Cavity Width 90 mm; 1 x Fibreglass (10kg/m³) 60mm Thickness: 60 mm

Panel 2 : 1 x 10 mm Plasterboard

freq.(Hz)	R(dB)	R(dB)
50	15	
63	15	15
80	14	
100	13	
125	19	17
160	24	
200	30	
250	35	33
315	39	
400	43	
500	47	46
630	50	
800	51	
1000	51	51
1250	50	
1600	54	
2000	64	58
2500	68	
3150	68	
4000	67	68
5000	71	

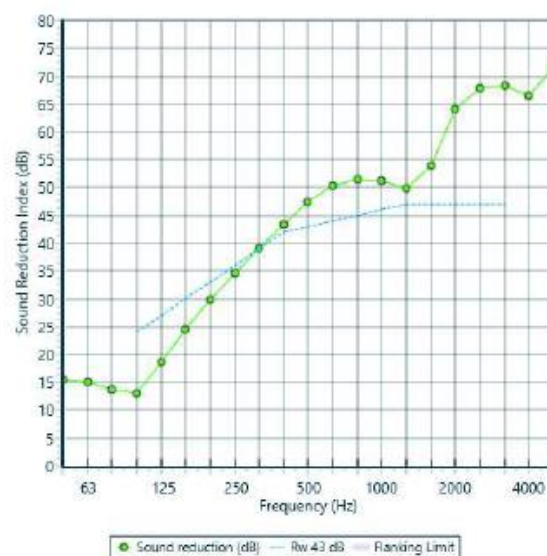


Figure 9: Example Up rated Roof Specification

Example Uprated Roller Door Specification

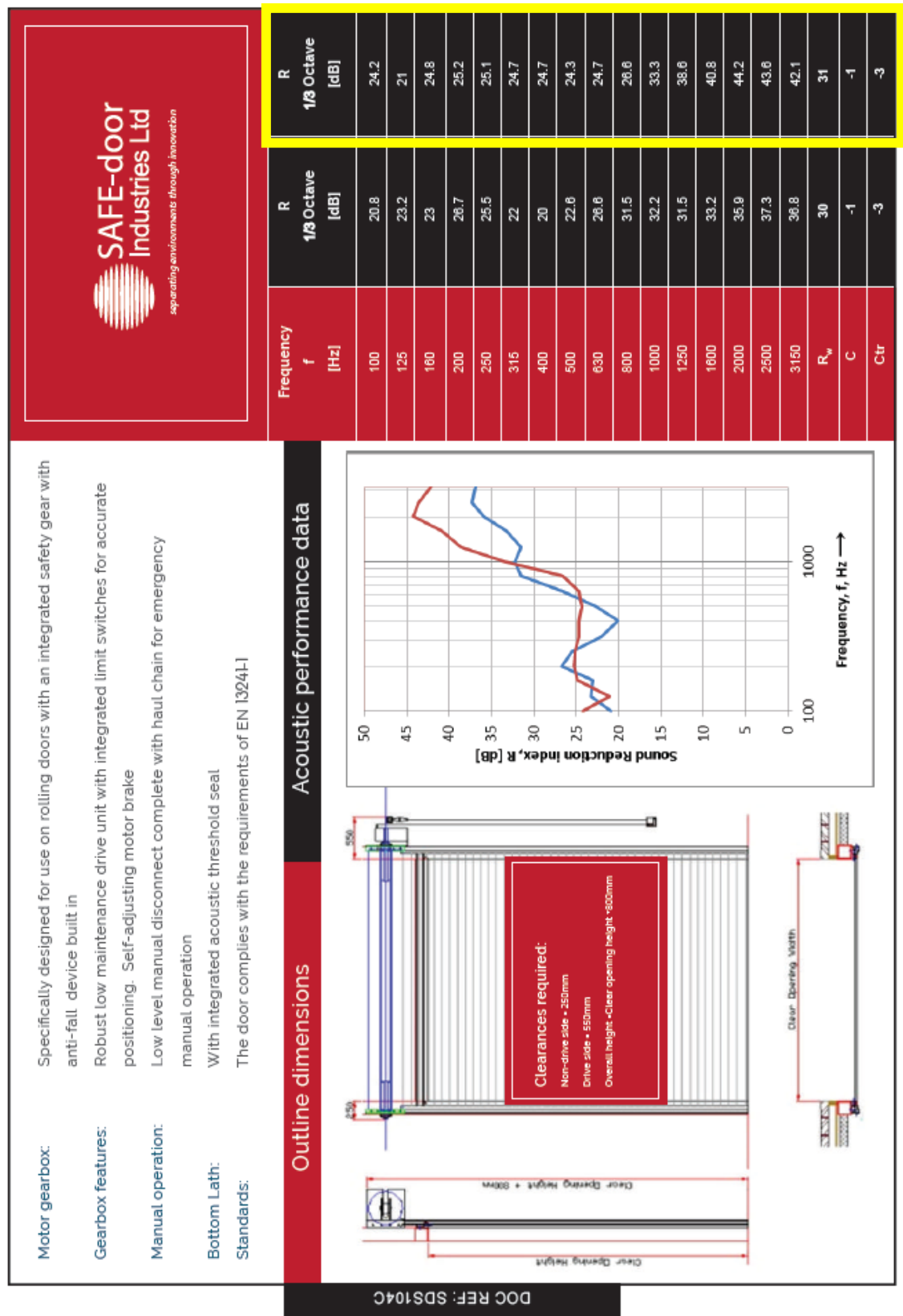


Figure 10: Data sourced from www.safe-door.co.uk.

APPENDIX H - Site Plans

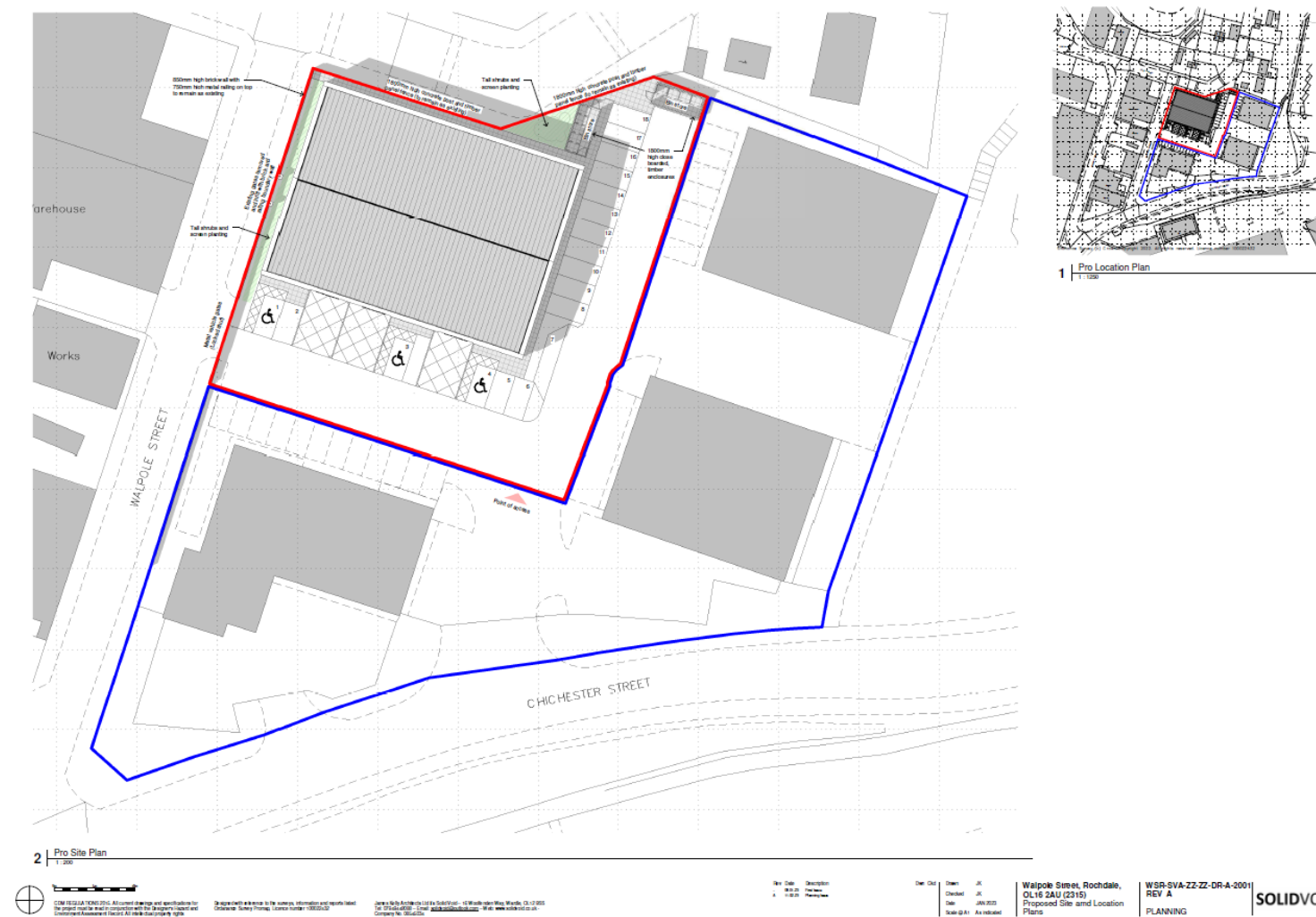


Figure 11: Site Plans Provided by 'Solid Void Architects'

APPENDIX I - Legislation, Policy & Guidance

Guidance for the assessment of noise affecting new residential development is given in the National Planning Policy Framework (NPPF). Section 15 of the NPPF states:

“174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of...noise pollution.”

Section 185 further states:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- A. Mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- B. Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

Section 187 states:

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

To avoid and mitigate adverse noise effects on health arising from and impacting new development, the NPPF makes reference to NPSE. The Noise Policy Statement for England (NPSE) was published in March 2010 and covers all forms of noise other than occupational noise.

The Noise Policy Statement for England (NPSE) states the following aims in paragraph 2.2.

NOEL – No Observed Effect Level.

This is the 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.

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level.

This is the level above which significant adverse effects on health and quality of life occur.

The NPSE does not define the SOAEL numerically, stating in paragraph 2.22:

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

There is no local or national guidance on how the three terms should be defined numerically, it is for the assessor to collate and interpret appropriate guidance on noise, such as may be found in British Standards, and correlate the guidance with the concepts of NOEL, LOAEL and SOAEL.

BS4142:2014+A1:2019

The common standard for the assessment of industrial and commercial sound is '**BS4142 – Methods for rating and assessing industrial and commercial sound**'. The industrial noise assessment method in BS4142 is based on the difference between the measured 'background sound level' (L_{A90}), and the 'Rating Level' of the industrial source, at a noise-sensitive location (NSR). BS4142:2014 states:

"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs."

An estimation of the impact of the specific sound can be obtained by the difference between the rating sound level and the background sound level whilst considering the following:

"A Sound Rating Level at or below the background noise level is indicative of Low Impact;

A Sound Rating Level that exceeds the background noise level by around +5dB is likely an indication of Adverse Impact, depending on the context;

A Sound Rating Level that exceeds the background noise level by around +10dB is likely an indication of Significant Adverse Impact, depending on the context;"

BS4142 further states:

"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 negligible impact, depending on the context."

Achievement of a *Low Impact* in accordance with BS4142 along with a contextual assessment can be deemed to correspond to '*NOEL – No Observed Effect Level*' in the NPSE.

BS8233:2014

BS8233:2014 - *Guidance on sound insulation and noise reduction for buildings* suggests indoor ambient noise levels for dwellings in Table 4, Section 7.7.2. These are summarised below.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

BS8233 states that the guideline values given above are for 'noise without character', further stating:

"Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate."

Table 4 of BS8233 also has accompanying notes that were subject to additions in ProPG. The relevant notes with the additions of ProPG are given below.

"NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events."

"NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

APPENDIX J - Acoustic Terminology

To aid the understanding of acoustic terminology and the relative difference between noise levels the following background information is provided.

We perceive sound when the ear detects fluctuations in air pressure (sound waves), which are then processed by the brain and perceived as sound. Humans can hear an incredibly wide range of sound intensities ranging from jet engines to fingertips lightly brushing against each other. This range is quantified using a logarithmic scale called the decibel scale (dB). The comfortable range of the decibel scale typically ranges from 0dB (the threshold of hearing) to around 140 dB. Here are some examples of common environments and their typical noise levels.

Noise Level	Environment
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40 dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a moving car
60 to 70 dB(A)	Typical high street
100 to 110 dB(A)	Fire alarm at 1 metre away
140 dB(A)	Threshold of pain

Terminology

dB (decibel) – A unit used to quantify the pressure level of sound. Defined as 20 times the logarithm of the ratio between the root-mean-square pressure of a given sound field and a reference pressure level (2×10^{-5} Pa – threshold of hearing).

$L_{Aeq, T}$ – The equivalent continuous sound pressure level over a stated period. It quantifies a fluctuating sound level over a given period as the equivalent continuous sound level over which the same amount of acoustic energy is contained over. This is A-weighted in order to assess human perception.

L_{A90} – The sound level exceeded 90% of the time. Typically used to describe background noise the L_{90} is regarded as the ‘average minimum level’ and quantifies the common sound level of a fluctuating sound field i.e. the sound level that occurs 90% of the time. Alternatively, L_{10} describes the sound level exceeded 10% of the time and therefore quantifies the ‘average maximum level’ of sound which is often used during the calculation of road traffic noise.

A-Weighting – A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.

R_w – The Weighted Sound Reduction Index (R_w) is a number used to rate the effectiveness of a soundproofing system or material.