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KUFIC ARCHITECTS

NOISE IMPACT ASSESSMENT REPORT

42 MILL ROAD, DEWSBURY WF13 2HH

Client: Kufic Architects

Report Ref: P7619-R1-V1

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REPORT VERSION CONTROL:

Document Reference	Date	Report Prepared by	Report Checked by	Report Authorised by
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APPENDICES

1 INTRODUCTION

1.1 Overview

1.1.1 By instruction from Kufic Architects ('the client'), NoiseAir was commissioned to undertake a noise impact assessment (NIA) to support a planning application proposing the demolition of existing retail unit and erection of retail unit to ground floor with two flats above at the site at 42 Mill Road, Dewsbury WF13 2HH.

1.1.2 General limitations with respect to this NIA are outlined in **Appendix A**.

1.2 Site Description

1.2.1 At the time of writing, the proposed development site is currently situated in a mixed use area in Dewsbury. With predominant land usage in the area comprising residential and commercial use buildings.

1.2.2 The primary noise sources observed at the site is road traffic noise from Town Street and Mill Road.

1.2.3 **Figure 1** presents a site ariel photograph of the development site with respect to the local area and its context.

Figure 1: Site Ariel Photograph.

1.3 Development Proposals

1.3.1 At the time of writing, proposals outline the demolition of the existing retail unit, and the erection of a new building comprised of a ground floor retail unit and 2no. new residential dwellings to the first and second floors.

1.3.2 The proposed floor plans are shown overleaf in **Figure 2**

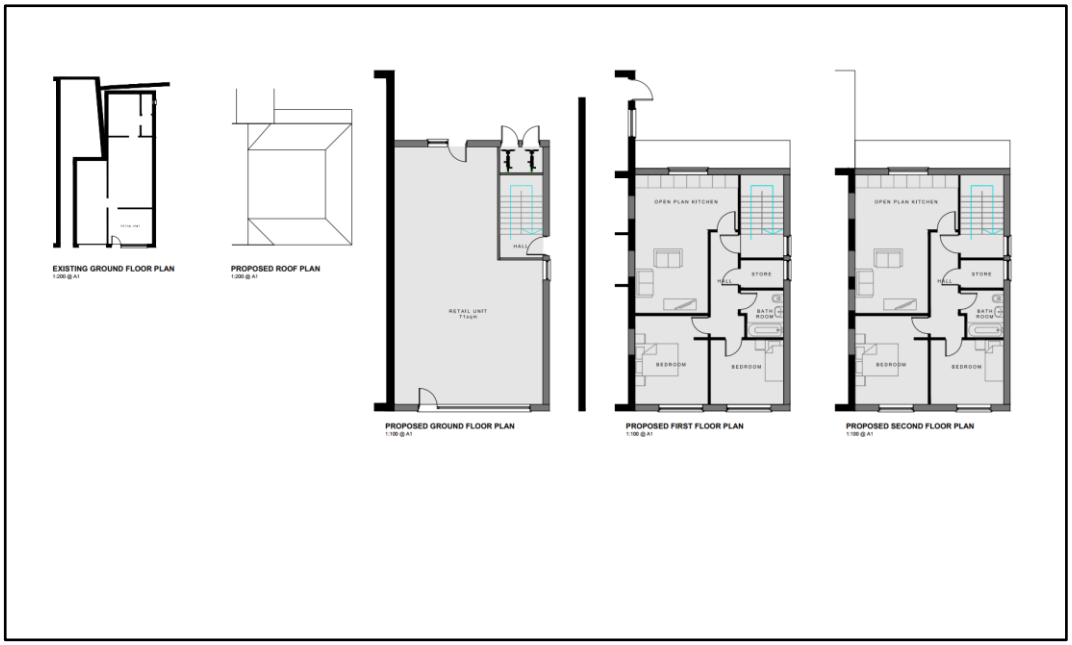

Figure 2: Proposed Floor Plans

2 ASSESSMENT METHODOLOGY AND SCOPE OF WORKS

2.1 National Planning Policy Framework [NPPF 2023]

2.1.1 The NPPF sets out the government's planning policies for England and how they are expected to be applied. It aims to achieve sustainable development; stating that planning policies and decisions should prevent unacceptable levels of noise pollution from new and existing development while affirming that National Policy Statements form part of the national planning policy framework and should be considered in planning decisions.

2.2 Noise Policy Statement for England (NPSE)

2.2.1 The Noise Policy Statement for England (NPSE), published in March 2010, states the long-term vision of Government noise policy is to "promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".

2.2.2 The NPSE sets out the government's overall policy on noise within the context of sustainable development. It introduces three concepts for noise management: avoid significant adverse effects; mitigate and minimise adverse effects; and where possible, contribute to improvements in health and quality of life.

2.2.3 It also establishes a hierarchy of noise management actions: avoid; reduce; remedy; mitigate; compensate.

2.2.4 The NPSE also introduces the below categories with respect to 'adverse impacts'.

'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.'

2.2.5 The NPSE states that significant adverse effects on health and quality of life should be avoided. Where the impact lies somewhere between LOAEL and SOAEL, it requires that all reasonable steps are taken to mitigate and minimise the adverse effects of noise. In this regard, a certain degree of impact between LOAEL and SOAEL would be acceptable in

terms of planning policy, provided that the impact has been mitigated and minimised by design.

2.3 Planning Practice Guidance - Noise [PPG 2019]

2.3.1 PPG 2019 provides guidance on how noise should be considered in planning decisions. It was published in 2014 and updated in 2019. The document advises on how to avoid, mitigate, or minimise adverse effects of noise through good acoustic design and appropriate conditions or obligations.

2.3.2 **Table 1** summarises the noise exposure hierarchy outlined within the PPG.

Table 1: National Planning Practice Guidance noise exposure hierarchy

Perception	Increasing Effect Level	Action
Not noticeable	No Observed Effect	No specific measures required
Noticeable and not intrusive	No Observed Adverse Effect	No specific measures required
Lowest Observed Effect Level		
Noticeable and intrusive	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Effect Level		
Noticeable and disruptive	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Unacceptable Adverse Effect	Prevent

2.4 Comments Received by Local Planning Authority

2.4.1 The following are comments from KC Environmental Health (Pollution & Noise Control) which outlines elements and requirements of the noise assessment to be carried out.

> *"**Noise Assessment Report Required Before Determining the Application (new noise sensitive use next to existing/new noise sources)***
>
> *Before the application can be determined, details of an assessment of all significant noise sources likely to affect the proposed development including but not limited to; existing plant and machinery to existing businesses/the proposed ground floor retail unit and noise associated with customers/deliveries to the commercial businesses close by, particularly if late night opening hours apply. The report must be authored by a suitably competent person (see note) and must be submitted in writing to the Local Planning Authority. The report shall:*

a) Determine the existing noise climate

b) Predict the noise climate in the living rooms, bedrooms (night-time) and other habitable rooms of the development

c) Detail the proposed attenuation/design necessary to protect the amenity of the occupants of the new residences.

If the noise attenuation measures include windows being kept closed, then details of alternative ventilation over background ventilation will be required. If levels predicted in the report are unacceptable, it may be necessary to refuse the application. Otherwise, it may be necessary to specify attenuation measures as conditions of consent.

We require this information to ensure that the proposed use(s) does not give rise to the loss of amenity to future occupiers, by reason of noise or disturbance and to accord with the aims of Policies LP24 and LP52 of the Kirklees Local Plan and Chapters 12 and 15 of the National Planning Policy Framework."

2.5 Scope of Works

2.5.1 The location of the development site is mixed use setting with road traffic noise due to Town Street and Mill Road, being the predominant source of noise. During site visits, no significant sources of plant or industrial noise was identified, therefore, it is reasoned that the NIA should consider noise from road traffic primarily. However, the proposed development has the potential to include mechanical plant thus reference has been made to the appropriate standard.

2.5.2 The scope of this assessment includes consideration of noise at each facade of the proposed residential dwellings where noise sensitive areas might be located, in terms of the potential impact of local noise sources.

2.5.3 The ground floor area falls under Class E and the noise impact from the retail unit to the residential dwellings will be assessed.

2.6 Assessment Criteria

2.6.1 In order to achieve noise levels which are considered to be in alignment with the planning approaches and policies discussed in Section 2.1, it is considered that all efforts are made to ensure that future occupants are unlikely to be exposed to noise levels which might breach the LOEL criteria.

2.6.2 It should be noted however that planning guidance does not preclude development where the LOEL is likely to be breached in certain circumstances as long as reasonable efforts are made to mitigate and reduce such an effect.

2.6.3 It is therefore considered that the noise assessment and subsequent criteria should be undertaken in accordance with Pro-PG:2017 Planning and Noise, a summary of which is provided below.

2.6.4 In addition to the aforementioned documentation, reference has also been made to BS 4142:2014+A1:2019 (BS 4142:2014) given the potential of adverse impact upon the proposed residential dwellings due to van deliveries to the retail unit. The BS 4142:2014 document and its assessment criteria are set out below.

2.6.5 Consideration has also been given to noise transmission between the ground floor shared facilities and first floor dwellings.

2.7 Pro-PG – Planning & Noise [Pro-PG 2017]

2.7.1 Pro-PG:2017 Planning and Noise provides professional practice guidance in relation to new residential development exposed to noise from transport sources. It provides practitioners with a recommended approach to the management of noise within the planning system in England.

2.7.2 The guidance reflects the Government's overarching National Planning Policy Framework, the Noise Policy Statement for England, and Planning Practice Guidance (including PPG-Noise) and draws on other authoritative sources of guidance. It provides advice for Local Planning Authorities and developers, and their professional advisers, on achieving good acoustic design in and around new residential developments.

2.7.3 Pro-PG:2017 adopts a two-stage approach to assessment:

- **Stage 1** – an initial noise risk assessment of the proposed development site; and,
- **Stage 2** – a systematic consideration of four key elements.

2.7.4 The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- **Element 1** – demonstrating a "Good Acoustic Design Process";
- **Element 2** – observing internal "Noise Level Guidelines";
- **Element 3** – undertaking an "External Amenity Area Noise Assessment"; and,
- **Element 4** – consideration of other relevant issues.

2.7.5 Internal noise level guidelines are set out in Figure 2 of Pro-PG:2017 which have been reproduced in **Table 2**.

Table 2: Summary of internal noise guidelines.			
Activity	**Location**	**0700 – 2300 hours**	**2300 – 0700 hours**
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room / area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$ 45 dB L_{AMax}

2.7.6 There are multiple notes outlined within Pro-PG:2017 with respect to **Table 2** which should be considered in full however the main points for consideration are outlined below:

- The table provides recommended internal $L_{Aeq,T}$ target levels for overall noise in the design of a building. These are the sum total of structure-borne noise and airborne noise sources.
- The internal $L_{Aeq,T}$ target levels shown in the table are based on the existing guidelines issued by the World Health Organisation (WHO) and assume normal diurnal fluctuation in external noise.
- The internal $L_{Aeq,T}$ target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.
- Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. 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 $L_{AFmax,}$ 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.
- Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded.
- 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.

2.7.7 The guidelines presented in **Table 2** reflect and extend current practice contained in BS 8233:2014.

2.7.8 In terms of external amenity noise assessment, Pro-PG:2017 again draws upon guidelines set presented by the WHO and also presented in BS 8233:2014.

2.7.9 BS 8233:2014 states that "the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$". The standard continues… "These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited."

2.7.10 Pro-PG:2017 also promotes the use of BS 4142:2014 in circumstances where commercial or industrial noise is considered to be prominent / measurable at the development site.

2.8 British Standard 4142:2014 (BS 4142:2014)

2.8.1 British Standard 4142:2014 - Methods for rating and assessing industrial and commercial sound, sets the methodology for rating and assessing sound of an industrial and commercial nature, which includes sound from fixed installations such as mechanical and electrical plant and equipment.

2.8.2 In BS 4142:2014, a noise rating is determined and compared with the existing local background sound level based on several more cumulative acoustic feature corrections to apply where appropriate. For example, if the noise includes a distinguishable tone, impulse, intermittency or other readily distinguishable sound characteristic, then additional cumulative penalties individually ranging from 0 to 9 dB may be applied depending on the type of noise.

2.8.3 BS 4142:2014 seeks to determine a "representative" background sound level, stating 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".

2.8.4 The assessment of the impact depends upon the margin by which the rating level of the specific sound source exceeds the background sound level but also promotes a consideration of the context in which the sound occurs when making an assessment. BS 4142:2014 states that an initial estimate of the impact of the specific sound is made by subtracting the measured background sound level from the rating level, while considering the following points:

- 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; and,

- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

2.8.5 Therefore, a BS 4142:2014 assessment may deduce a low impact where the specific sound level is below the background sound level.

3 ACOUSTIC SURVEY

3.1 Noise Monitoring

3.1.1 NoiseAir conducted unattended noise monitoring between the 27th September 2024 and the 1st October 2024 at the development site. Unattended noise monitoring was undertaken at the monitoring location (ML1) as presented in **Figure 3**. ML1 was positioned at the first-floor entrance approximately 1 meter from the building façade.

3.1.2 In addition to the above, attended noise monitoring was conducted between 10:00 and 11:30 am on 1st October 2024 at the monitoring position ML2 also presented in **Figure 3**.

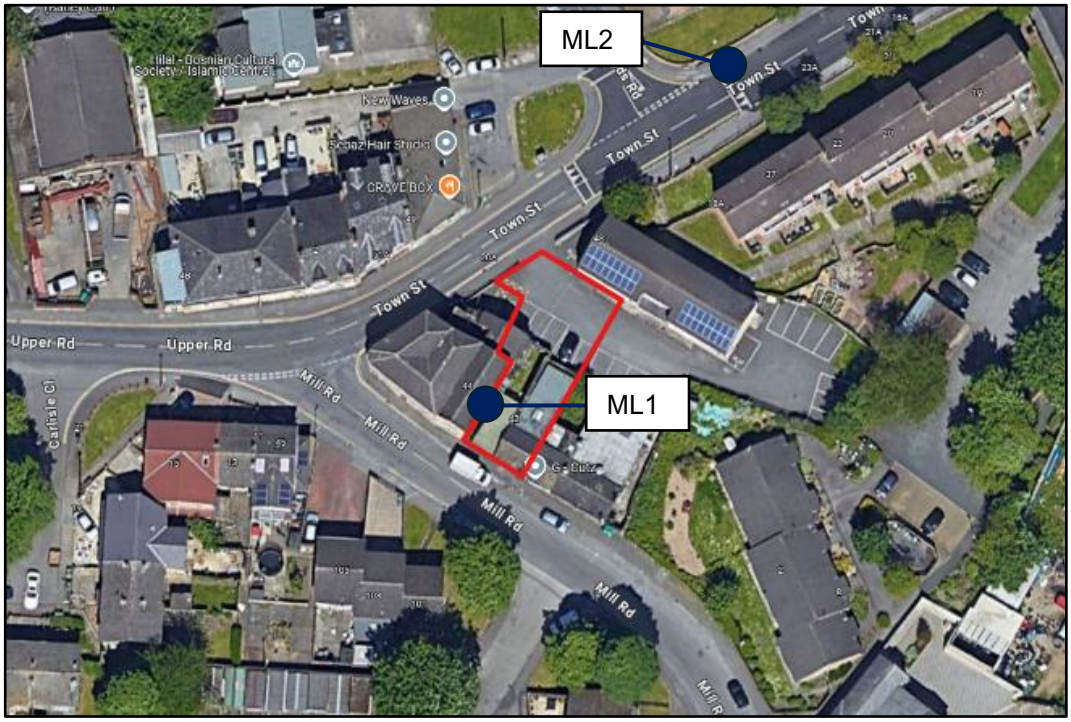

Figure 3: Noise monitoring locations

3.1.3 The noise measurements were made using Class 1, integrating sound level meters (SLMs).

3.1.4 The acoustic equipment was calibrated to comply with Section 4.2 of BS 7445-1:2003[1], before and after the noise monitoring periods.

3.1.5 The SLMs were calibrated upon installation and collection of the survey and found to have negligible drift (< 0.1 dB).

3.1.6 The results are summarised in **Table 3** overleaf.

[1] BS 7445-2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures.

Table 3: Summary of SLMs used for survey and associated field calibration						
SLM (Serial No.)	**Preamp (Serial No.)**	**Microphone (Serial No.)**	**Calibrator (Serial No.)**	**Start Calibration**	**End Calibration**	**Drift**
NOR140 (1402867)	NOR1209 (12113)	NOR1225 (38650)	SVAN-SV30A 10818	-26.0	-26.0	0.0
NOR140 (1403342)	NOR1209 (12113)	NOR1225 (38650)	SVAN-SV30A 10818	-26.6	-26.6	0.0

3.2 Measured Sound Levels

3.2.1 The data shown in **Figure 4** and **Figure 5** details a level vs time graph of the recorded L_{Amax}, L_{Aeq} and L_{A90} sound levels over 15-minute time periods for the entire measurement duration at ML1 and ML2 respectively

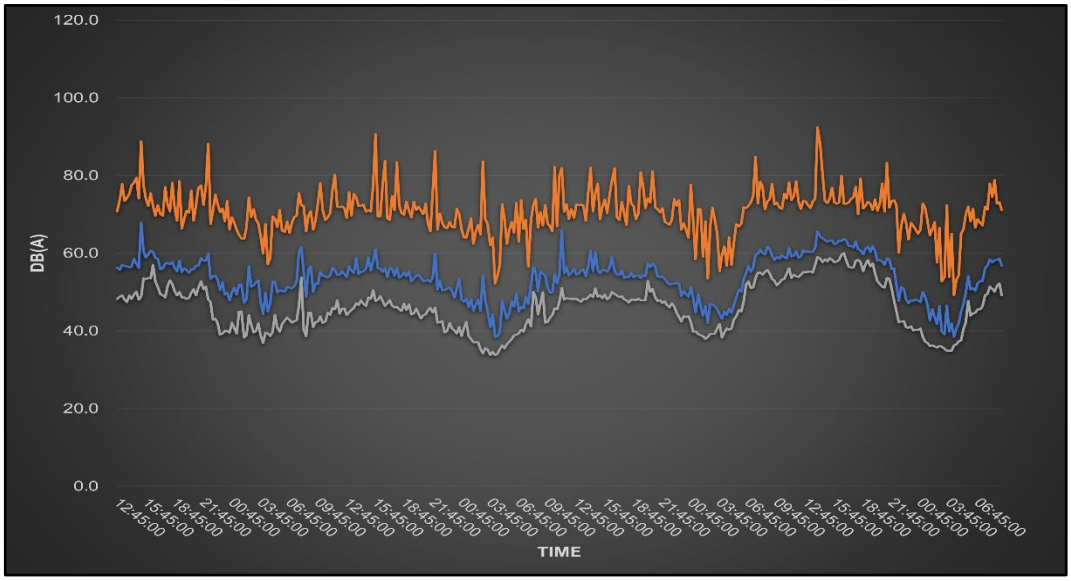

Figure 4: Level vs. time graph showing L_{Amax}, L_{Aeq} and L_{A90} sound levels – ML1

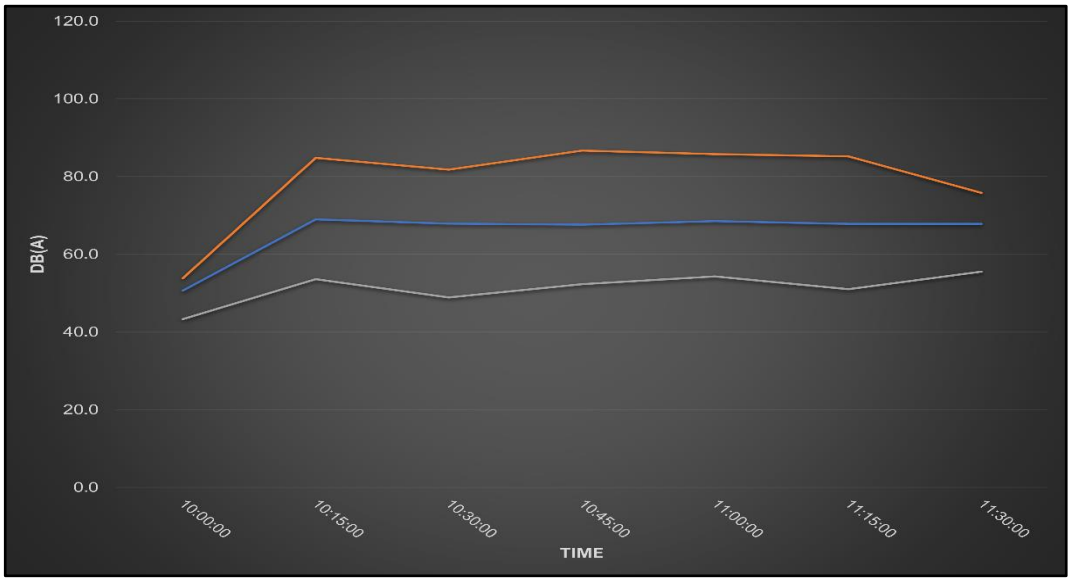

Figure 5: Level vs. time graph showing L_{Amax}, L_{Aeq} and L_{A90} sound levels – ML2

3.2.2 The results for each of the monitoring locations during the daytime and night-time periods are presented in **Table 4** below.

Table 4: Average Measured Daytime and Night-time Noise Levels

Monitoring Location	Time	Measured Noise Level
		dB $L_{Aeq,16hour}$ / dB $L_{Aeq,8hour}$ / dB $L_{AFmax,8hour}$
ML1	07:00-23:00 23:00-07:00 23:00-07:00*	55.5 – 60.8 47.9 – 51.1 68.0 – 70.0
ML2	10:00-11:30	67.5

*$L_{AF(max)}$ values exceeded more than ten times per night-time period.

3.3 Background Sound Levels

3.3.1 A histogram showing the distribution of existing $L_{A90,T}$ sound levels for the daytime and night-time are presented in **Figure 6** and **Figure 7** respectively for ML1.

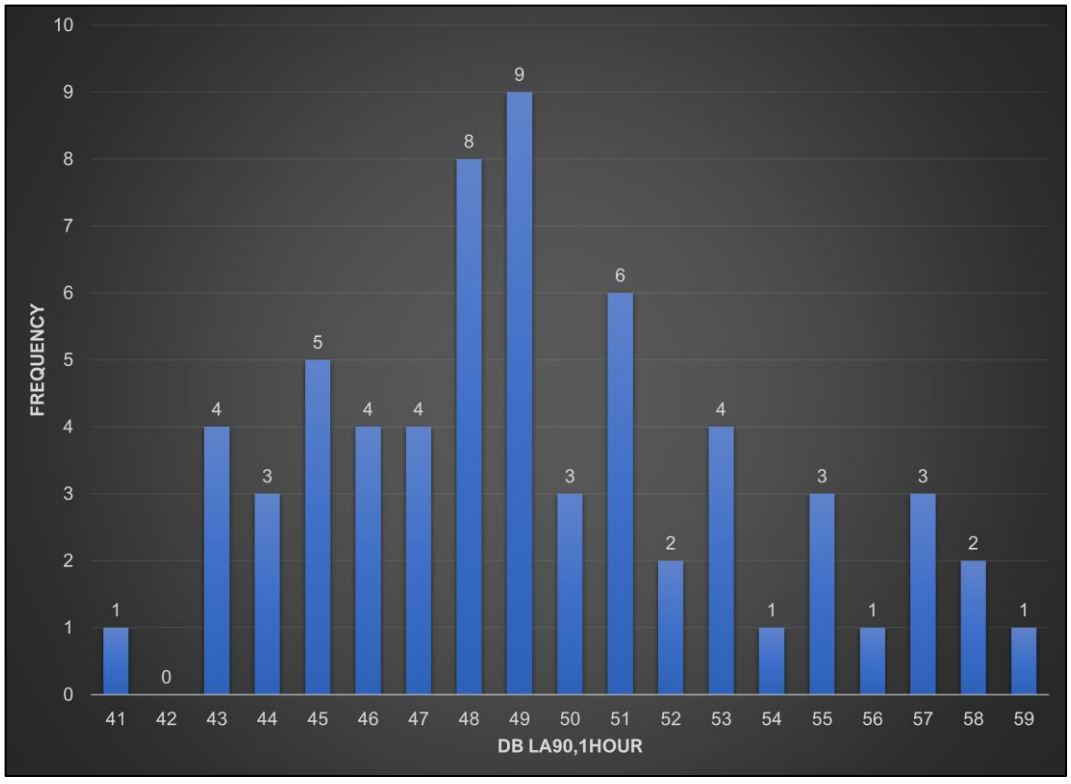

Figure 6: $L_{A90,1hour}$ noise readings at ML1 – Daytime.

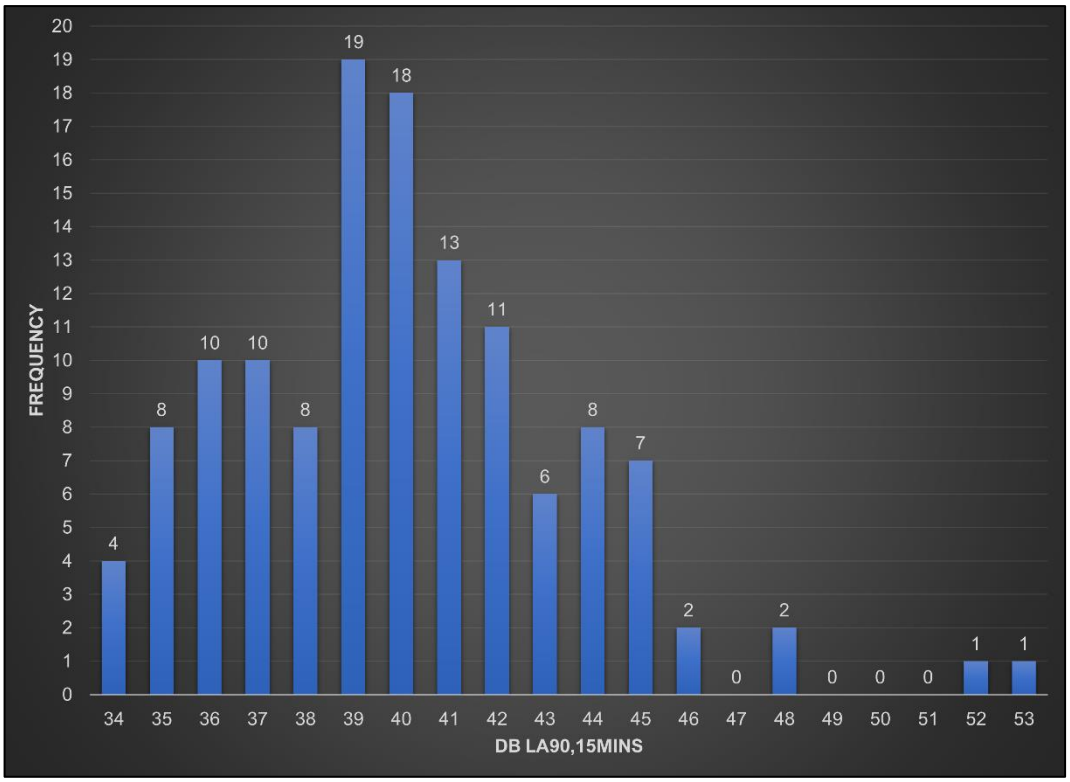

Figure 7: $L_{A90,15mins}$ noise readings at ML1 – Night-time.

3.3.2 For ML1 background sound levels (L_{A90}) of 48 dB(A) and 39 dB(A) are considered typical during daytime and night-time periods respectively.

4 3D SOUND MODEL

4.1 Overview

4.1.1 A 3D sound model has been constructed in SoundPLAN™ to model the noise from nearby noise sources and calculate the predicted sound pressure levels at the front and rear facades of the proposed development. The model uses the calculation method from ISO 9613-2:1996[2] to account for the distance between the source and receiver and any screening or reflections provided by the surrounding buildings.

4.1.2 The model is based on and calibrated against road traffic noise data collected during the survey as presented in Section 3 of this report.

4.1.3 Operation of the retail unit will rely on deliveries to the site which may occur daily. This poses a risk of adverse noise impacts to residents at the proposed residential dwellings. An additional 3D sound model has therefore been constructed to model noise from deliveries and assess their impact.

4.1.4 As the retail unit was not operational during the time of writing this report, sound power data from the NoiseAir noise data library has been used.

4.2 3D Sound Model (ProPG Assessment)

4.2.1 A noise contour plot illustrating the propagation of the sound from source to receptor during the daytime ($L_{Aeq,16hour}$) and night time ($L_{Aeq,\ 8hour}$) condition is given in **Figure 8** and **Figure 9** respectively.

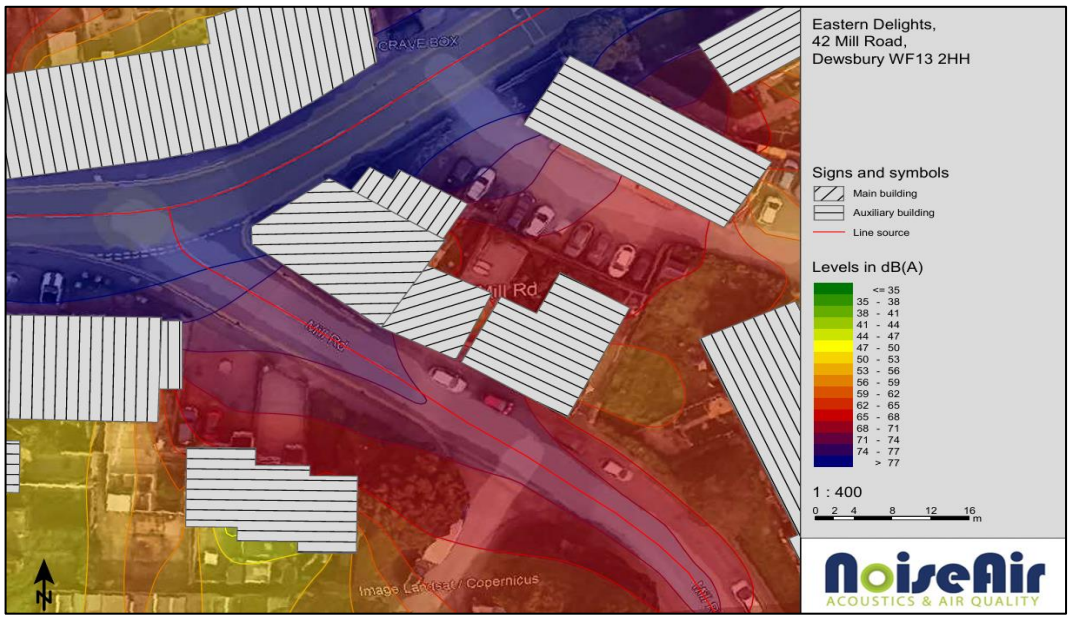

Figure 8: Noise contour plot during the daytime – $L_{Aeq,16hour}$.

[2] ISO9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation"

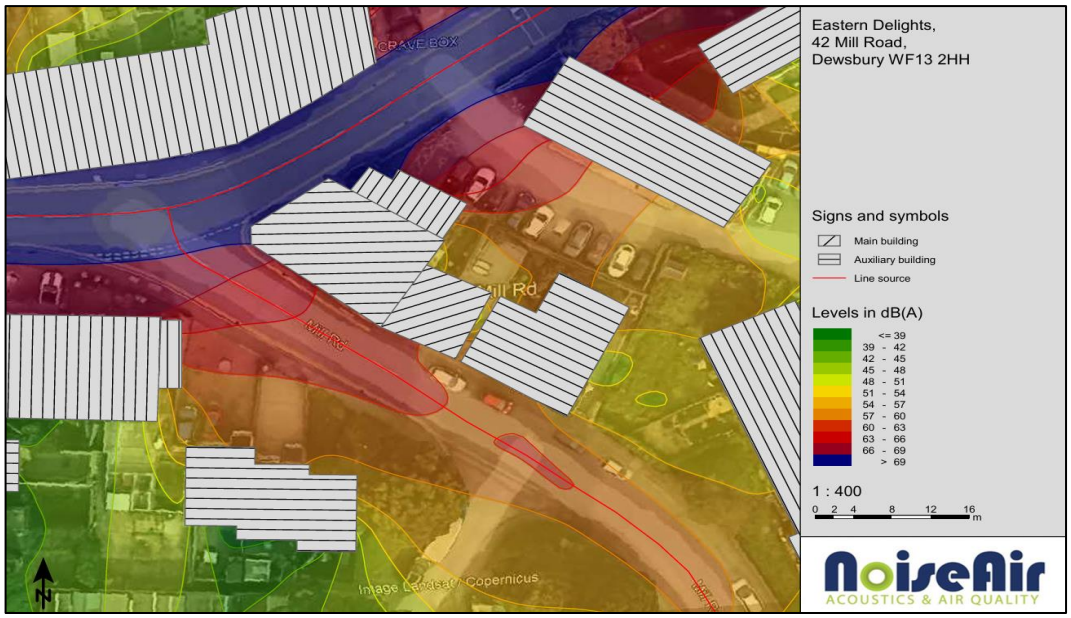

Figure 9: Noise contour plot during the night-time – $L_{Aeq,8hour}$.

4.2.2 **Figure 10** and **Table 5** detail the predicted noise levels as calculated at the development site.

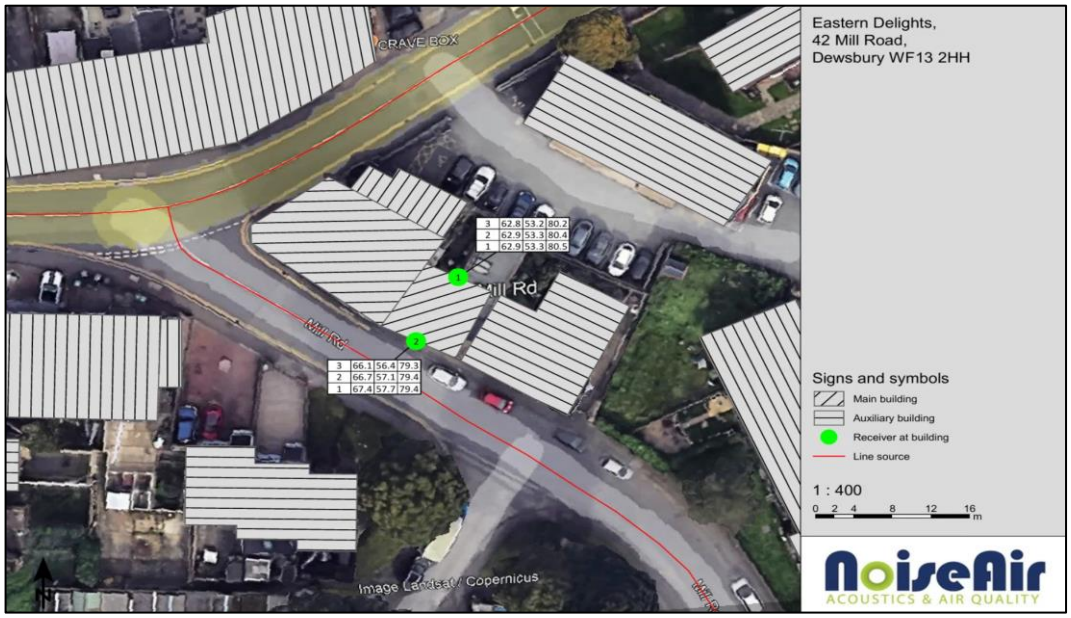

Figure 10: Receiver Locations

Table 5: Predicted Receptor Noise Levels

Receptor Number	Facade	Floor	dB $L_{Aeq,16hours}$ Daytime	dB $L_{Aeq,8hours}$ Night-Time	dB $L_{Amax,\ Night}$
1	Rear	1.FL	62.9	53.3	80.4
2	Front	1.FL	66.7	57.1	79.4

4.3 3D Sound Model (BS 4142:2014 Assessment)

4.3.1 **Figure 11** presents the source and receiver locations for the BS 4142:2014 assessment for van deliveries to the site.

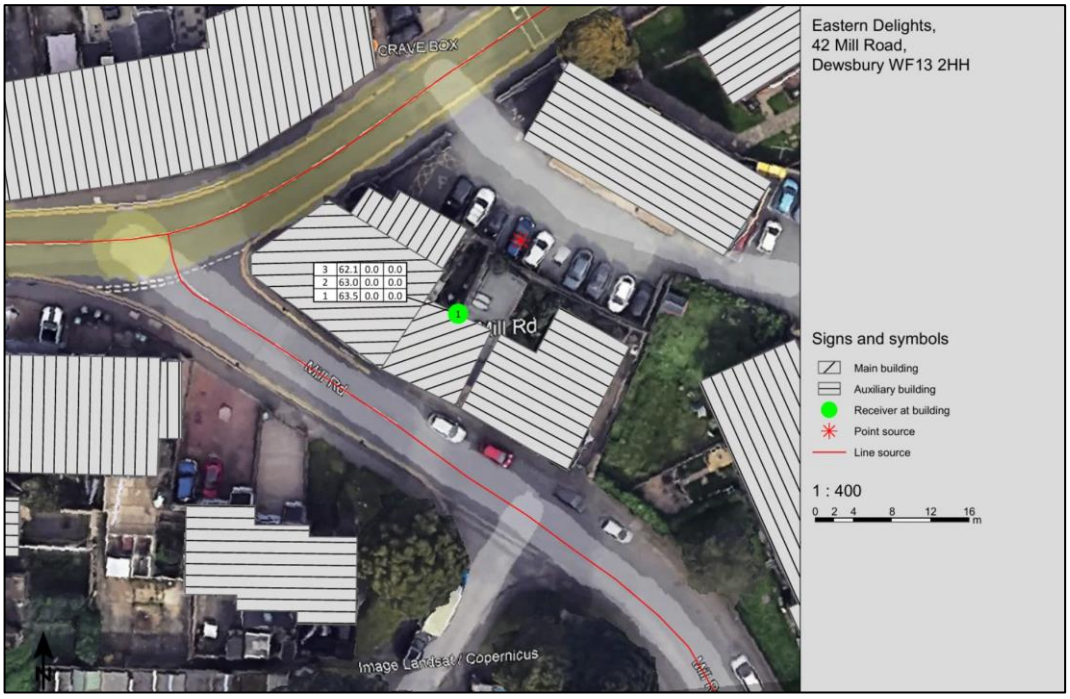

Figure 11: Source and Receiver Locations.

4.3.2 The highest predicted specific noise level is 63.5 dB(A).

5 PRO-PG:2017 SITE NOISE RISK ASSESSMENT AND ACOUSTIC DESIGN STATEMENT

5.1 Pro-PG:2017 Stage 1 Risk Assessment of Noise Levels

5.1.1 Based on the results of the 3D sound model and in accordance with Pro-PG:2017, a Site Noise Risk Assessment (SNRA) has been conducted. The SNRA assesses the initial risk of noise to have an adverse impact on a proposed development based on the overall measured levels with no mitigation in place.

5.1.2 The worst-case results have been compared to the information provided on Figure 1 of Pro-PG:2017.

Table 6: Stage 1 Risk Assessment of Noise Levels

Receptor Point	Façade	Daytime Noise Level (dB L_{Aeq})	Risk of Adverse Effect	Night-time Noise Level (dB L_{Aeq})	Risk of Adverse Effect
1	Rear	63	Low	53	Low
2	Front	67	Medium	57	Medium

5.1.3 **Table 6** indicates that during the daytime and night-time periods, proposed receptors of the development can be categorised as being at a **'Low - Medium'** risk of adverse impact.

5.1.4 The Site Noise Risk Assessment shows that local noise mitigation and good acoustic design will be required to ensure that the potential risk of the noise impact is minimised, and guideline internal and external noise levels are achieved.

5.1.5 In accordance with Pro-PG:2017, a Stage 2 full noise assessment, which includes an acoustic design statement, is required to ensure future residents are protected and a good acoustic design has been implemented.

5.2 Pro-PG:2017 Stage 2 – Site Noise Risk Assessment

5.2.1 The results of the Pro-PG:2017 Stage 1: Initial Site Noise Risk Assessment shows that receptors at the proposed development are likely to be at a **'Low** - **Medium'** risk of experiencing an adverse noise impact, with no mitigation in place. Therefore, an assessment against the criteria in WHO and BS 8233:2014 has been undertaken with reference to the general sound levels at the site.

5.2.2 This section forms the Stage 2 Acoustic Design Statement.

5.3 BS 8233:2014 Assessment of Daytime and Night-time Noise Levels in Living Rooms and Bedrooms

5.3.1 The predicted noise levels at the façades of the proposed building structures, as detailed in **Table 5** for the daytime and night-time period, together with the level of attenuation required in accordance with BS 8233: 2014, are presented in **Table 7**.

Table 7: Level of Attenuation Required to Achieve the Internal Noise Guideline Levels.

Façade	Daytime ($L_{Aeq,16hours}$) / Night-Time ($L_{Aeq,8hours}$ / L_{Amax})	Worst Case Noise Level at the Façade of the Property (dB(A))	BS 8233:2014 Target Internal Level (dB(A))	Worst Case Level of Attenuation Required (dB(A))
Rear	Daytime $L_{Aeq,16hours}$	63	35	28
	Night-Time $L_{Aeq,8hours}$	53	30	23
	Night-Time L_{Amax}	80	45	35
Front	Daytime $L_{Aeq,16hours}$	67	35	32
	Night-Time $L_{Aeq,8hours}$	57	30	27
	Night-Time L_{Amax}	79	45	34

5.4 Building Envelope Performance – Windows Open

5.4.1 The sound performance requirements for bedrooms, living and dining rooms at the development during the daytime and night-time in rooms with windows closed are summarised in Section 6.

5.4.2 However, with windows open, the attenuation provided by the façade will be approximately 10 -15 dB(A). This would potentially allow the recommended internal noise limit to be exceeded in most rooms at the development during certain parts of a typical day / night.

5.4.3 **Table 8** shows the level of exceedance for partially open windows at the front, rear and side facades.

Table 8: Summary of Internal Noise Levels with Windows Partially Open (based on a Partially Open Window Providing up to 15 dB(A) Attenuation).

Receptor	Room Type	Day / Night	Yes / No	Excess (dB)
1	Living/Dining/Kitchen Room	Day	No	+13
	Bedroom	Night	No	+20
2	Living/Dining/Kitchen Room	Day	No	+17
	Bedroom	Night	No	+19

5.4.4 It is considered that in many circumstances, such as urban/ sub-urban developments, an exceedance of up to 5 dB(A) in accordance with BS 8233:2014 is likely to be acceptable to

future residents and therefore is unlikely to breach the LOEL criteria discussed in Section 2 of this report.

5.4.5 Where exceedances are likely to be greater than +5 dB, on occasions, this may be acceptable to a resident, but when quiet conditions are required, the resident should be able to close the windows whilst maintaining adequate ventilation.

5.4.6 Active ventilation may be a consideration for habitable rooms on all facades where noise levels are considered to be elevated.

5.5 BS 4142:2014+A1:2019 Assessment for Daytime & Night-Time Deliveries

Overview

5.5.1 A BS 4142:2014 assessment has been undertaken considering noise breakout from van deliveries to the commercial retail unit with respect to the future residents at the development site.

5.5.2 Deliveries to a retail unit may occur during daytime or night-time periods and risks creating an adverse effect at residential receptors. The potential risk of adverse effect from van deliveries has been assessed.

Specific Sound Level

5.5.3 The specific sound level was calculated by modelling a typical delivery van with an 'engine idling' sound power level of 90 dB L_w. The worst-case specific sound level calculated at an external façade is 63.0 dB(A) which has been adopted for the subsequent assessment.

Background Sound Level

5.5.4 For ML1, the daytime and night-time L_{A90} background sound levels adopted are 48 dB(A) and 39 dB(A) respectively.

Character Corrections

5.5.5 The following character corrections have been applied for the noise from delivery vans:

- **Tonality**: +2 for the low-pitched noise from an idling engine which would be characteristic of a delivery van;
- **Intermittency**: +3 for the intermittent nature of sounds associated with van deliveries; and,
- **Impulsivity**: No correction.

5.5.6 The BS 4142:2014 initial assessment for the calculated noise breakout levels for all noise sources is presented in **Table 9** overleaf.

Table 9: BS 4142:2014 Assessment to Determine the Likelihood of Adverse Impacts on the Worst Affected Noise Sensitive Receptors		
Quantity	**Daytime**	**Night-time**
Specific Sound Level	63	
Acoustic Feature Correction	+5	
On-time Correction	-3	-
Rating Level	65	68
Background Sound Level dB L_{A90}	48	39
Excess of Rating Level over Background Sound Level	**+17**	**+29**
Initial Indication of Potential Impact	**Significant Adverse Impact**	

BS 4142:2014 Assessment and Context

5.5.7 The initial assessment indicates that during the daytime, the excess of rating level above the existing background sound level is +17. The initial assessment therefore indicates that a **significant adverse impact** is likely at the nearest NSRs.

5.5.8 Although the rating levels are considered to be elevated above the background sound levels, it is important to consider a number of contextual considerations which form an important aspect of the assessment.

5.5.9 Background sound levels are considered to be moderate; BS 4142:2014 states that when this is the case, absolute noise levels become a more important factor rather than the excess of rating level of the background sound levels. As such, consideration to the absolute noise levels have been compared to internal noise level guidelines.

5.5.10 Given the sound insulation scheme presented in Section 6 of this report indicates a calculated R_W+C_{tr} of at least 40 dB(A) based on external façade calculations presented in Section 6 of this report, a specific sound level of 63 dB(A) incident on the external façade is likely to be mitigated to the point that falls below the guidelines set out in BS 8233:2014.

5.5.11 In addition to the above it is recommended that properties at the development site are fitted with an MVHR system. Such a system will allow future residents to ventilate their homes adequately whilst maintaining acceptable internal levels of noise.

5.5.12 Based on the above, it is considered that the assessment of impacts can be revised down to **adverse**, however, it is acknowledged that some adverse impacts may persist.

5.5.13 It should be noted however, that adverse impacts should not prohibit development where efficient use of land is proposed.

5.5.14 As per the guidance in the NPSE, a certain degree of impact between LOAEL and SOAEL would be acceptable in terms of planning policy, provided that the impact has been mitigated and minimised by design.

5.6 Uncertainty

5.6.1 Uncertainty of measurements can have a significant effect on the outcome and findings of an assessment and therefore such constraints are documented and discussed below.

5.6.2 The SLM used was a Norsonic Class 1 SLM, it is generally recognised that Class 1 SLM's offer an uncertainty of ±1.0 dB. The instrumentation used for the survey has been calibrated by UKAS approved laboratories.

5.6.3 The sound levels measured (which include busier and quieter periods) are considered typical for the area.

5.6.4 Wind speeds during the survey visits were typically less than 5 ms-1 and the effect of wind generated noise is not considered to have a significant impact on this assessment.

5.6.5 It is therefore considered that, in this instance, the uncertainty of the calculations is not likely to have any influence on the outcome of the assessment.

6 SOUND INSULATION SCHEME

6.1 Building Envelope Requirements – Windows Closed

6.1.1 Proposals for the development site at the time of writing outline residential use to the first floor and above. Noise sensitive rooms are proposed to all facades of the property. Therefore, internal noise levels are required to not exceed 35 dB L_{Aeq} during the daytime hours in all rooms, 30 dB L_{Aeq} during the night-time in bedrooms and not typically exceed 45 dB L_{Amax} during the night-time hours in bedrooms.

6.1.2 When assessing sound levels in habitable areas of the proposed development, the sound attenuation provided by the overall building facade should be considered. To mitigate sound levels, the composition of the building facade can be designed to provide the level of attenuation required. Glazing is generally the building element which attenuates noise the least, so the proportion of glazing in a building facade is an important consideration when assessing overall sound attenuation. Additionally, any façade penetrations should also be considered such as for ventilation, e.g., trickle ventilation.

6.1.3 Based on the design details forwarded, worst case façade attenuation calculations have been undertaken in accordance with BS EN ISO 12354-3:2017.

6.1.4 Due to the elevated risk of adverse effect due to van deliveries to the site, a sound insulation scheme which utilises active ventilation has been proposed. Calculations assuming an active ventilation strategy have been undertaken and presented in this section.

6.1.5 **Table 10** presents a summary of the different elements for living rooms and bedrooms.

Table 10: Summary of Building Envelope Performance Requirements - Active Ventilation

Façade	Room Type	Wall R_w+C_{tr} (dB)	Glazing R_w+C_{tr} (dB)
Front	Living Room	50	40
	Bedrooms		
Rear	Living Room	50	40
	Bedrooms		

6.1.6 It should be noted that the acoustic performance values stated are for guidance and based on information provided at the time of writing, changes to location, size and orientation of rooms/ facades can have impacts on the calculated internal noise levels and subsequently the required acoustic performance criteria.

6.1.7 **Table 11** below provides a typical example summary for each elements type outlined in **Table 10** above.

Table 11: Summary of Building Element - Typical Examples		
Element Type	**Acoustic Performance**	**Typical Example**
Wall	50 dB R_w+C_{tr}	Concrete / Brick exterior wall with min. 100 mm insulated (60 kg / m3 rockwool) cavity constructed with timber studwork and resilient bars with min. 10 mm plasterboard lining
Window	Up to 40 dB R_w+C_{tr}	10 mm pane, 20 mm argon filled cavity, 8.8 mm Pilkington Optiphon pane.

6.1.8 It should be noted that the examples provided in **Table 11** are for guidance only, however any adopted solution must achieve the acoustic performance values presented in **Table 10**.

6.2 Ventilation Requirements

6.2.1 It is recommended that the ventilation system proposed at the site should, as a minimum, comply with Building Regulations 2010 Approved Document F1 2021 Means of Ventilation and British Standard BS5925 1991: “Code of Practice for Ventilation Principles and Designing for Natural Ventilation”. Acoustic ventilation is only recommended for noise sensitive rooms, which are bedrooms and living/ dining rooms.

6.2.2 The implementation of the recommended glazing would ensure that the required internal daytime and night-time noise limits are achieved.

6.2.3 It should be further noted that the glazing configurations within this report are for guidance only. Similar products to those used in NoiseAir calculations may achieve a similar level of sound reduction, however this should be verified by the manufacturer.

6.2.4 As detailed in Section 5 it is likely that noise levels in noise sensitive rooms within the proposed rooms will likely rely on the windows being in the closed position and therefore appropriate ventilation design should be completed.

6.2.5 Active ventilation may be a consideration for habitable rooms on all facades where noise levels are considered to be elevated.

6.2.6 Any active ventilation system incorporated into the design should be designed to meet NR25 criteria.

7 CONCLUSIONS

7.1 Overview

7.1.1 By instruction from Kufic Architects, NoiseAir was commissioned to undertake a noise impact assessment to support a planning application proposing the demolition of existing retail unit and erection of retail unit to ground floor with two flats above.

7.2 Conclusions

7.2.1 The results of the Pro-PG:2017 Stage 1: Initial Site Noise Risk Assessment shows that receptors at the proposed development are likely to be at a '**Low - Medium'** risk of experiencing an adverse noise impact, with no mitigation in place.

7.2.1 A BS 4142:2014 assessment found a +29 dB excess over background sound levels from potential deliveries during the night-time period, indicating a significant adverse impact on future residents. After considering contextual factors, this was revised down to adverse. Some impact between LOAEL and SOAEL is acceptable under planning policy if mitigated and minimized as per NPSE guidelines.

7.2.2 Calculations show that to achieve a reasonable internal acoustic environment in habitable rooms as specified within BS 8233:2014, the building envelope constructions should be selected to meet the sound reduction index (SRI) values presented in **Table 10**.

7.2.3 Active ventilation may be a consideration for habitable rooms on all facades where noise levels are considered to be elevated. Any active ventilation system incorporated into the design should be designed to meet NR25 criteria.

APPENDIX A - REPORT LIMITATIONS

This Report is presented to Kufic Architects and may not be used or relied on by any other person or by the client in relation to any other matters not covered specifically by the scope of this report.

Notwithstanding anything to the contrary contained in the report, NoiseAir Limited is obliged to exercise reasonable skill, care and diligence in the performance of the services required by Kufic Architects and NoiseAir shall not be liable except to the extent that it has failed to exercise reasonable skill, care and diligence, and this report shall be read and construed accordingly.

This report has been prepared by NoiseAir Limited. No individual is personally liable in connection with the preparation of this report. By receiving this report and acting on it, the client or any other person accepts that no individual is personally liable whether in contract, tort, for breach of statutory duty or otherwise.

The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from who it has been requested and that such information is accurate. Information obtained by NoiseAir Limited has not been independently verified by NoiseAir Limited unless otherwise stated in the report and should be treated accordingly.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

Where / if estimates and projects are made within this report, are made based on reasonable assumptions as of the date of this report, such statements however by their very nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. NoiseAir Limited specifically does not guarantee or warrant any estimates or projects contained in this report.

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APPENDIX B – NOISE INGRESS CALCULATIONS

BS 8233:2014 - Noise Ingress Calculation

Term	Description	Value
S_f	Total facade area (m^2)	9.80
S_{wi}	Window area (m^2)	2.20
S_{ew}	External wall area (Sf - Swi) (m^2)	7.60
S_{rr}	Area of the ceiling (m^2)	11.20
S	Total area exposed to noise ingress (Sf + Srr)	21.00
x	Room length (x)	3.20
y	Room width (y)	3.50
z	Room height (z)	2.80
V	Room Volume (m^3)	31.36
K	Facade Measuremet Correction	0.00
A0	Ref. qbs area (m2)	10.00
k	k=3 in BS 8233:2014 + Tollerance	3.00
	Number of vents	1.00
r	Distance to window / vent (m)	0.00
d	Angle of incidence (deg)	180.00

Project: 42 Mill Road, Dewsbury WF13 2HH
Description: Daytime Rear Façade
by: MG

Results: **23** dB L_{Aeq} **NR 19**

Term	Description	Description of noise level	Octave Band Centre Frequency (Hz)								Broadband	
			63	125	250	500	1000	2000	4000	8000	dB(A) 63-8k	dB(A) 125-2k
$L_{eq,ff}$	Free-field L_{eq} outside room		44	48	52	55	60	55	45	36	63	62

Term	Description	Specification										Dn,e,w	Rw	C	Ctr	Rw + Ctr	Comments
												$D_{n,e,w}$	R_w	C	C_{tr}		Comments
$D_{n,e}$	$D_{n,e}$ of **each** venitlator:	**Ignore trickle vent**	130	130	130	130	130	130	130	130	-	-	0	-	-	0		Dnew (C;Ctr) = 66 (66;66), Free Area = ∞ +1
	Cumulative $D_{n,e}$ for all venitilators		130	130	130	130	130	130	130	130								
R_{wi}	SRI of glazing/window:	**33 dB Rw+Ctr 10:12:6 mm**	20	26	27	34	40	38	46	46	-	-	-	37	-1	-4	33	Acoustics Bulletin Sept/Oct 1994
	SRI of external wall:	**47 dB Rw+Ctr BS8233 Example - Brick and block external wall**	34	40	44	45	51	56	56	56	-	-	-	51	-1	-4		0.0
R_{rr}	SRI of roof and ceiling:	**39 dB Rw+Ctr BS8233 Example (with 3 dB uplift for sound incident on roof)**	25	31	37	43	48	52	52	52	-	-	-	44	-2	-5		0.0

Term	Description	Type / Comment /Source								dB(A) 63-8k	dB(A) 125-2k
$L_{eq,2}$	Internal L_{eq}		25	23	23	21	20	14	0	-10	**23**	**23**
$L_{max,2}$	Internal L_{max}		-19	-25	-29	-35	-40	-41	-45	-45	**-31**	**-32**

Leq	via Vent		-83	-79	-75	-72	-67	-72	-82	-92	**-65**	**-65**
	via Window		21	19	21	18	16	13	-4	-14	**21**	**21**
	via Wall		12	10	9	12	11	1	-9	-19	**14**	**14**
	via Ceiling		20	18	15	13	13	3	-6	-16	**16**	**16**
	via All		24	21	22	20	19	14	-1	-11	**23**	**23**

BS 8233:2014 - Noise Ingress Calculation

Term	Description	Value
S_f	Total facade area (m^2)	9.80
S_{wi}	Window area (m^2)	2.20
S_{ew}	External wall area (Sf - Swi) (m^2)	7.60
S_{rr}	Area of the ceiling (m^2)	11.20
S	Total area exposed to noise ingress (Sf + Srr)	21.00
x	Room dimension x	3.20
y	Room dimension y	3.50
z	Room dimension z	2.80
V	Volume of receiving room (m^3)	31.36
K	Facade Measuremet Correction	0.00
A0	Ref. qbs area (m2)	10.00
k	k=3 in BS 8233:2014 + Tollerance	3.00
	No. of vents in external wall	1.00
r	Distance to window / vent (m)	0.00
d	Angle of incidence (deg)	180.00

Project: 42 Mill Road, Dewsbury WF13 2HH
Description: Night-time Rear Façade
by: MG

Results: **8** dB L_{Aeq} **NR 6**
43 dB LA_{max}

Term	Description	Description of noise level	Octave Band Centre Frequency (Hz)								Broadband	
			63	125	250	500	1000	2000	4000	8000	dB(A) 63-8k	dB(A) 125-2k
$L_{eq,ff}$	Free-field L_{eq} outside room		35	39	42	46	51	45	36	26	53	52
L_{max}	Free-field L_{max} outside room		81	82	88	80	69	65	57	61	82	82

Term	Description	Specification										Dn,e,w		Rw		C	Ctr	Rw + Ctr	Comments
												$D_{n,e,w}$		R_w		C	C_{tr}		Comments
$D_{n,e}$	$D_{n,e}$ of **each** venitlator:	**Ignore trickle vent**	130	130	130	130	130	130	130	130	-	-	0		-		-	0		Dnew (C;Ctr) = 66 (66;66), Free Area = ∞ +1
	Cumulative $D_{n,e}$ for all venitilators		130	130	130	130	130	130	130	130										
R_{wi}	SRI of glazing/window:	**40 dB Rw+Ctr 10:16:16.8 mm Stadip Silence**	23	29	36	42	44	47	59	59	-	-	-		44		-1	-4	40	0
	SRI of external wall:	**47 dB Rw+Ctr BS8233 Example - Brick and block external wall**	34	40	44	45	51	56	56	56	-	-	-		51		-1	-4		0.0
R_{rr}	SRI of roof and ceiling:	**Ignore roof**	130	130	130	130	130	130	130	130	-	-	-		0		0	0		0.0

Term	Description	Type / Comment /Source								dB(A) 63-8k	dB(A) 125-2k
$L_{eq,2}$	Internal L_{eq}		9	7	4	4	5	-4	-18	-28	**8**	**8**
$L_{max,2}$	Internal L_{max}		56	50	50	39	23	16	3	7	**43**	**43**

Leq	via Vent		-92	-89	-85	-81	-77	-82	-92	-101	**-75**	**-75**
	via Window		8	6	2	0	3	-5	-27	-37	**5**	**5**
	via Wall		2	0	0	2	1	-9	-19	-28	**4**	**4**
	via Ceiling		-95	-91	-87	-84	-79	-84	-94	-104	**-77**	**-77**
	via All		9	7	4	4	5	-4	-18	-28	**8**	**8**

BS 8233:2014 - Noise Ingress Calculation

Term	Description	Value
S_f	Total facade area (m^2)	9.80
S_{wi}	Window area (m^2)	2.20
S_{ow}	External wall area (Sf - Swi) (m^2)	7.60
S_{rr}	Area of the ceiling (m^2)	11.20
S	Total area exposed to noise ingress (Sf + Srr)	21.00
x	Room length (x)	3.20
y	Room width (y)	3.50
z	Room height (z)	2.80
V	Room Volume (m^3)	31.36
K	Facade Measuremet Correction	0.00
A0	Ref. qbs area (m2)	10.00
k	k=3 in BS 8233:2014 + Tollerance	3.00
	Number of vents	1.00
r	Distance to window / vent (m)	0.00
α	Angle of incidence (deg)	180.00

Project: 42 Mill Road, Dewsbury WF13 2HH
Description: Daytime Front Façade
by: MG

Results: **27** dB L_{Aeq} **NR 23**

Term	Description	Description of noise level	Octave Band Centre Frequency (Hz)								Broadband	
			63	125	250	500	1000	2000	4000	8000	dB(A) 63-8k	dB(A) 125-2k
$L_{eq,ff}$	Free-field L_{eq} outside room		46	51	55	59	64	59	50	41	67	66

Term	Description	Specification										$D_{n,e,w}$	R_w	C	C_{tr}	Rw + Ctr	Comments
$D_{n,e}$	$D_{n,e}$ of **each** venitlator:	**Ignore trickle vent**	130	130	130	130	130	130	130	130	-	-	0	-	-	0		Dnew (C;Ctr) = 66 (66;66), Free Area = ∞ +1
	Cumulative $D_{n,e}$ for all venitilators		130	130	130	130	130	130	130	130								
R_{wi}	SRI of glazing/window:	**33 dB Rw+Ctr 10:12:6 mm**	20	26	27	34	40	38	46	46	-	-	-	37	-1	-4	33	Acoustics Bulletin Sept/Oct 1994
	SRI of external wall:	**47 dB Rw+Ctr BS8233 Example - Brick and block external wall**	34	40	44	45	51	56	56	56	-	-	-	51	-1	-4		0.0
R_{rr}	SRI of roof and ceiling:	**39 dB Rw+Ctr BS8233 Example (with 3 dB uplift for sound incident on roof)**	25	31	37	43	48	52	52	52	-	-	-	44	-2	-5		0.0

Term	Description	Type / Comment /Source									dB(A) 63-8k	dB(A) 125-2k
$L_{eq,2}$	Internal L_{eq}		27	26	27	24	24	18	4	-5	**27**	**27**
$L_{max,2}$	Internal L_{max}		-19	-25	-29	-35	-40	-41	-45	-45	**-31**	**-32**

Leq	via Vent		-81	-76	-72	-68	-63	-68	-78	-86	**-61**	**-61**
	via Window		22	21	25	21	20	17	0	-9	**25**	**25**
	via Wall		14	13	13	16	15	5	-5	-13	**17**	**17**
	via Ceiling		21	20	19	16	17	7	-2	-11	**19**	**19**
	via All		25	24	26	23	23	18	3	-6	**26**	**26**

BS 8233:2014 - Noise Ingress Calculation

Term	Description	Value
S_f	Total facade area (m^2)	9.80
S_{wi}	Window area (m^2)	2.20
S_{ow}	External wall area (Sf - Swi) (m^2)	7.60
S_{rr}	Area of the ceiling (m^2)	11.20
S	Total area exposed to noise ingress (Sf + Srr)	21.00
x	Room dimension x	3.20
y	Room dimension y	3.50
z	Room dimension z	2.80
V	Volume of receiving room (m^3)	31.36
K	Facade Measuremet Correction	0.00
A0	Ref. qbs area (m2)	10.00
k	k=3 in BS 8233:2014 + Tollerance	3.00
	No. of vents in external wall	1.00
r	Distance to window / vent (m)	0.00
α	Angle of incidence (deg)	180.00

Project: 42 Mill Road, Dewsbury WF13 2HH
Description: Night-time Front Façade
by: MG

Results: **11** dB L_{Aeq} **NR 10**

42 dB LA_{max}

Term	Description	Description of noise level	Octave Band Centre Frequency (Hz)								Broadband	
			63	125	250	500	1000	2000	4000	8000	dB(A) 63-8k	dB(A) 125-2k
$L_{eq,ff}$	Free-field L_{eq} outside room		36	41	46	49	54	49	40	31	57	56
L_{max}	Free-field L_{max} outside room		84	85	84	80	72	68	60	56	81	81

Term	Description	Specification										$D_{n,e,w}$		R_w		C	C_{tr}	Rw + Ctr	Comments
$D_{n,e}$	$D_{n,e}$ of **each** venitlator:	**Ignore trickle vent**	130	130	130	130	130	130	130	130	-	-	0		-		-	0		Dnew (C;Ctr) = 66 (66;66), Free Area = ∞ +1
	Cumulative $D_{n,e}$ for all venitilators		130	130	130	130	130	130	130	130										
R_{wi}	SRI of glazing/window:	**40 dB Rw+Ctr 10:16:16.8 mm Stadip Silence**	23	29	36	42	44	47	59	59	-	-	-		44		-1	-4	40	0
	SRI of external wall:	**47 dB Rw+Ctr BS8233 Example - Brick and block external wall**	34	40	44	45	51	56	56	56	-	-	-		51		-1	-4		0.0
R_{rr}	SRI of roof and ceiling:	**Ignore roof**	130	130	130	130	130	130	130	130	-	-	-		0		0	0		0.0

Term	Description	Type / Comment /Source								dB(A) 63-8k	dB(A) 125-2k
$L_{eq,2}$	Internal L_{eq}		11	10	8	8	9	0	-14	-23	**11**	**11**
$L_{max,2}$	Internal L_{max}		58	54	46	39	27	19	6	2	**42**	**42**

Leq	via Vent		-91	-86	-82	-78	-73	-78	-87	-96	**-71**	**-71**
	via Window		10	8	6	4	7	-1	-23	-32	**9**	**9**
	via Wall		4	3	3	6	5	-5	-14	-23	**8**	**8**
	via Ceiling		-93	-88	-84	-80	-75	-80	-90	-98	**-73**	**-73**
	via All		11	10	8	8	9	0	-14	-23	**11**	**11**

APPENDIX C – GLOSSARY

A-weighted sound pressure, p_A	Value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network. *NOTE: The A-weighting network modifies the electrical response of a sound level meter with frequency in approximately the same way as the sensitivity of the human hearing system.*
A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure in decibels (dBA).
Acoustic environment	Sound from all sound sources as modified by the environment [BS ISO 12913-1:2013].
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. *NOTE: The ambient sound comprises the residual sound and the specific sound when present.*
Ambient sound level, $L_a = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T *NOTE: The ambient sound level is a measure of the residual sound and the specific sound when present.*
Background sound	Underlying level of sound over a period, *T*, which might in part be an indication of relative quietness at a given location.
Background sound level, $L_{A90,T}$ (BS 4142:2014)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Break-in	Noise transmission into a structure from outside.
Break-out	Noise transmission from inside a structure to the outside.
Cross-talk	Noise transmission between one room and another room or space via a duct or other path.
C_{tr}	Correction term applied against the sound insulation single-number values (R_w, D_w, and $D_{nT,w}$) to provide a weighting against low frequency performance. *NOTE: The reference values used within the C_{tr} calculation are based on urban traffic noise.*
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time.
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ (BS 4142:2014)	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 – t_1$, has the same mean-squared sound pressure as a sound that varies with time.
Equivalent sound absorption area of a room, A	Hypothetical area of a totally absorbing surface without diffraction effects, expressed in square metres (m2), which, if it were the only absorbing element in the room, would give the same reverberation time as the room under consideration
Facade level	Sound pressure level 1 m in front of the façade. *NOTE: Facade level measurements of L_{pA} are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the facade.*
Free-field level	Sound pressure level away from reflecting surfaces. *NOTE: 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). Estimates of noise from aircraft overhead usually include a correction of 2 dB to allow for reflections from the ground.
Impact sound pressure level, L_i	Average sound pressure level in a specific frequency band in a room below a floor when it is excited by a standard tapping machine or equivalent.
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants. *NOTE: The location(s) within the room at which the ambient indoor noise is to be measured or calculated ought to be considered.*
Measurement time interval, T_m (BS 4142:2014)	Total time over which measurements are taken. *NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.*
Noise criteria	Numerical indices used to define design goals in a given space.
Noise rating, NR	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves.
Normalised impact sound pressure level, L_n	Impact sound pressure level normalized for a standard absorption area in the receiving room. *NOTE: Normalised impact sound pressure level is usually used to characterize the insulation of a floor in a laboratory against impact sound in a stated frequency band.*
Octave band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.
Percentile level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting "F," which is exceeded for *N*% of a specified time interval.
Reference time interval, T_r (BS 4142:2014)	Specified interval over which the specific sound level is determined. *NOTE: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h.*
Residual sound (BS 4142:2014)	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, $L_r = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.
Rating level, $L_{Ar,Tr}$	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise. *NOTE: This is used in BS 7445 and BS 4142 for rating industrial noise, where the noise is the specific noise from the source under investigation.*
Reverberation time, *T*	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped.
Sound exposure level, *L*AE	Level of a sound, of 1 s duration, which has the same sound energy as the actual noise event considered.
Sound level difference, *D*	Difference between the sound pressure level in the source room and the sound pressure level in the receiving room.
Sound pressure, *p*	Root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound.

Sound pressure level, L_p	Quantity of sound pressure, in decibels (dB).
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, $L_s = L_{Aeq,Tr}$ (BS 4142:2014)	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.
Specific sound source (BS 4142:2014)	Sound source being assessed.
Standardised impact sound pressure level, L'_{nT}	Impact sound pressure level normalized to a reverberation time in the receiving room of 0.5 s.
Standardised level difference, D_{nT}	Difference in sound level between a pair of rooms, in a stated frequency band, normalized to a reference reverberation time of 0.5 s for dwellings.
Ground borne noise	Audible noise caused by the vibration of elements of a structure, for which the vibration propagation path from the source is partially or wholly through the ground. *NOTE Common sources of ground-borne noise include railways and heavy construction work on adjacent construction sites.*
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. *NOTE Common sources of structure-borne noise include building services plant, manufacturing machinery and construction or demolition of the structure.*
Third octave band	Band of frequencies in which the upper limit of the band is 2% times the frequency of the lower limit.
Weighted level difference, D_w	Single-number quantity that characterizes airborne sound insulation between rooms, but which is not adjusted to reference conditions. *NOTE Weighted level difference is used to characterize the insulation between rooms in a building as they are. Values cannot normally be compared with measurements made under other conditions (see BS EN ISO 717-1).*
Weighted normalised impact sound pressure level, $L'_{n,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or
Weighted standardised impact sound pressure level $L'_{nT,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted standardised level difference, $D_{nT,w}$	Single-number quantity that characterizes the airborne sound insulation between rooms.

Symbols

D_w	Weighted level difference (dB)
D_{nT}	Standardized level difference (dB)
$D_{nT,w}$	Weighted standardized level difference (dB)
L_{Amax}	Maximum noise level (dB)
$L_{Ar,Tr}$	Rating level (dB)
L_n	Normalised impact sound pressure level (dB)
L'_{nT}	Standardised impact sound pressure level (dB)
$L'_{nT,w}$	Weighted standardised impact sound pressure level (dB)
$L'_{n,w}$	Weighted normalised impact sound pressure level (dB)
L_p	Sound pressure level (dB)
L_{pA}	A-weighted sound pressure level (dB)
$L_{AN,T}$	Percentile level (dB)
L_{AE}	Sound exposure level (dB)
$LAeq,T$	Equivalent continuous A-weighted sound pressure level (dB)
p	Sound pressure (Pa)
p_A	A-weighted sound pressure (dB)
$p_{A(t)}$	Instantaneous A-weighted sound pressure (Pa)

R	Sound reduction index (dB)
R_w	Weighted sound reduction index (dB)
T	Time interval (also used for reverberation time) (s)
t_0	Reference time interval (s)

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