
BHARYA DESIGN & BUILD CONSULTANCY LIMITED

NOISE IMPACT ASSESSMENT REPORT

**ACORN HOUSE, 115 SPOTLAND ROAD, ROCHDALE OL12
6PJ**

Client: Bharya Design & Build Consultancy
Limited

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REPORT VERSION CONTROL:

Document Reference	Date	Report Prepared by	Report Checked by	Report Authorised by
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1 INTRODUCTION

1.1.1 By instruction from Bharya Design & Build Consultancy Limited ('the client'), NoiseAir was commissioned to conduct a noise impact assessment (NIA) for the proposed change of use from use class E to use class C3 accommodating 12 no. apartments. The location for the proposal is: Acorn House, 115 Spotland Road, Rochdale OL12 6PJ, herein referred to as the 'development site'.

1.1.2 A planning application has been submitted to the local authority under reference 22/1380/PRA56 and in order to determine approval under the Town and County Planning General Permitted Development (England) Order 2015, the following Environmental Health Officer (EHO) comments have been issued:

'Given the proximity to some night time economy we would require an acoustic survey to inform the design of the units facing Spotland road to ensure the following internal noise levels can be achieved:

35 dB(A) Leq (16 hour) in the bedrooms with windows shut and other means of ventilation provided between 7 am and 11pm;

30dB(A) Leq 8 hour in the bedrooms with windows shut and other means of ventilation provided between 11pm and 7am;

35 dB(A) Leq (16 hour) in the living room/s with windows shut and other means of ventilation provided between 7 am and 11pm;

40dB(A) Leq (16 hour) in other habitable rooms with windows shut and other means of ventilation provided at all times.

upon completion and prior to occupation validation testing is carried out.'

1.1.3 This report provides the specification required to achieve the noise levels stipulated by the comments. In accordance with the comments 'validation testing' will need to be conducted 'prior to occupation'. This would consist of a post-completion noise survey within the building.

1.1.4 General limitations with respect to this NIA are presented in **Appendix A**.

1.2 Site Description

- 1.2.1 At the time of writing, the development site is a three storey block understood to accommodate vacant former office units.
- 1.2.2 The development site is located approximately 1.3 kilometres north north-west of Rochdale town centre and is considered an urban location.
- 1.2.3 The site is flanked to the north northeast by the A680 (Spotland Road) which is a road typically accommodating a variety of vehicle types, travelling at speeds up to 30 miles per hour (mph). Beyond the A680 lies a residential housing estate.
- 1.2.4 To the south southwest lies Ashworth Street, a road typically accommodating local domestic vehicles providing access to the local housing estate to the south of the development site.
- 1.2.5 To the East southeast, the site is flanked by Daisy Street, which is a small cul-de-sac leading to Ashworth Street, beyond Daisy Street lies residential housing.
- 1.2.6 Flanking the west northwest of the site lies further residential housing.
- 1.2.7 **Figure 1** presents an aerial image of the proposed development site with respect to the local area and its context.



Figure 1: Site aerial image.

1.3 Development Proposals

- 1.3.1 Proposals for the development site are to refurbish the former vacant office space and to accommodate 12 no. new apartments.
- 1.3.2 Documentation provided at the time of writing indicates the following:
- Existing glazing is assumed to consist of 2 no. 4 mm panes with a 12 mm void separating the panes.
 - Existing ceiling on second floor to be over-boarded with 12.5 mm duplex with insulation in roof void consisting of 2 no. layers of 150 mm thick glass fibre insulation.
 - All external walls to receive new metal frame lining incorporating min 75mm thermal insulation and 2 layers of 15mm thick soundbloc plasterboard.
- 1.3.3 The roof void depth is not indicated in the documentation provided and is therefore assumed to be 300 mm.
- 1.3.4 **Figure 2** presents the existing and proposed floor plans provided at the time of writing.

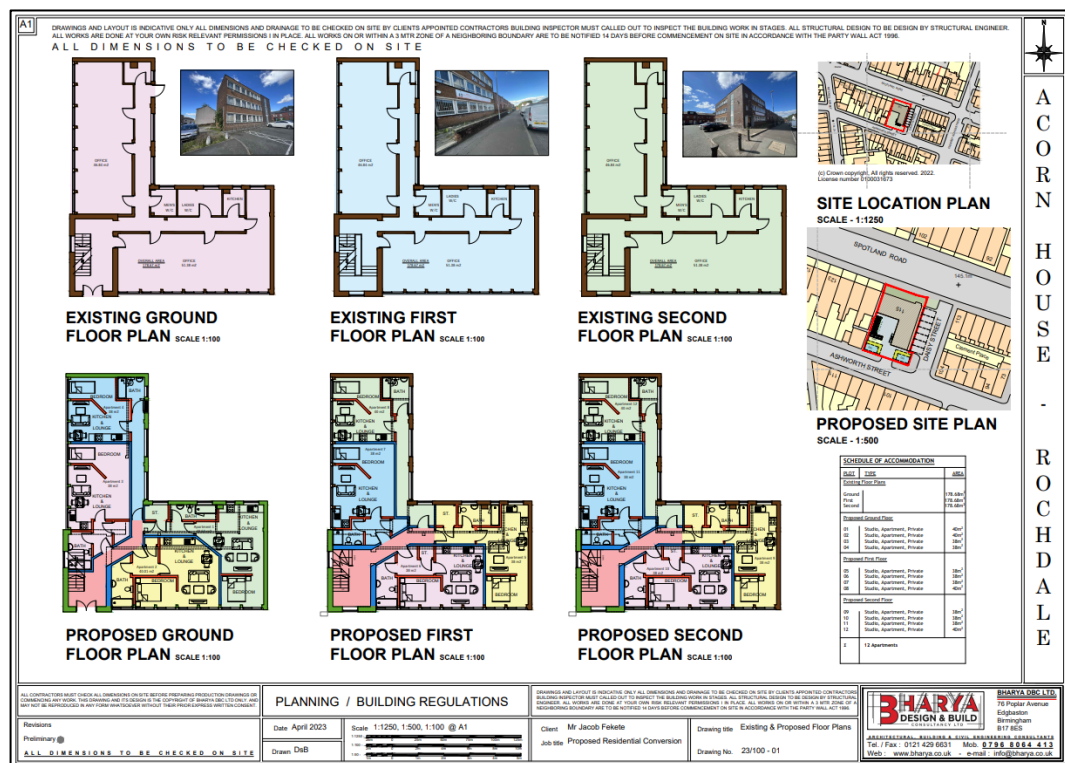


Figure 2: Proposed basement to first floor plan view of the development site

- 1.3.5 All Bharya Design & Build Consultancy Limited drawings received at the time of writing are presented in **Appendix B**.

2 ASSESSMENT METHODOLOGY AND SCOPE OF WORKS

2.1 Consultation and Scope of Works

- 2.1.1 This report has been prepared with respect to the EHO comments provided. The NIA presented in this report is based on site specific data collected at the development site and assesses the likely impacts of the proposals with respect to existing local noise sources. Where site specific data is not available, data is sought from other reputable sources such as SoundPLAN™.
- 2.1.2 Based on the site survey, it is considered likely that the dominant noise at the facades of the development site is that from road traffic.

2.2 Assessment Criteria

- 2.2.1 Given the comments issued by the local authority, it is therefore considered that the noise assessment should be conducted, and mitigation introduced such that the requirements stated in section 1 are achieved.

3 ACOUSTIC SURVEY

3.1 Acoustic Survey Details

3.1.1 NoiseAir conducted primarily unattended fixed position noise monitoring between the 16th of May 2023 and the 17th of May 2023 at the development site (ML1 and ML2).

3.1.2 ML1 and ML2 are presented in **Figure 3** and described in **Table 1**.

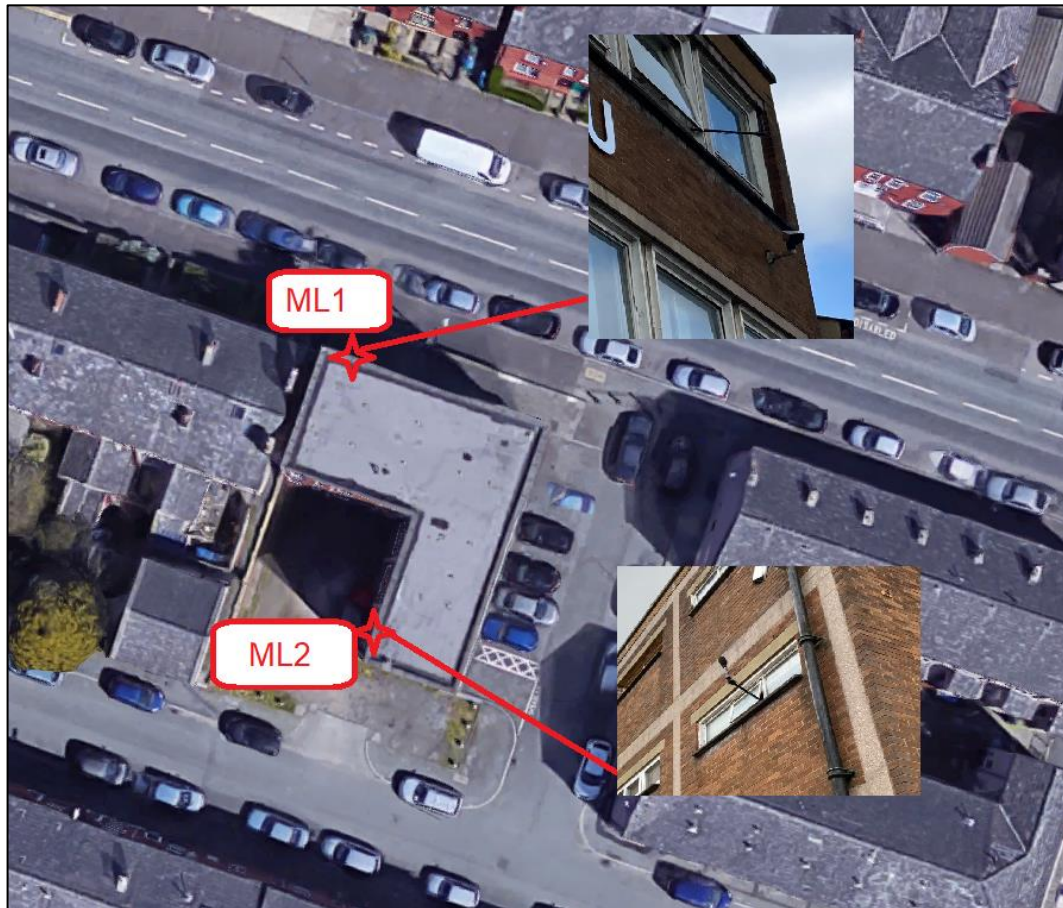


Figure 3: Site layout plan and noise monitoring location – ML1 and ML2.

Table 1: Summary of Noise Monitoring Locations				
Monitoring Location Number	Location Description	Time Period Monitored		Attended or Unattended Monitoring
		Start	End / Duration	
ML1	Protruding from the second floor window within 1 m of the north facing façade.	10:15 16/05/23	10:00 17/05/23	Unattended
ML2	Protruding from the first floor window within 1 m of the west facade.	10:30 16/05/23	10:00 17/05/23	Unattended

- 3.1.3 ML1 was positioned to be representative of the ambient and background noise levels at the north façade of the proposed development site.
- 3.1.4 ML2 was positioned to be representative of the ambient and background noise levels at the west façade of the proposed development site.
- 3.1.5 The noise measurements were made using Class 1, integrating sound level meters (SLMs).
- 3.1.6 The acoustic equipment was calibrated to comply with Section 4.2 of BS 7445-1:2003¹, before and after the noise monitoring periods.
- 3.1.7 Details of the SLM and associated field calibration are presented in **Table 2**.

Table 2: Summary of the SLMs used for survey and associated field calibration					
SLM (Serial Number)	Preamp (Serial Number)	Microphone (Serial Number)	Start Calibration	End Calibration	Drift
NOR140 (1405015)	NOR1209 (14517)	NOR1225 (42327)	-26.6	-26.6	0.0
NOR140 (1403057)	NOR1209 (12320)	NOR1225 (72835)	-25.3	-25.3	0.0

- 3.1.8 The weather conditions were noted to be as presented in **Table 3** during the site visits at the start and end of the monitoring period.

Table 3: Summary of weather conditions noted at the start and end of the monitoring duration.		
Parameter	16 th of May 2023	17 th of May 2023
Roads (Wet / Dry)	Dry	Dry
Temperature (°C)	8	14
Wind speed (ms-1) / direction	< 1 / SSE	2 / variable direction
Cloud Cover (Approx. %)	80	50
Humidity (%)	95	67

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

3.1.9 A-weighted² L_{eq}^3 noise levels were measured at ML1 and ML2 to comply with the requirements of the EHO comments. A-weighted⁴ L_{90}^5 and L_{Fmax}^6 were also measured to provide further information. The measured noise levels are presented in full in **Appendix C**.

3.1.10 Attending the development site at the start and end of the survey monitoring period provided opportunity for observations and detailed notes to be made of the significant noise sources, which contribute to the measured levels.

ML1

Dominant noise was that from road traffic on Spotland Road accommodating various vehicle types from cars to light commercial.

ML2

Consistent with ML1.

3.2 Measured Sound Levels

3.2.1 Data presented in **Figure 4** and **Figure 5** detail a level vs time graph of the recorded $L_{Aeq,T}$, L_{AFMax} and $L_{A90,T}$ sound levels over 15-minute time periods for the entire monitoring duration at ML1 and ML2, respectively.

² An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions.

³ Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.

⁴ An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions.

⁵ The noise level which is exceeded for 90% of the measurement period.

⁶ The instantaneous maximum noise level recorded for a measurement period.

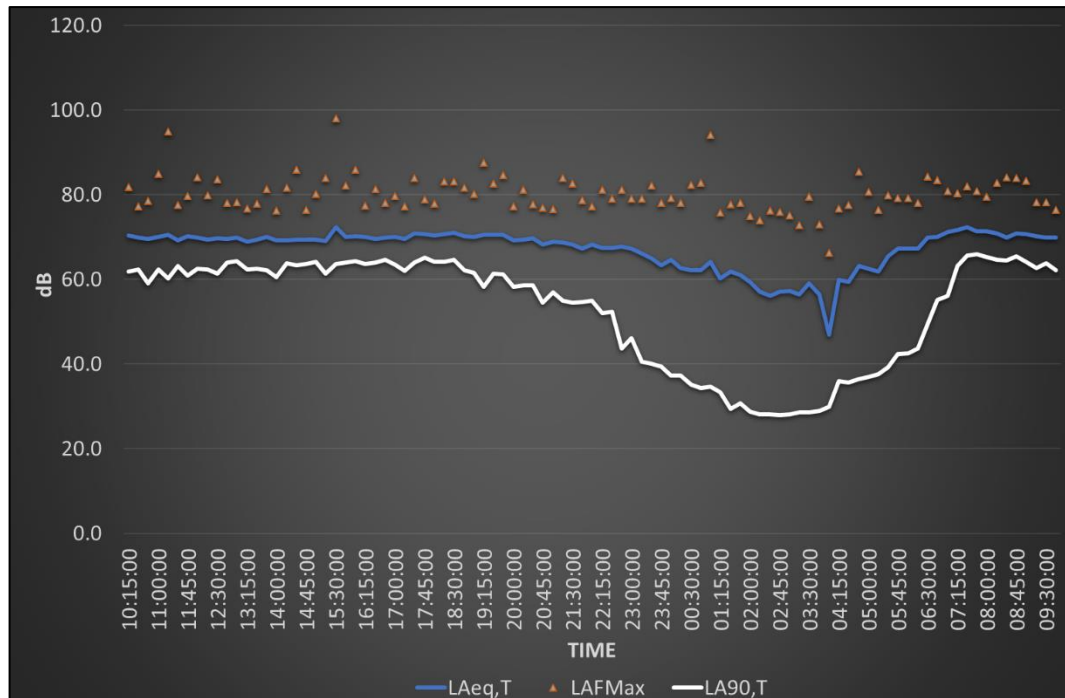


Figure 4: Level vs. time graph presenting $L_{Aeq,T}$, L_{AFMax} and $L_{A90,T}$ sound levels – ML1.

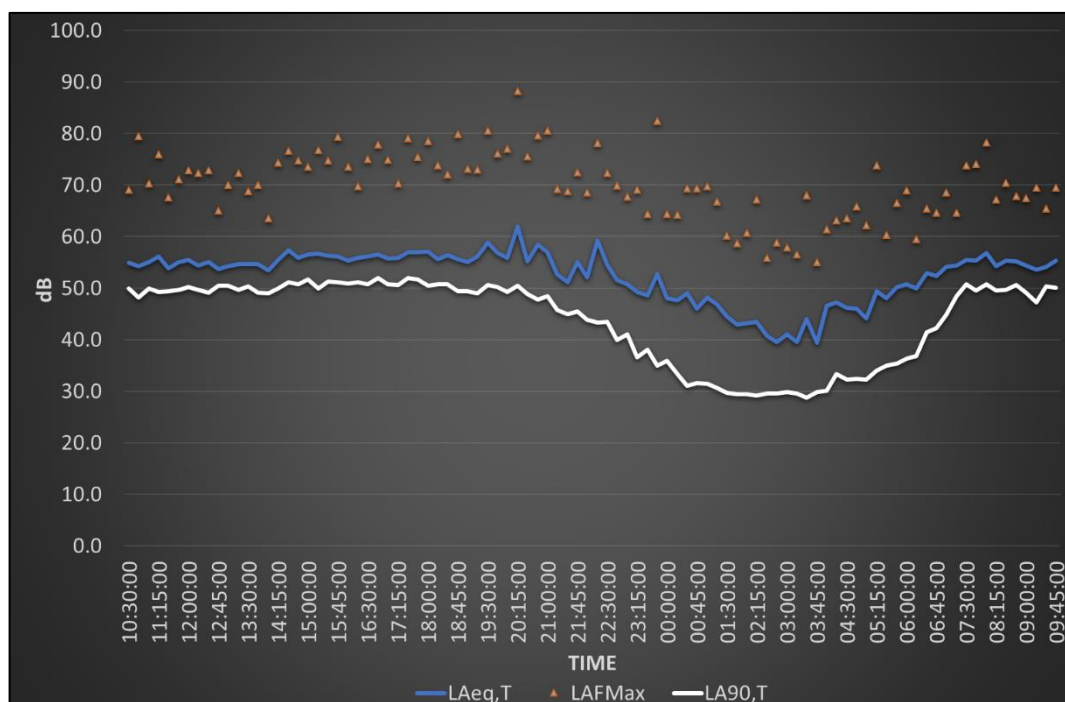


Figure 5: Level vs. time graph presenting $L_{Aeq,T}$, L_{AFMax} and $L_{A90,T}$ sound levels – ML2.

- 3.2.2 Given the location of ML1 and ML2 being within 1 m from the façade, 3 dB has been subtracted from the measurements at ML1 and ML2 to account for façade reflections.
- 3.2.3 Weather conditions have been reviewed throughout the monitoring period and data removed at times where the weather conditions could influence the measurements.

3.2.4 Following the removal of the aforementioned data, all data reported in this assessment report is based on the reduced dataset.

3.2.5 The results for ML1 and ML2 are presented in **Table 4**.

Table 4: Average Measured Daytime / Night-time Noise Levels				
Monitoring Location	Time	Measured Noise Level		
		dB $L_{Aeq,16hour}$ / $L_{Aeq,8hour}$	dB $L_{Aeq,1hour}$ / $L_{Aeq,15mins}$	dB $L_{A90,1hour}$ / $L_{A90,15mins}$
ML1	07:00-23:00	65.8 – 67.9	64.7 – 68.7	47.7 – 62.0
	23:00-07:00	61.0	43.9 – 67.0	25.0 – 52.1
ML2	07:00-23:00	51.9 – 53.5	51.4 – 55.8	39.7 – 47.5
	23:00-07:00	45.0	36.4 – 49.9	25.7 – 39.3

4 SITE NOISE RISK ASSESSMENT

- 4.1.1 Given the location of ML1 and ML2, it is reasoned that these locations represent the noise levels at the development site. Therefore, measured noise levels are adopted for the assessment and a 3D model of the site is not considered necessary.
- 4.1.2 Further to the measured results, the worst case predicted noise levels during the daytime and night-time periods have been colour coded in **Figure 6** and should be read in conjunction with **Table 5**.

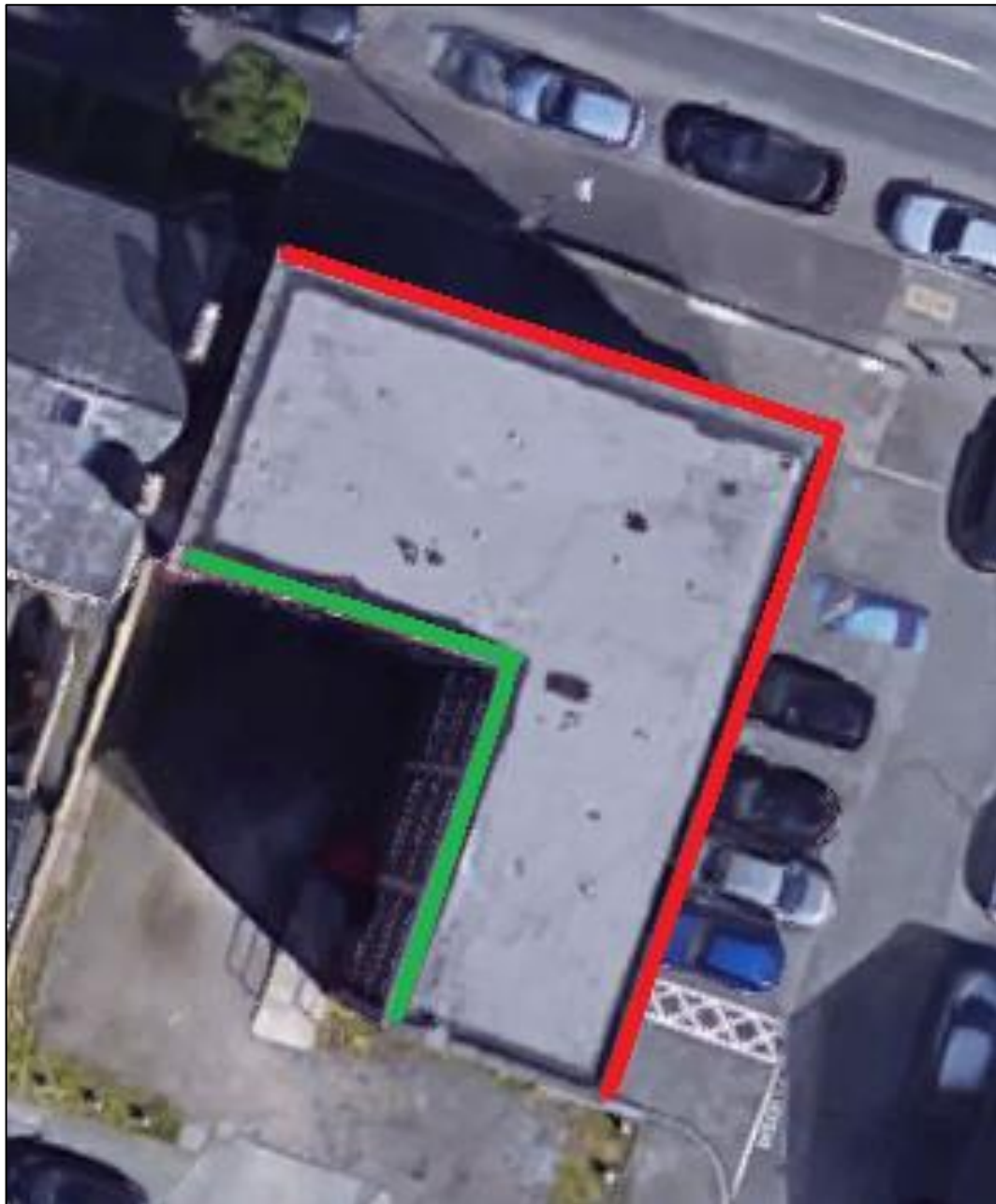


Figure 6: Colour coded plan view of the proposed development site

- 4.1.3 The measured noise levels at the façades of the existing building structure for the daytime and night-time period, together with the level of attenuation required to comply with the local authorities comments included in section 1 are presented in **Table 5**.

Table 5: Level of Attenuation Required to Achieve the Internal Noise Guideline Levels.			
Façade	Daytime ($L_{Aeq,16hours}$) / Night-Time ($L_{Aeq,8hours}$)	Worst Case Noise Level at the Façade of the Property	Worst Case Level of Attenuation Required
Red	Daytime $L_{Aeq,16hours}$	68	33*
	Night-Time $L_{Aeq,8hours}$	61	31
Green	Daytime $L_{Aeq,16hours}$	54	19*
	Night-Time $L_{Aeq,8hours}$	45	15
*Indicates the worst case façade noise levels at each façade colour			

5 SOUND INSULATION SCHEME

5.1 Building Envelope Requirements – Windows Closed

- 5.1.1 Proposals for the development site at the time of writing outline residential use, specifically in the form of dwellings covering three storeys of the development site. The proposed layout is presented in **Appendix B**.
- 5.1.2 Noise sensitive rooms are proposed to all facades colour coded in **Figure 6**. Therefore, internal noise levels required in accordance with the comments are as follows:
- 35 dB $L_{Aeq,16\text{ hour}}$ in the bedrooms with windows shut and other means of ventilation provided between 7 am and 11pm;
 - 30dB $L_{Aeq,8\text{ hour}}$ in the bedrooms with windows shut and other means of ventilation provided between 11pm and 7am;
 - 35 dB $L_{Aeq16\text{ hour}}$ in the living room/s with windows shut and other means of ventilation provided between 7 am and 11pm;
 - 40dB $L_{Aeq16\text{ hour}}$ in other habitable rooms with windows shut and other means of ventilation provided at all times.
- 5.1.3 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, i.e., trickle ventilation.
- 5.1.4 Based on the design details forwarded, worst case façade attenuation calculations have been conducted based on a typical bedroom / living room from the drawings and in accordance with BS EN ISO 12354-3:2017.
- 5.1.5 Initial investigations indicate that the roof specification provided in the documentation received at the time of writing does not attenuate the incident noise levels such that the internal noise levels on the second floor comply with the EHOs comments.
- 5.1.6 The sound insulation scheme is therefore based on roof modifications that are presented in the recommendations section of this report.

-
- 5.1.7 Calculations indicate that to achieve a reasonable internal acoustic environment in habitable rooms as specified in the EHOs comments, the building envelope constructions should be selected to meet the sound reduction index (SRI) values presented in **Table 6**.

Table 6: Summary of Building Envelope Performance Requirements

All facades	Walls	59 $R_w + C_{tr}$	Typical example: Soundbloc2 no. layers of 15mm soundbloc on 75mm cavity frame with 75mm fibreglass insulation (10 Kg / m ³). Double leaf, 110mm brickwork.
Red facade	Secondary Glazing	40 $R_w + C_{tr}$	Typical Example: 4:12:4 mm + secondary glazing 25mm void and 8mm glass
Green facade		27 $R_w + C_{tr}$	Existing glazing as advised in documentation provided at time of writing + secondary glazing 25mm void and 6.8 mm glass achieving sound reduction index presented in Table 7 .
Throughout	Roof	61 $R_w + C_{tr}$	Typical Example: 1 x 18.0 mm plywood, cavity: Solid joist stud spacing 600 mm, infill fibreglass (10kg / m ³) thickness 300 mm, 1 x 15mm gyproc soundbloc. Secondary ceiling: separate joists, stud spacing 600 mm, infill 150 mm thick rockwool (120 Kg / m ³), 2 x 15 mm Gyproc soundbloc finish.

Table 7: Required sound insulation per octave band for 6.8mm glazing specified for the green facade

Building Element	Sound Insulation Spectrum (dB)						$R_w + C_{tr}$
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
6.8mm single glazing	22	26	31	37	40	40	32

- 5.1.8 Given the importance placed on the secondary glazing system as a contribution to the façade insulation, it is highly recommended that the secondary glazing is installed by a reputable and experienced contractor.
- 5.1.9 It should be noted that this sound insulation scheme is based on the assumed existing glazing specification provided at the time of writing. Should the existing glazing differ from this assumption the sound insulation across the façade is likely to change and may potentially invalidate the assessment.
- 5.1.10 The above scheme is based on the existing façade and roof being free from sound insulation weakness. For example, gaps in the roof or façade due to damage or existing services penetrating can create weaknesses across the building envelope.

5.2 Ventilation Requirements

- 5.2.1 The implementation of the recommended glazing together with appropriate ventilation would ensure that the required internal daytime and night-time noise limits are achieved.

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- 5.2.2 As detailed in the EHOs comments, required ventilation should be assessed with windows in the closed position. It should be noted however that ventilation requirements for future occupants of the proposed development are outside the scope of this report.
- 5.2.3 Given the comments indicate the requirement for an assessment with windows in the closed position, an active ventilation in the form of MVHR is recommended throughout the development which complies with NR25 L_{eq} noise rating curve
- 5.2.4 It should be further noted that the glazing and ventilation 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 RECOMMENDATIONS

6.1 Roof Detail

- 6.1.1 Initial investigations into the sound insulation achieved by the roof specification provided at the time of writing indicates that it does not achieve the requirements to provide an internal noise level on second floor that complies with the EHOs comments. It is therefore considered necessary to recommend modifications.
- 6.1.2 As stated in the introduction the documentation provided at the time of writing indicates the existing ceiling on second floor to be overboarded with 12.5mm duplex with insulation in roof void consisting of 2 no. layers of 150mm thick glass fibre insulation.
- 6.1.3 Recommended modifications to that provided are as follows:
- Secondary ceiling, separate joists, stud spacing 600mm 150mm thick rockwool insulation, 2 no. layers of 15mm thick Gyproc soundbloc finish
- 6.1.4 The recommended modifications to the roof have been modelled in Insul 8.0 and are presented in **Figure 7** and indicate a sound reduction performance of 61 dB $R_w + C_{tr}$.

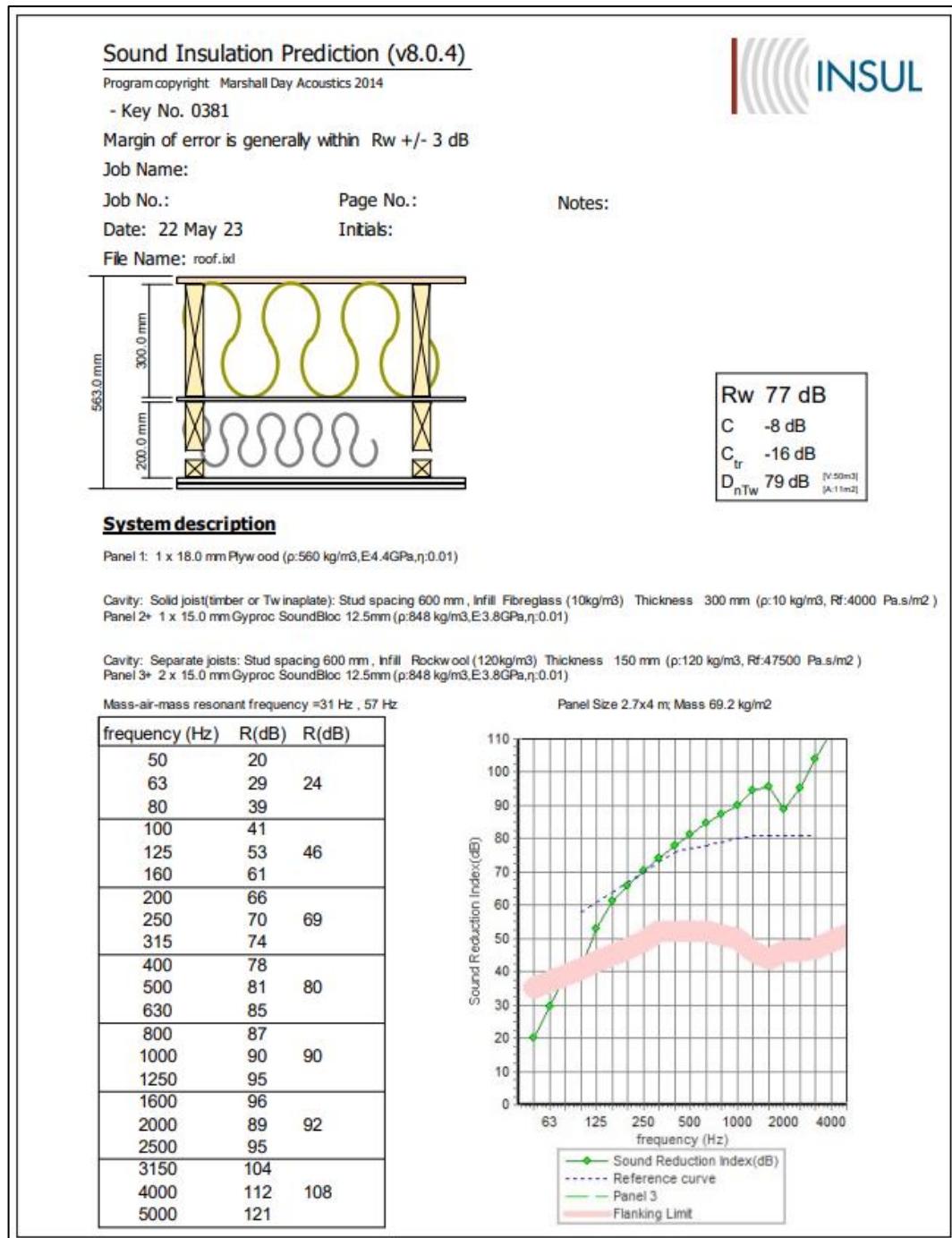


Figure 7: Insul 8.0 model of the recommended roof modifications

6.2 Post Completion Recommendations

- 6.2.1 Given the comments state that validation testing is conducted prior to occupation, it is recommended that a post-completion noise survey is conducted to verify that the required noise levels have been achieved.

7 CONCLUSIONS

- 7.1.1 NoiseAir has conducted a noise impact assessment with respect to the proposed development at the location: Acorn House, 115 Spotland Road, Rochdale OL12 6PJ.
- 7.1.2 Building performance requirements with windows in the closed position are based on the glazing and roof design as presented in section 5, the designs are summarised as follows:
- Red façade – secondary glazing system achieving at least 40 dB $R_W + C_{tr}$ with an active ventilation system achieving NR25 L_{eq} noise rating curve.
 - Green façade – existing glazing system achieving at least 27 dB $R_W + C_{tr}$ with an active ventilation system achieving NR25 L_{eq} noise rating curve.
 - Roof – modified as presented in **Figure 7** which indicates a sound reduction performance of 61 dB $R_W + C_{tr}$.
- 7.1.3 A sound insulation test has been recommended on completion of the refurbishment and prior to occupation in order to ensure that the building envelope achieves the sound reduction such that the internal noise levels comply with the EHOs comments.

APPENDIX A - REPORT LIMITATIONS

This Report is presented to Bharya Design & Build Consultancy Limited 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 Bharya Design & Build Consultancy Limited 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.

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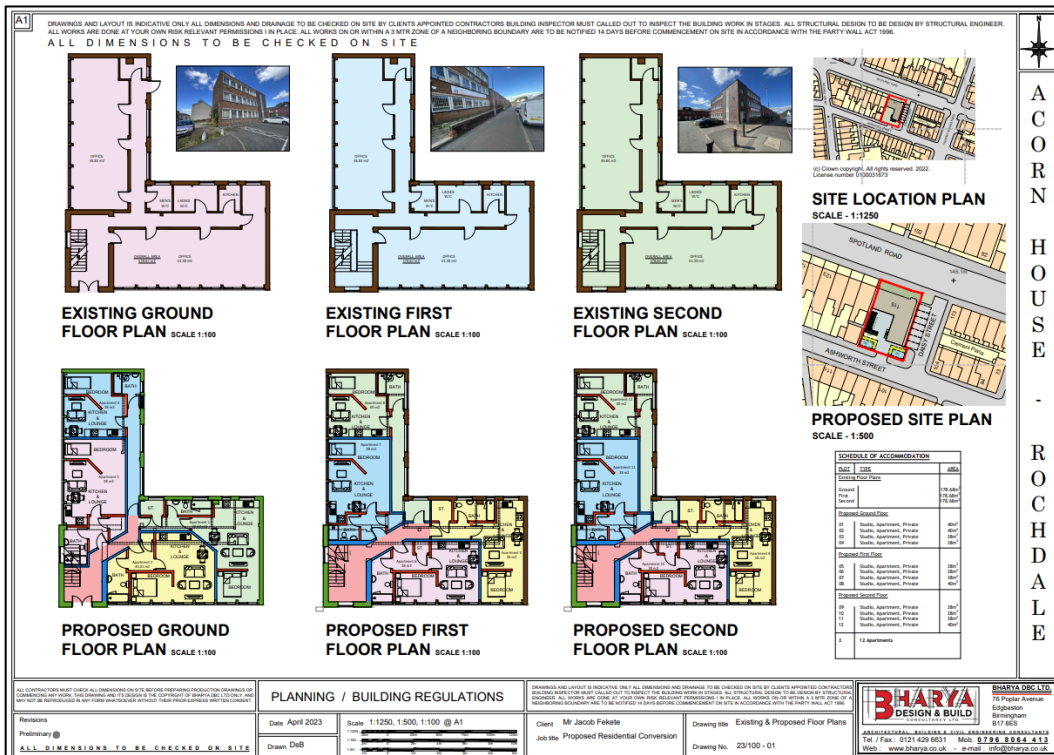
The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from who it has been requested and that such information is accurate. Information obtained by NoiseAir Limited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

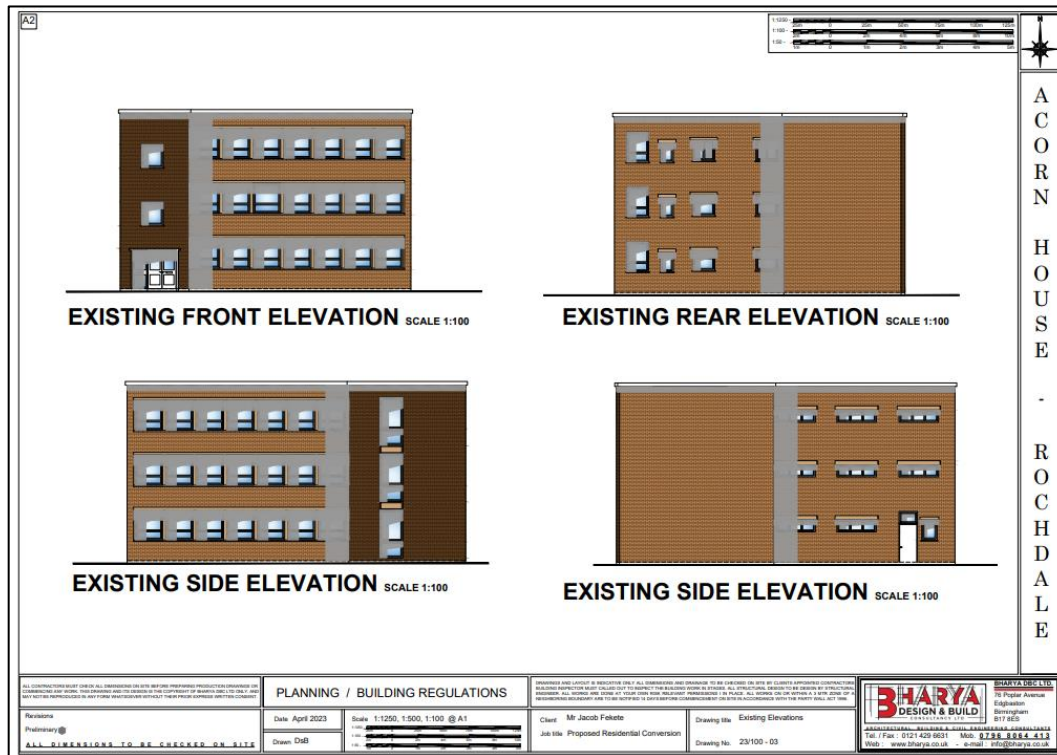
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Where / if estimates and projects are made within this report, are made based on reasonable assumptions as of the date of this report, such statements however by their very nature involve risks and uncertainties that could cause actual results to differ 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 – EXISTING AND PROPOSED DRAWINGS





APPENDIX C – MEASURED DATA

ML1

Start Date	Start Time	Duration	L_{Aeq}	L_{AFMax}	L_{A90}
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB		dB
16/05/2023	10:15:00	00:15:00	70.4	81.9	61.8
16/05/2023	10:30:00	00:15:00	69.8	77.2	62.3
16/05/2023	10:45:00	00:15:00	69.6	78.6	59.1
16/05/2023	11:00:00	00:15:00	70.1	84.9	62.3
16/05/2023	11:15:00	00:15:00	70.5	94.9	60.2
16/05/2023	11:30:00	00:15:00	69.3	77.6	63.2
16/05/2023	11:45:00	00:15:00	70.2	79.7	60.8
16/05/2023	12:00:00	00:15:00	69.8	84.2	62.5
16/05/2023	12:15:00	00:15:00	69.4	79.9	62.4
16/05/2023	12:30:00	00:15:00	69.7	83.6	61.4
16/05/2023	12:45:00	00:15:00	69.6	78.0	63.9
16/05/2023	13:00:00	00:15:00	69.8	78.3	64.3
16/05/2023	13:15:00	00:15:00	68.9	76.8	62.4
16/05/2023	13:30:00	00:15:00	69.4	77.9	62.5
16/05/2023	13:45:00	00:15:00	70.1	81.4	62.2
16/05/2023	14:00:00	00:15:00	69.3	76.2	60.5
16/05/2023	14:15:00	00:15:00	69.3	81.7	63.8
16/05/2023	14:30:00	00:15:00	69.4	86.0	63.4
16/05/2023	14:45:00	00:15:00	69.4	76.4	63.6
16/05/2023	15:00:00	00:15:00	69.4	80.2	64.1
16/05/2023	15:15:00	00:15:00	69.1	83.9	61.3
16/05/2023	15:30:00	00:15:00	72.4	98.0	63.6
16/05/2023	15:45:00	00:15:00	70.1	82.2	63.9
16/05/2023	16:00:00	00:15:00	70.2	86.0	64.3
16/05/2023	16:15:00	00:15:00	70.0	77.4	63.7
16/05/2023	16:30:00	00:15:00	69.5	81.4	64.0
16/05/2023	16:45:00	00:15:00	69.8	78.1	64.6
16/05/2023	17:00:00	00:15:00	70.0	79.7	63.5
16/05/2023	17:15:00	00:15:00	69.6	77.2	62.0
16/05/2023	17:30:00	00:15:00	70.8	84.0	64.0
16/05/2023	17:45:00	00:15:00	70.7	78.9	65.1
16/05/2023	18:00:00	00:15:00	70.4	77.9	64.2
16/05/2023	18:15:00	00:15:00	70.7	83.1	64.1
16/05/2023	18:30:00	00:15:00	71.0	83.2	64.7
16/05/2023	18:45:00	00:15:00	70.2	81.6	62.2
16/05/2023	19:00:00	00:15:00	70.0	80.2	61.6
16/05/2023	19:15:00	00:15:00	70.6	87.6	58.2
16/05/2023	19:30:00	00:15:00	70.6	82.6	61.4
16/05/2023	19:45:00	00:15:00	70.5	84.7	61.2
16/05/2023	20:00:00	00:15:00	69.3	77.3	58.3
16/05/2023	20:15:00	00:15:00	69.4	81.1	58.5
16/05/2023	20:30:00	00:15:00	69.7	77.8	58.5
16/05/2023	20:45:00	00:15:00	68.2	77.0	54.5
16/05/2023	21:00:00	00:15:00	68.9	76.6	57.0
16/05/2023	21:15:00	00:15:00	68.8	84.0	54.9
16/05/2023	21:30:00	00:15:00	68.2	82.7	54.5

Start Date	Start Time	Duration	L_{Aeq}	L_{AFMax}	L_{A90}
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB		dB
16/05/2023	21:45:00	00:15:00	67.3	78.8	54.6
16/05/2023	22:00:00	00:15:00	68.2	77.2	55.0
16/05/2023	22:15:00	00:15:00	67.5	81.1	52.0
16/05/2023	22:30:00	00:15:00	67.4	79.0	52.3
16/05/2023	22:45:00	00:15:00	67.8	81.2	43.6
16/05/2023	23:00:00	00:15:00	67.2	79.0	46.2
16/05/2023	23:15:00	00:15:00	66.1	79.0	40.5
16/05/2023	23:30:00	00:15:00	64.9	82.2	40.1
16/05/2023	23:45:00	00:15:00	63.3	78.0	39.4
17/05/2023	00:00:00	00:15:00	64.7	79.2	37.3
17/05/2023	00:15:00	00:15:00	62.7	78.0	37.2
17/05/2023	00:30:00	00:15:00	62.2	82.3	35.2
17/05/2023	00:45:00	00:15:00	62.2	82.9	34.3
17/05/2023	01:00:00	00:15:00	64.1	94.2	34.6
17/05/2023	01:15:00	00:15:00	60.2	75.8	33.4
17/05/2023	01:30:00	00:15:00	61.8	77.7	29.4
17/05/2023	01:45:00	00:15:00	61.0	78.0	30.7
17/05/2023	02:00:00	00:15:00	59.4	75.0	28.8
17/05/2023	02:15:00	00:15:00	57.1	74.0	28.1
17/05/2023	02:30:00	00:15:00	56.1	76.3	28.1
17/05/2023	02:45:00	00:15:00	57.1	75.9	28.0
17/05/2023	03:00:00	00:15:00	57.3	75.2	28.1
17/05/2023	03:15:00	00:15:00	56.5	72.9	28.6
17/05/2023	03:30:00	00:15:00	59.0	79.6	28.6
17/05/2023	03:45:00	00:15:00	56.5	73.0	29.0
17/05/2023	04:00:00	00:15:00	46.9	66.3	29.9
17/05/2023	04:15:00	00:15:00	59.9	76.7	35.9
17/05/2023	04:30:00	00:15:00	59.4	77.5	35.6
17/05/2023	04:45:00	00:15:00	63.2	85.5	36.4
17/05/2023	05:00:00	00:15:00	62.5	80.7	37.0
17/05/2023	05:15:00	00:15:00	61.8	76.5	37.6
17/05/2023	05:30:00	00:15:00	65.4	79.8	39.2
17/05/2023	05:45:00	00:15:00	67.2	79.2	42.4
17/05/2023	06:00:00	00:15:00	67.2	79.2	42.6
17/05/2023	06:15:00	00:15:00	67.2	78.1	43.7
17/05/2023	06:30:00	00:15:00	69.9	84.3	49.4
17/05/2023	06:45:00	00:15:00	70.0	83.4	55.1
17/05/2023	07:00:00	00:15:00	71.2	80.8	56.1
17/05/2023	07:15:00	00:15:00	71.7	80.3	63.2
17/05/2023	07:30:00	00:15:00	72.4	82.0	65.6
17/05/2023	07:45:00	00:15:00	71.4	80.8	65.9
17/05/2023	08:00:00	00:15:00	71.3	79.6	65.3
17/05/2023	08:15:00	00:15:00	70.8	82.9	64.7
17/05/2023	08:30:00	00:15:00	69.9	84.2	64.4
17/05/2023	08:45:00	00:15:00	70.8	83.9	65.5
17/05/2023	09:00:00	00:15:00	70.7	83.3	64.2
17/05/2023	09:15:00	00:15:00	70.2	78.3	62.6
17/05/2023	09:30:00	00:15:00	69.9	78.3	63.8
17/05/2023	09:45:00	00:15:00	69.8	76.5	62.2

ML2

Start Date	Start Time	Duration	L_{Aeq}	L_{AFMax}	L_{A90}
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB		dB
16/05/2023	10:30:00	00:15:00	54.9	69.1	50.0
16/05/2023	10:45:00	00:15:00	54.3	79.5	48.2
16/05/2023	11:00:00	00:15:00	55.0	70.3	49.9
16/05/2023	11:15:00	00:15:00	56.2	76.0	49.2
16/05/2023	11:30:00	00:15:00	53.9	67.6	49.4
16/05/2023	11:45:00	00:15:00	55.0	71.1	49.7
16/05/2023	12:00:00	00:15:00	55.5	72.9	50.2
16/05/2023	12:15:00	00:15:00	54.4	72.3	49.7
16/05/2023	12:30:00	00:15:00	55.1	72.9	49.1
16/05/2023	12:45:00	00:15:00	53.7	65.1	50.5
16/05/2023	13:00:00	00:15:00	54.2	70.1	50.5
16/05/2023	13:15:00	00:15:00	54.7	72.4	49.7
16/05/2023	13:30:00	00:15:00	54.7	68.8	50.4
16/05/2023	13:45:00	00:15:00	54.7	70.1	49.1
16/05/2023	14:00:00	00:15:00	53.4	63.5	49.0
16/05/2023	14:15:00	00:15:00	55.5	74.4	49.9
16/05/2023	14:30:00	00:15:00	57.4	76.7	51.1
16/05/2023	14:45:00	00:15:00	55.9	74.7	50.7
16/05/2023	15:00:00	00:15:00	56.5	73.6	51.7
16/05/2023	15:15:00	00:15:00	56.7	76.8	49.9
16/05/2023	15:30:00	00:15:00	56.3	74.7	51.3
16/05/2023	15:45:00	00:15:00	56.2	79.4	51.1
16/05/2023	16:00:00	00:15:00	55.4	73.6	50.9
16/05/2023	16:15:00	00:15:00	55.9	69.8	51.2
16/05/2023	16:30:00	00:15:00	56.1	75.0	50.8
16/05/2023	16:45:00	00:15:00	56.6	77.9	51.9
16/05/2023	17:00:00	00:15:00	55.7	74.9	50.8
16/05/2023	17:15:00	00:15:00	55.9	70.3	50.6
16/05/2023	17:30:00	00:15:00	57.0	79.1	51.9
16/05/2023	17:45:00	00:15:00	56.9	75.5	51.7
16/05/2023	18:00:00	00:15:00	57.1	78.6	50.5
16/05/2023	18:15:00	00:15:00	55.6	73.8	50.8
16/05/2023	18:30:00	00:15:00	56.4	72.0	50.8
16/05/2023	18:45:00	00:15:00	55.6	79.9	49.4
16/05/2023	19:00:00	00:15:00	55.0	73.1	49.4
16/05/2023	19:15:00	00:15:00	56.2	73.0	49.0
16/05/2023	19:30:00	00:15:00	58.9	80.5	50.6
16/05/2023	19:45:00	00:15:00	56.8	76.1	50.2
16/05/2023	20:00:00	00:15:00	55.9	77.1	49.3
16/05/2023	20:15:00	00:15:00	62.0	88.3	50.5
16/05/2023	20:30:00	00:15:00	55.2	75.6	48.8
16/05/2023	20:45:00	00:15:00	58.4	79.6	47.8
16/05/2023	21:00:00	00:15:00	57.0	80.5	48.4
16/05/2023	21:15:00	00:15:00	52.7	69.2	45.8
16/05/2023	21:30:00	00:15:00	51.1	68.8	44.9
16/05/2023	21:45:00	00:15:00	55.1	72.5	45.5

Start Date	Start Time	Duration	L_{Aeq}	L_{AFMax}	L_{A90}
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB		dB
16/05/2023	22:00:00	00:15:00	52.1	68.5	43.8
16/05/2023	22:15:00	00:15:00	59.2	78.2	43.3
16/05/2023	22:30:00	00:15:00	54.5	72.4	43.5
16/05/2023	22:45:00	00:15:00	51.6	69.9	40.0
16/05/2023	23:00:00	00:15:00	50.8	67.8	41.1
16/05/2023	23:15:00	00:15:00	49.2	69.1	36.6
16/05/2023	23:30:00	00:15:00	48.6	64.4	38.0
16/05/2023	23:45:00	00:15:00	52.8	82.4	35.0
17/05/2023	00:00:00	00:15:00	48.1	64.4	35.9
17/05/2023	00:15:00	00:15:00	47.7	64.3	33.3
17/05/2023	00:30:00	00:15:00	49.0	69.3	31.0
17/05/2023	00:45:00	00:15:00	46.0	69.4	31.6
17/05/2023	01:00:00	00:15:00	48.2	69.8	31.5
17/05/2023	01:15:00	00:15:00	46.8	66.8	30.6
17/05/2023	01:30:00	00:15:00	44.5	60.2	29.7
17/05/2023	01:45:00	00:15:00	42.9	58.7	29.4
17/05/2023	02:00:00	00:15:00	43.2	60.7	29.4
17/05/2023	02:15:00	00:15:00	43.4	67.2	29.1
17/05/2023	02:30:00	00:15:00	40.8	55.9	29.5
17/05/2023	02:45:00	00:15:00	39.5	58.9	29.6
17/05/2023	03:00:00	00:15:00	41.1	57.9	29.9
17/05/2023	03:15:00	00:15:00	39.5	56.5	29.6
17/05/2023	03:30:00	00:15:00	44.0	68.0	28.7
17/05/2023	03:45:00	00:15:00	39.4	55.1	29.8
17/05/2023	04:00:00	00:15:00	46.6	61.4	30.1
17/05/2023	04:15:00	00:15:00	47.3	63.2	33.4
17/05/2023	04:30:00	00:15:00	46.1	63.5	32.3
17/05/2023	04:45:00	00:15:00	46.0	65.8	32.4
17/05/2023	05:00:00	00:15:00	44.1	62.2	32.3
17/05/2023	05:15:00	00:15:00	49.4	73.8	34.0
17/05/2023	05:30:00	00:15:00	48.0	60.3	35.0
17/05/2023	05:45:00	00:15:00	50.2	66.5	35.4
17/05/2023	06:00:00	00:15:00	50.7	68.9	36.3
17/05/2023	06:15:00	00:15:00	49.9	59.5	36.8
17/05/2023	06:30:00	00:15:00	52.9	65.5	41.4
17/05/2023	06:45:00	00:15:00	52.4	64.6	42.3
17/05/2023	07:00:00	00:15:00	54.1	68.5	44.8
17/05/2023	07:15:00	00:15:00	54.4	64.7	48.5
17/05/2023	07:30:00	00:15:00	55.5	73.8	50.8
17/05/2023	07:45:00	00:15:00	55.3	74.1	49.6
17/05/2023	08:00:00	00:15:00	56.8	78.3	50.7
17/05/2023	08:15:00	00:15:00	54.3	67.2	49.5
17/05/2023	08:30:00	00:15:00	55.3	70.4	49.7
17/05/2023	08:45:00	00:15:00	55.2	67.9	50.6
17/05/2023	09:00:00	00:15:00	54.4	67.5	49.1
17/05/2023	09:15:00	00:15:00	53.6	69.5	47.3
17/05/2023	09:30:00	00:15:00	54.1	65.5	50.3
17/05/2023	09:45:00	00:15:00	55.3	69.5	50.1

APPENDIX D - 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. <i>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.</i>
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. <i>NOTE: The ambient sound comprises the residual sound and the specific sound when present.</i>
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 <i>NOTE: The ambient sound level is a measure of the residual sound and the specific sound when present.</i>
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. <i>NOTE: The reference values used within the C_{tr} calculation are based on urban traffic noise.</i>
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 (m ²), 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. <i>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.</i>
Free-field level	Sound pressure level away from reflecting surfaces. <i>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.</i>

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. <i>NOTE: The location(s) within the room at which the ambient indoor noise is to be measured or calculated ought to be considered.</i>
Measurement time interval, T_m (BS 4142:2014)	Total time over which measurements are taken. <i>NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.</i>
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. <i>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.</i>
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. <i>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.</i>
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_{A,r,T_r}	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise. <i>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.</i>
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, that 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, $L_s = L_{Aeq,T_r}$ (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.
Groundborne 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. <i>NOTE Common sources of ground-borne noise include railways and heavy construction work on adjacent construction sites.</i>
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. <i>NOTE Common sources of structure-borne noise include building services plant, manufacturing machinery and construction or demolition of the structure.</i>
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. <i>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).</i>
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,T_r}	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)
$L_{Aeq,T}$	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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