PEAK acoustics



Post Completion Validation

Client:	Jason Taft
Site:	Flying Horse Inn, 130 Ashbourne Road, Leek
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Project Consultant

J. Parrott BEng (Hons) AMIOA
Acoustic Consultant
jack@acousticsurveys.co.uk

Proofing Consultant

T. Brown BSc (Hons) MIOA
Acoustic Consultant
tom@acousticsurveys.co.uk

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1. Introduction

1.1. Assessment Summary

A Post Completion Validation Assessment has been conducted at the Flying Horse Inn, 130 Ashbourne Road, Leek, Staffordshire, to validate whether internal noise levels in habitable rooms are within the given criteria of Staffordshire Moorlands District Council in the decision notice for the application.

The proposal is for the demolition of a public house and the erection of 5no. dwellings.

1.2. Planning Conditions

The applicant received conditional planning approval, Application No: SMD/2021/0266 on the 7th of September 2021 from Staffordshire Moorlands District Council. The following planning condition requires discharging:

> *"20. Except for works of site clearance and demolition, no development hereby permitted shall take place until a site specific noise assessment and scheme for protecting the proposed residential units for that phase of the site from external noise has been submitted to and approved in writing by the Local Planning Authority. The submitted scheme shall have due regard for the British Standard 8233:2014 (Sound insulation and noise reduction for buildings) and be designed to achieve noise levels of less than 30 dB LAeq in bedrooms (23:00 to 07:00), 35dB Laeq in bedrooms 07:00 to 23:00), less than 40 dBLAeq in living areas and less than 55 dB Laeq in outdoor living areas.*
>
> *Pre-completion tests shall be carried out to verify compliance with this condition. A report shall be produced containing all raw data and showing how calculations have been made. No dwelling within the development hereby permitted shall be occupied until the approved works to that dwelling have been completed in accordance with the approved details.*
>
> *Reason:- To protect the amenity of future occupiers"*

1.3. Assessment Guidance Documentation

Guidance on the assessment and design criteria will be drawn from BS8233:2014 - *Guidance on sound insulation and noise reduction for buildings.* Table 4 in Section 7.7.2 of this standard suggests indoor ambient noise levels for dwellings.

Additional guidance will be drawn from 'ProPG: Planning & Noise' which was published *"to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England."*

2. Internal Noise Survey

2.1. Survey Measurement

To validate the internal noise levels an unattended noise survey was undertaken at the site for approximately 24 hours from the 24th to the 25th of April 2023.

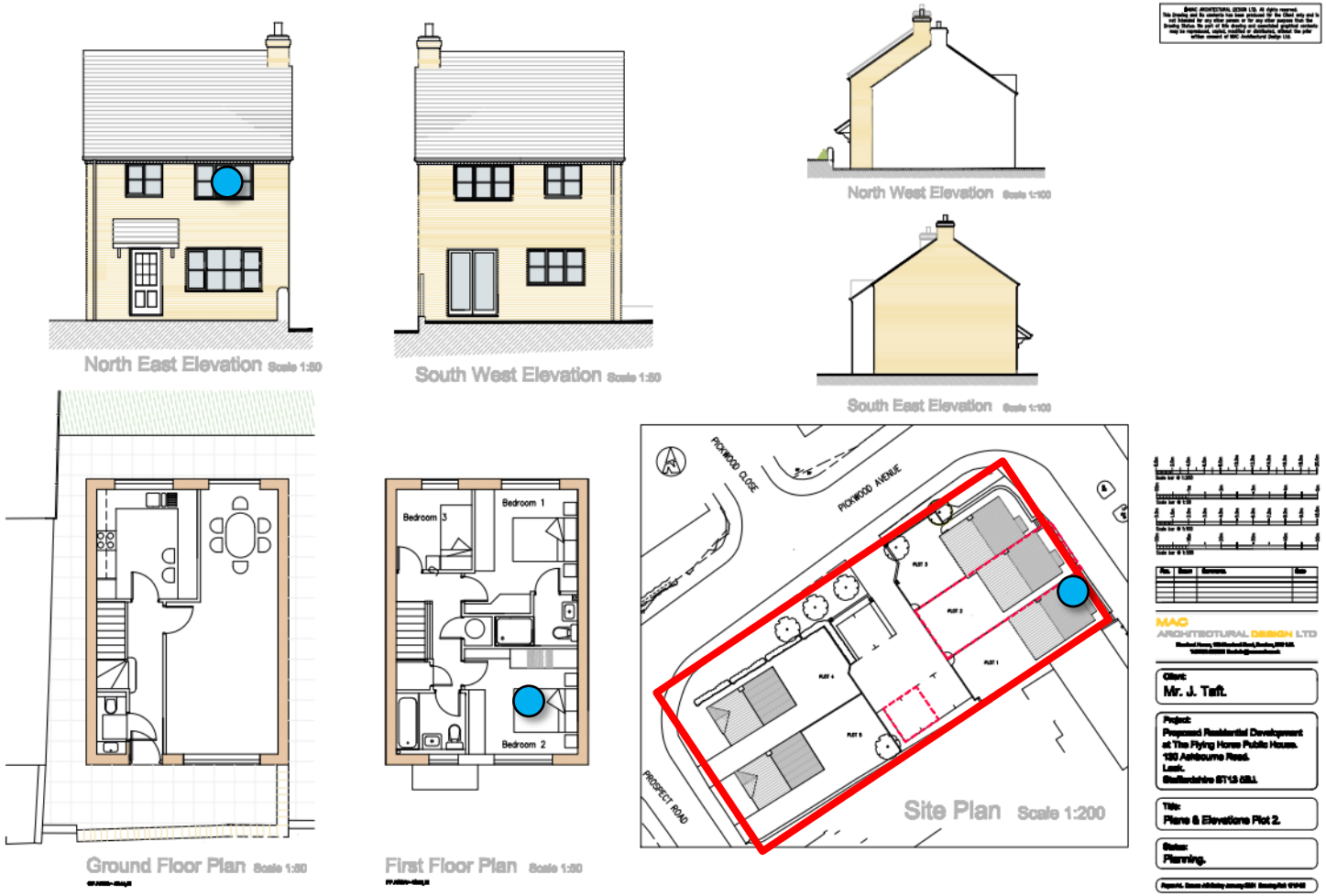
The sound level meter was positioned on the first floor 'Bedroom 2' in the 'Plot 1' dwelling at approximately 1.4 metres from the floor and an equal distance from the surrounding walls. The room was finished but not furnished at the time of the survey. Doors, skirting boards and carpets were all fitted in the room as well as electrical plug sockets and light fixtures.

Measurements of $L_{Aeq,T}$ and L_{AFmax} were logged in 5- minute intervals in accordance with the provisions of BS7445 - *'Description and Measurement of Environmental Noise'*.

The noise climate affecting the proposed development is mainly road noise from the adjacent A523, a road network between Leek and Ashbourne. A high volume of all vehicle types was observed during the consultant's time on site. Noise from ongoing construction internally and externally was also noted during the site visit.

The monitoring location is shown on the site plan below in **Figure 1**.

Figure 1: Site & Measurement Locations, Site Plan provided by 'MAC Architectural Design Ltd'



Monitoring Location (M1)

Site Boundary (Approx.)

2.2. Weather Conditions

Daytime temperatures of between 0 - 9°C were noted during the survey with negligible winds. Detailed weather conditions are given in **Appendix C**.

2.3. Measurement Equipment

Measurement equipment complies with accuracy requirements for common environmental noise measurement standards. Equipment was calibrated before and after use and no significant drift occurred during measurements. Up-to-date calibration certification can be provided upon request. A detailed equipment list is given in **Appendix B** with calibration information in **Appendix D**.

3. Internal Noise Levels

3.1. Design Criteria

In line with the Council Comments given in Section 1.2, BS8233:2014 - *Guidance on sound insulation and noise reduction for buildings*, Table 4, Section 7.7.2., will be used as the indoor criteria assessment levels.

In the case of individual noise events (L_{AFmax} events), additions of ProPG state the following:

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

The criteria values for the assessment are summarised below.

Table 1. – Indoor Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$
Sleeping	Bedroom	-	45 dB L_{AFmax}

The installed specification of the assessed first-floor Bedroom is given in the table below.

Table 2. – Glazing & Ventilation Scheme

Internal Space	Glazing		Ventilation	
	Assumed Performance[1] R_w *(+*C_{tr}*)*	*Specification*[2]	*Minimum Performance* $D_{ne,w}$ *+*C_{tr} *(Open)*	*Specification*
Bedroom	34 (29)	*4 / 20 / 4*	32	*Hit & Miss Trickle Vent*

[1] *The sound insulation value of the glazing should take into account the glass as well as the frame and perimeter seal.*

[2] *Example glazing specification format given as 'XXmm Float / 16mm Air gap / XXmm Float'*

4. Internal Noise Levels

The measured internal noise levels in the first-floor Bedroom are given below.

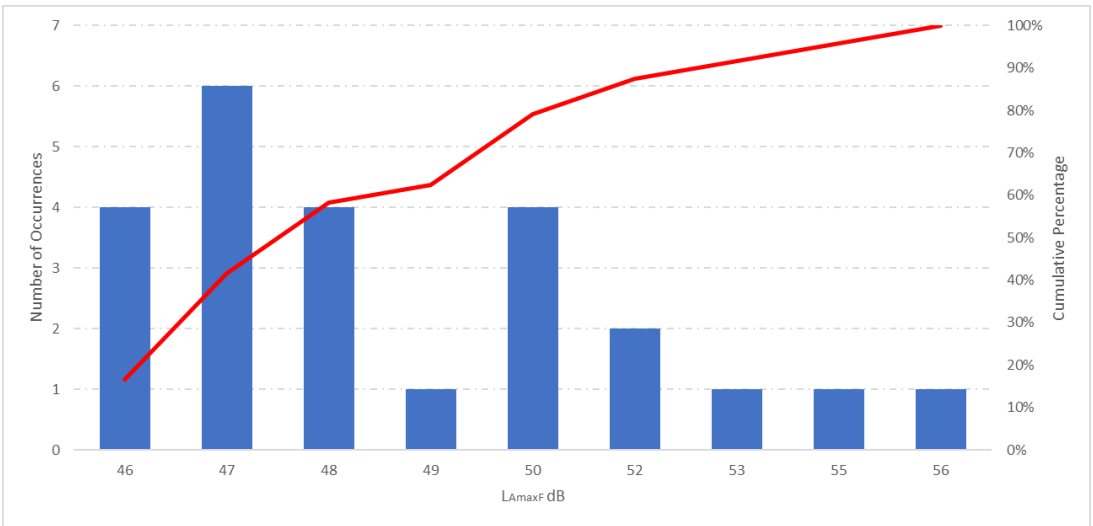
Table 3. – Internal Noise Levels

Internal Space	Noise Parameter	Internal Noise Level (dB)	Within Design Criteria?
Bedroom	Daytime $L_{Aeq,16hr}$	33	Yes
	Night-time $L_{Aeq,\ 8hr}$	26	Yes
	Night-time $L_{Amax\ F}$	52	No

With the implementation of the sound insulation scheme given in **Table 2**, the internal noise levels were measured to be at or below L_{Aeq} criteria for both the day and night-time periods.

The measured L_{AFmax} are noted to be above the limits set out in ProPG. After further analysis of the measurement data, the following graph has been produced.

Table 2. – Internal L_{Amax} measured occurrences



The night-time L_{Amax} levels exceed the guideline level of '*45 dB $L_{Amax,F}$ 10 times a night*', 24 times over the course of the measurement period. Between 46 – 50 dB $L_{Amax,F}$ the guideline is exceeded **19** times whilst between 51 - 56 dB $L_{Amax,F}$ is exceeded only **5** times.

Whilst considering the above points, this slight deviation from guidelines is deemed acceptable whilst L_{Aeq} levels within the bedroom are measured to be within the criteria for both the day and night-time periods set out by the local authority and BS8233.

Some additional $L_{Amax,F}$ attenuation could be assumed when all rooms within the property are fully finished/furnished.

5. Conclusions

A Post Completion Validation Assessment has been conducted at Flying Horse Inn, 130 Ashbourne Road, Leek, Staffordshire, to validate whether internal noise levels in habitable rooms are within the given criteria of Staffordshire Moorlands District Council in the decision notice for the application.

To validate the internal noise levels an unattended noise survey was undertaken at the site for approximately 24 hours from the 24th to the 25th of April 2023.

Internal noise levels have been measured to be within the guidelines of BS8233 in line with the planning criteria set out by Staffordshire Moorlands District Council.

Additional comments from ProPG stated guidelines of 45 dB $L_{Amax\ F}$ which were measured to be exceeded up to 24 times during the measurement period.

The slight deviation from ProPG guidelines is deemed acceptable whilst L_{Aeq} levels within the bedroom are measured to be within the criteria for both the day and night-time periods set out by the local authority and BS8233.

APPENDIX A – Measurement Details

Measurement(s)	Kit	Start Date	Start Time	End Date	End Time
M1	A3	24/04/2023	11:50	25/04/2023	09:00

APPENDIX B - Equipment Details

Kit	Equipment	Make	Model	Class	Serial Number
A3	Sound Meter	Svantek	971	1	41980
A3	Pre-Amp	Svantek	SV18	1	44331
A3	Microphone	ACO	7052E	1	60249
2	Calibrator	Svantek	SV33	1	83715

APPENDIX C - Meteorology Details

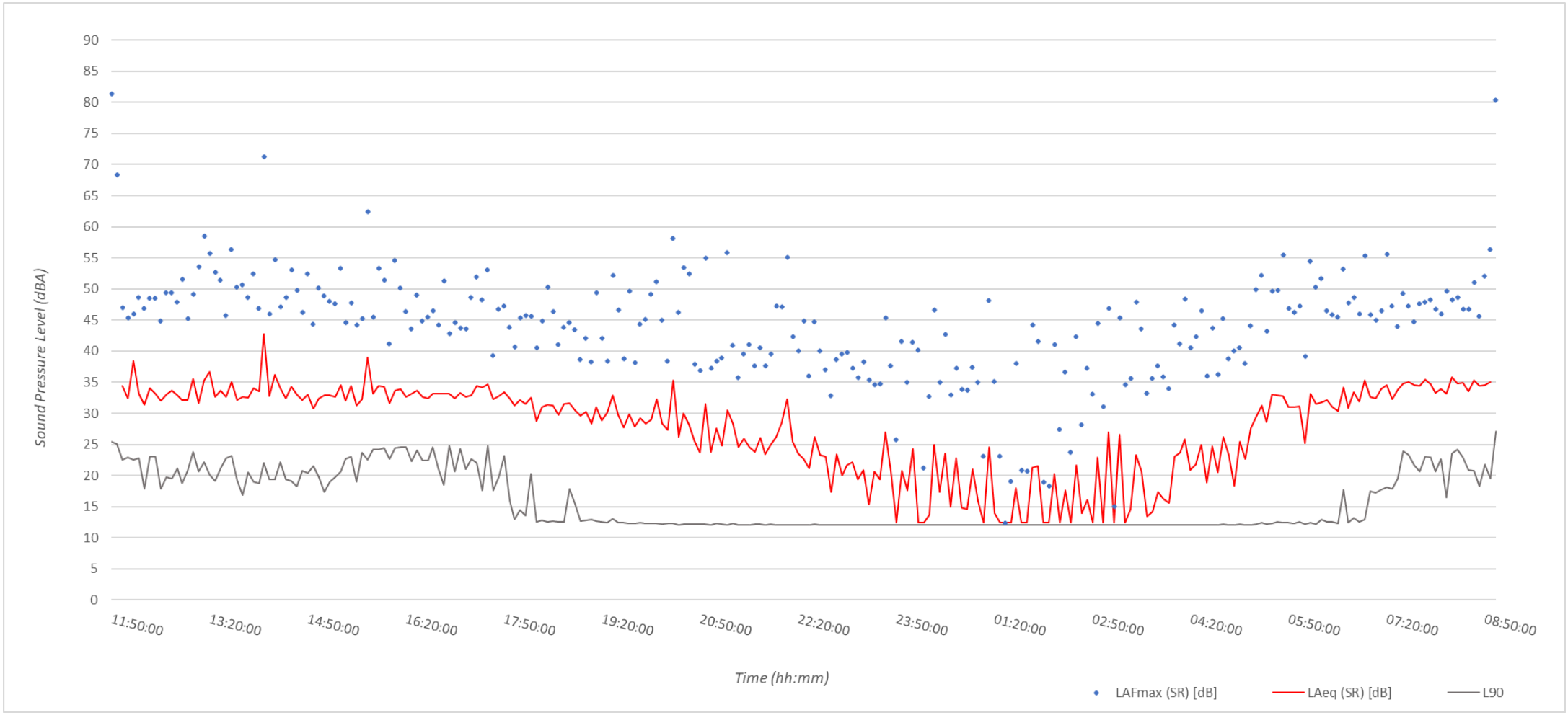
Date	Temp C°	Wind Speed m/s	Wind Direction	Humidity %	Precipitation mm	Cloud Cover (Oktas)
24/04/2023	9	4	NE	67	0.0	2/8
25/04/2023	0	1	N	80	0.0	0/8

APPENDIX D - Calibration Details

Kit	Calibrator Ref Level (dB)	Deviation Before (dB)	Deviation After (dB)
A3	113.8	0.35	0.27

APPENDIX E – Noise Survey Time History

Internal Noise Measurement M1 Time History: 24th – 25th April 2023



APPENDIX F – Installed Technical Specifications

Lymer Doors Ltd - Leek Depot
Unit 5, Lymer Business Park
Barnfield Road
Leek
Staffordshire
ST13 5QG

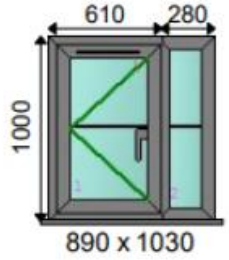
01538 388727

Quotation

To:- Lymer Doors Ltd
Unit 5, Lymer Business Park
Barnfield Road
Leek
Staffordshire
ST13 5QG
Tel: 01538 388727

Quotation Number: **LDL001Q04032**
Customer Ref : **J Taft Flying Horse Plot**

REHAU 70S (EDGE)



Frame Specification:		Additional Frame Details:
Win Handle:	Casement Handle Chrome	NO CYLINDER REQUIRED
Win Hinge:	SH Egress/Easy Cln / TH Std	
Win Lock:	Shoot Bolt Mech.	
Outer:	Edge Large 5 CH Outer Anthracite Grey/Warm White (SF)	
Outer:	Edge Large 5 CH Outer Anthracite Grey/Warm White (LF)	
Cill:	95mm Stub Cill @ 990mm	
Beading:	28mm Ovlo bead Warm White	
Drainage:	Concealed	
Reinforcing:	@15Standard Reinforcing	

Glazing:		Dimensions:	
28mm 4/20/4 Clear Softcoat 1.2 CP V Warm Edge Grey 18mm B2B Spacer Silver Chamfered Astrical Bar (Single) -Argon Gas - Factory Glazed No SHAPE SURCHARGE 20kg Energy Surcharge	436 x 788	Overall Size:	890 x 1030
		Actual Frame Size:	890 x 1000
28mm 4/20/4 Clear Softcoat 1.2 CP V Warm Edge Grey 18mm B2B Spacer Silver Chamfered Astrical Bar (Single) -Argon Gas - Factory Glazed No SHAPE SURCHARGE 20kg Energy Surcharge	202 x 886		

Frame No: 3 Qty: 1 EDGE Large Int Casement FOILED/WHT Anthracite Grey Location: Front Bed L

Kitemark™ Certificate

No. KM 733366

BS 7412:2007 /PAS24:2016 – Enhanced security performance requirements for window assemblies.

This Certificate covers the fabrication of windows from the range of profiles and components supplied by Rehau Limited under Certificate Number KM 76189.

System(s):	**REHAU Total 70 Window System**
Fabrication and Installation:	Fabricated and installed in accordance with the latest issue(s) of the following controlled manual(s): REHAU Technical Manual REHAU Total 70 Window System PAS 24 Manufacturing Specification
System Description:	The windows are double or triple glazed, internally or externally beaded, multipoint locking, with welded and/or mechanically fixed transoms/mullions, tee and/or cruciform joints.
Ventilation:	None
Window Types:	Casement windows including flush sash Tilt/Turn Fully Reversible Windows Fixed windows Multilight windows comprising opening light(s) and/or fixed light(s)

APPENDIX G – Installed Specification Site Pictures



APPENDIX H – Legislation, Policy and Guidance

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

> *"174. Planning policies and decisions should contribute to and enhance the natural and local environment by:*
> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of…noise pollution."*

Section 185 further states:

> *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *A. Mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
>
> *B. Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

Section 187 states:

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

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

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

> **NOEL – No Observed Effect Level.**
> *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*
>
> **LOAEL – Lowest Observed Adverse Effect Level**.
> *This is the level above which adverse effects on health and quality of life can be detected.*
>
> **SOAEL – Significant Observed Adverse Effect Level.**
> *This is the level above which significant adverse effects on health and quality of life occur.*

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

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

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

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

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

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

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

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

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

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

APPENDIX I – Acoustic Terminology

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

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

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

Terminology

dB (decibel) – A unit used to quantify the pressure level of sound. Defined as 20 times the logarithm of the ratio between the root-mean-square pressure of a given sound field and a reference pressure level ($2x10^{-5}$ Pa – threshold of hearing).

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

L_{Amax} – the maximum RMS A-weighted sound pressure level occurring within a specified time period; the time weighting is typically either Fast or Slow.

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

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

$D_{n,e,W}$ – The Weighted Sound Reduction Index specifically for ventilators.

C_{tr} – C_{tr} is a spectrum adaptation term which method is defined in BS EN ISO 717. The standard uses a reference curve to determine the weighted value of airborne sound insulation. The spectrum adaptation terms C and C_{tr} may are used to take into account different source spectra. 'C_{tr}' is the A-weighted urban traffic noise spectrum.