

Acoustic South East



Discharge of Planning Condition (5 of DM25/0196)

Report by: Scott Castle BSc (Hons) CEnvH, MCIEH MIOA

Date: 25/03/2026

Project: J4179

Issue 1

Site: **45 The Broadway, Haywards Heath**

Client: **Roblewood Projects Limited**

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Report by: Scott Castle BSc (Hons) CEnvH, MCIEH MIOA

Checked by: Peter Attwood BSc(Hons) MSc MCIOB MIOA

Issue 1	25/03/2026	Original Issue
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1 Introduction and Executive Summary

Acoustic South East have been appointed to undertake an acoustic assessment to support a discharge of planning condition. Specifically, Mid Sussex District Council approved DM/25/0196 on 5th November 2025.

This document seeks to provide Mid Sussex District Council with sufficient detail in order to discharge condition 5 of DM25/0196.

Standards and guidance referenced for this assessment include:

- BS8233:2014 – (Guidance on sound insulation and noise reduction for buildings)
- ProPG2017 – June 2017
- Acoustics, Ventilation and Overheating Guidance, 2020
- World Health Organisation, Night Noise Guidelines for Europe (2009)

Mid Sussex District Council approved planning application DM/25/0196 on 5th November 2025. This was to demolish an outbuilding and create residential apartments at lower ground, ground, first and second floors. Condition 5 contained numerous components which the report has sought to address.

The noisier façade is that of the Broadway with passing road traffic noise. The rear façade to the West is subject to railway noise, and is the quieter of the façades. Measurements have been used from two different surveys carried out at 43 and 57 The Broadway in 2025 by Acoustic South East.

The report has considered the WHO Night Noise Guidelines (2009) as well as BS8233:2014 Table 4 values for internal criterion. Examples have been presented to demonstrate that due to the urban town centre setting, the soundscape is such that windows would not likely be openable during the daytime or night time periods and thus the client's proposed method of ventilation is to consider Mechanical Ventilation and Heat Recovery (MVHR).

With this in mind, calculations have been derived for the glazing needed to protect future occupants against adverse noise levels. For bedrooms which are subject to high levels of attenuation to achieve the Night Noise Guidelines 2009, these utilise high specification glazing.

It is however recognised that should the ProPG2017 guidance be applied in terms of protecting future occupants during the night time period as opposed to the WHO Night Noise Guidelines (NNG 2009), there will be a drastic reduction in the Sound Reduction Index Required for bedrooms. Bedroom 2 is used as an example whereby using ProPG2017 an SRI of 35 is warranted, yet for the NNG(2009), this increases to 48dB and creates unrealistic internal sound pressure levels of below 10dB LAeq,8 hour. The ProPG2017 guidance also recognises that the NNG2009 are not likely to be achieved in all but the most remote and quietest parts of the country.

Based on the information presented, condition 5 of DM/25/0196 is capable of being discharged.

2 Context, Noise Criteria & Noise Assessment Methodology

2.1 Context

Mid Sussex District Council provided planning consent for DM/25/0196 on 5th November 2025. Specifically, as part of the decision notice, condition 5 was applied and has been replicated as follows for transparency below:

“5. No development shall commence until a scheme that addresses the issues of acoustics, ventilation and overheating (AVO) has been submitted to and agreed in writing by the Local Planning Authority. Good acoustic design shall be fully integrated into the scheme. The hierarchy of good acoustic design (GAD) shall be applied in descending order and the methods utilised shall be clearly outlined in an Acoustic Design Statement (ADS). The scheme shall a) outline the level of noise exposure for each property and how the noise level within any domestic living room or bedroom, with windows open for normal ventilation, shall comply with the desirable internal noise levels as outlined in Table 2.1 of BS8233:2014 and b) outline how the noise level within any domestic bedroom, with windows open, shall not normally exceed 42 dB(A) LAFmax between 23:00 and 07:00, in line with WHO NNGL 2007.

Where the standards in (a) or (b) above cannot be achieved following GAD and with windows open, only then shall the scheme show how those standards will be met with windows closed and how adequate ventilation and cooling will be provided.

And, unless otherwise agreed in writing by the Local Planning Authority, where windows must remain closed to achieve acceptable internal noise levels, an overheating assessment must be undertaken with accordance with CIBSE. The cooling hierarchy shall be applied to the scheme.

The methods integrated into the design to prevent overheating shall be fully outlined in the AVO scheme and no dwelling hereby permitted shall be occupied until the approved scheme has been implemented in full for that dwelling.

If as a last resort mechanical ventilation is to be used, it must be demonstrated that it still complies with internal noise levels while providing sufficient ventilation”

2.2 Condition 5 Requirements

There remains a lot of information contained within condition 5. This is not limited to the following:

- Good Acoustic Design – It is limited to be able to apply good acoustic design post the local planning authority deciding the application. The building position is set and the room orientations and floor plans are set at the time that the planning authority consent the scheme. In an ideal world, if an application falls short on design grounds, then it is an opportune moment to engage during the life of the application for potential changes to be made. However, at the point where a decision notice is then issued, the floor plans are then accepted and permanent. To change these requires a new application to be made and this is not practical.
- Table 2.1 (BS8233:2014). It is assumed that this relates to the Table 4 internal daytime and night time sound pressure levels which are referred to in BS8233:2014. Table 2 relates to indoor ambient noise levels in restaurants, open plan offices, which are considered to be unoccupied design targets.

- World Health Organisation Night Noise Guidelines 2007 – The World Health Organisation Night Noise Guidelines for Europe (2009) require no exceedances above 42dB L_{Amax} inside a bedroom space. It is noted within the condition, that the wording states “shall not normally” exceed 42dB L_{Amax} with the windows open.
- Open Windows. Openable windows are capable of providing short term purge ventilation but should not be relied upon for background ventilation. Section 4.5 of the report discusses this further.
- Overheating Assessment - With regards to the Acoustics, Ventilation and Overheating Guidance (AVOG) (Jan 2020), as well as the newly implemented Building Regulations Approved Document O (ADO), attention is drawn to the fact that these relate to new build developments and not conversions. For the AVOG, 2020, this is found in paras 1.4 and 1.13 and for the ADO, see para 0.3.

The ADO Frequently Asked Questions (FAQ) also referenced that an overheating assessment for a change of use is not applicable- [Approved Document O: Overheating, frequently asked questions - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/overheating-frequently-asked-questions)

2.3 43 The Broadway

It is noted that the building immediately adjacent, 43 the Broadway was consented by Mid Sussex District Council under DM/22/1462, again for residential flats. This included condition 5 on the decision notice which is replicated below:

“5. No development shall take place until a scheme for protecting the residential and other noise sensitive units from noise generated by road traffic or other external sources, has been submitted to, and approved in writing by, the local planning authority. The scheme shall include an Acoustic Design Statement in line with the recommendations of ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise 2017 and shall ensure that internal and external noise levels are in accordance with BS 8233 2014: Guidance on Sound Insulation and Noise Reduction for Buildings. Noise from individual external events typical to the area shall not exceed 45dB L_{Amax} when measured in bedrooms internally between 23:00 and 07:00 hours, post construction unless otherwise agreed in writing with the LPA. Where the internal noise levels will be exceeded by more than 5dB with windows open, then the applicant shall submit details of an alternative means of ventilation with sufficient capacity to ensure the thermal comfort of the occupants with windows closed. All works that form part of the scheme shall be completed before the noise sensitive development is occupied.”

It is noted that the WHO Night Noise Guidelines for Europe (2009) have not been applied here.

2.4 Soundscape

The soundscape is dominated by passing vehicular traffic to the front of the site. To the rear of the site is a railway located in a cutting. Trains enter and depart a tunnel leaving southbound from Haywards Heath train station to the immediate North of the site.

2.5 Approved Plans

The plans, taken from Mid Sussex District Council planning website are as follows.

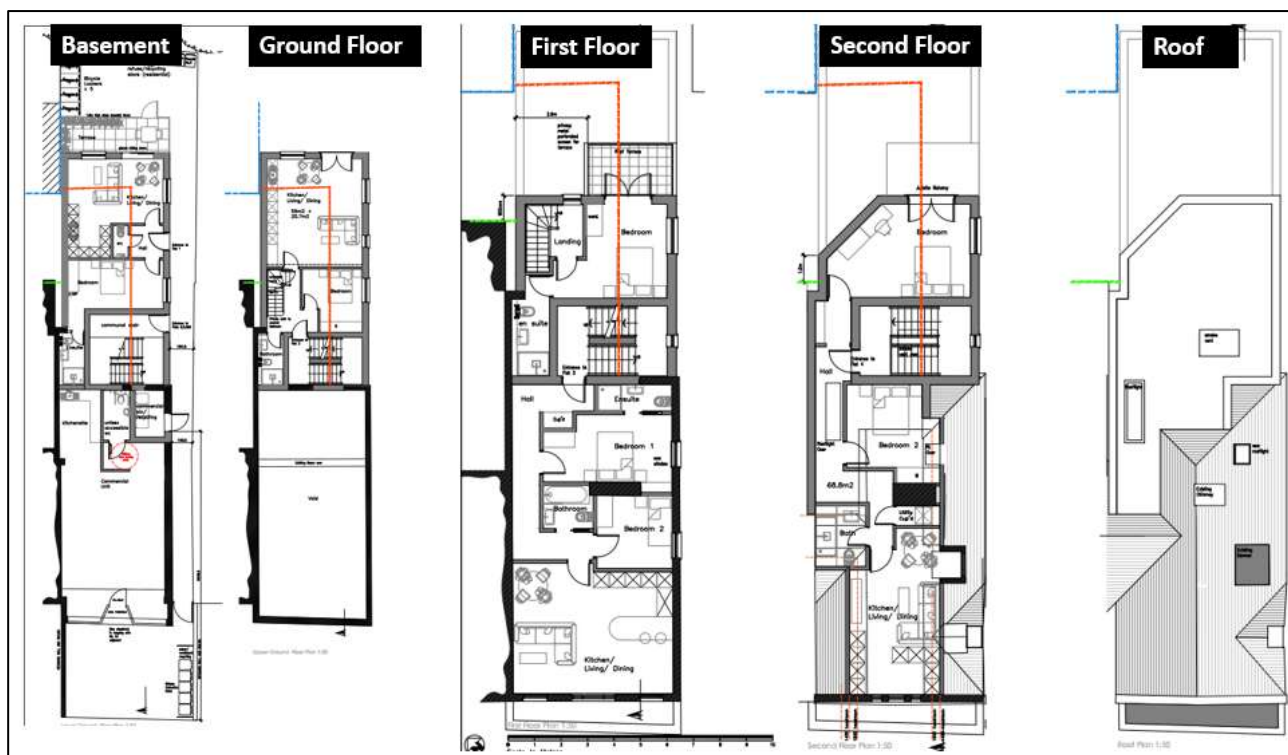


Figure 1. Approved Floor Plans

2.6 Client Proposals

The client proposes using Mechanical Ventilation and Heat Recovery (MVHR) for the site.

3 Measured Acoustic South East Data

Data was measured at the front and rear of 57 The Broadway, Haywards Heath. This was undertaken from the 12th to 15th November 2025. This involved LT1 overlooking the Broadway and LT2 secured against the rear chain-link fence boundary with Network Rail.

Data was also measured at 43 The Broadway from 10th to 15th July 2025, albeit only overlooking The Broadway.

The data comparison between the two projects is only 1dB different for the daytime period and 2dB at night.

For the rear survey at 57 Broadway, it was noted that this was measured as 31m from the closest railway line, however for the 45 Broadway, the distance from the closest railway line to the rear façade is 33.5m.

The measured noise data at 57 The Broadway for the rear (LT2) is therefore capable of being adjusted, reduced by 0.4dB to accommodate the additional 2.5m in distance. Given the minor reduction, the data from LT2 will be applied

3.1 Data Summary

Figure 2 below shows the measured data applicable to the site and it is evident that the rear façade facing the railway is the quieter façade.

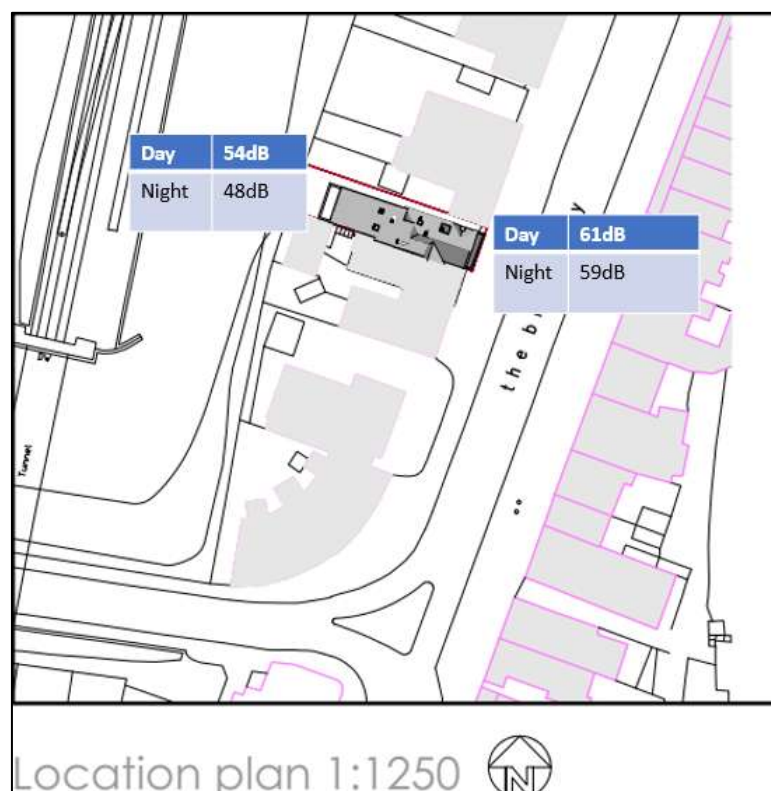


Figure 2. Data Summary (Freefield, Externally Measured $L_{Aeq,16\text{hour}}$ values (Day) and $L_{Aeq, 8\text{ hours}}$ (Night))

4 Discussion

4.1 Good Acoustic Design

It is noted that as anticipated the Broadway is the noisier façade and bedrooms as the more sensitive spaces have been placed to the rear and away from the front facades. For rooms which overlook The Broadway, these are kitchen/living and dining rooms. It is argued that this represents good acoustic design.

4.2 Sound Reduction Index (SRI)

By being aware of how the soundscape impacts the proposed properties, the required Sound Reduction Index (SRI) to achieve satisfactory internal sound pressure levels can be calculated.

There are three drivers that impact the façade sound reduction index or SRI. These are the daytime continuous noise levels measured over 16 hours in $L_{Aeq,T}$, the night time continuous noise levels over 8 hours, also measured in $L_{Aeq,T}$. Thirdly, ProPG2017 requires a consideration of the number of L_{Amax} events which will occur in a bedroom during the night time period. Specifically, ProPG2017 requires no more than ten events exceeding 45dB L_{Amax} measured internally. Whichever of these drivers is highest is applied to ensure that the residents are protected from all criteria.

An assessment has been made below of both Kitchen/Living/Diners and bedrooms at first and second floor levels.

It is relevant to note that living room and bedroom calculations differ, as although living rooms are subject to only the daytime predicted sound pressure levels, bedrooms must consider both daytime and night time continuous sound pressure levels as well as L_{Amax} events during the night to protect sleep.

The daytime SRI is the predicted external freefield sound pressure level minus 35dB as per the Table 4 values in BS8233:2014 and the same for the night time values (albeit minus 30dB).

The L_{Amax} SRI is achieved by using the predicted night time external sound pressure level and comparing this with the measured night time survey noise level. The SRI figure is then adjusted to prevent no more than 10 L_{Amax} events per night inside the bedroom environment above 45dB L_{Amax} . The adjustment process takes account of each of the 8 measured night time periods to ensure that no individual night exceeds 10 events of 45dB L_{Amax} inside the bedroom.

The long-term survey positions (from 43 The Broadway and 57 The Broadway) have been used to assess night time data and L_{Amax} considerations. The SRI considerations have been split into bedrooms and living rooms for each façade.

Summary of Sound Reduction Index (SRI) Required for Bedrooms								
Location	Measured <u>Daytime</u> External Sound Pressure Level (L_{Aeq} , 16 hour)- Rounded	BS8233:2014 Daytime Criterion	Daytime SRI	Measured <u>Night</u> Time External Sound Pressure Level L_{Aeq} , 8 hour- Rounded	BS8233:2014 Night Time Criterion	Night Time SRI	SRI to ensure less than 10 L_{Amax} events 45dB(A)	SRI to Apply
Front	61	35 dB L_{Aeq} , 16 hour	26	59	30 dB L_{Aeq} , 8 hour	29	35	35
Rear	54	35 dB L_{Aeq} , 16 hour	19	48	30 dB L_{Aeq} , 8 hour	18	22	22

All data presented is dB(A) and Freefield

Figure 3. Sound Reduction Index (Bedrooms)

Summary of Sound Reduction Index (SRI) Required for Habitable Rooms			
Location	Measured <u>Daytime</u> External Sound Pressure Level ($L_{Aeq, 16 \text{ hour}}$)- Rounded	BS8233:2014 Daytime Criterion	Daytime SRI
Front	61	35 dB $L_{Aeq, 16 \text{ hour}}$	26
Rear	54	35 dB $L_{Aeq, 16 \text{ hour}}$	19
All data presented is dB(A) and Freefield			

Figure 4. Sound Reduction Index (Kitchen/Living/Diners)

4.3 Consideration of the SRI and AVOG2020

The worst-case SRI to be achieved is 35dB. As per Figure 5 below, this indicates that this is achievable with either mechanical extract ventilation or mechanical ventilation and heat recovery (MVHR).

For context, the Acoustics, Ventilation and Overheating Guidance dated Jan 2020 describes the relationship between the level difference between inside and outside sound pressure levels and how this might be achieved with different ventilation types, with types 1 and 2 being trickle vents, type 3 being mechanical extract ventilation (MEV) and type 4 being Mechanical Ventilation and Heat Recovery.

Table B-2 Potential level differences associated with different ventilation Systems from ADF			
Ventilation System from ADF	Cont. equiv. (L_{Aeq}) or events (L_{Amax})	Level Difference, external free field level – internal reverberant level, dB	
		Typical windows and vent	Higher acoustic performance windows and vent
1, 2	L_{Aeq}	21	31
	L_{Amax}	22	35
3 (with trickle vent)	L_{Aeq}	23	33
	L_{Amax}	24	38
4 (no trickle vent)	L_{Aeq}	27	38
	L_{Amax}	31	45

Figure 5. Table B2 Extracted From AVOG2020

As per section 2.5 above, the client proposes MVHR for the project.

4.4 World Health Organisation (WHO) - Night Noise Guidelines for Europe-2009

It is noted that for Figure 3 above, when having calculated the SRI, this relates to the ProPG2017 requirements of no more than 10 events per night which exceed 45dB L_{Amax} inside a bedroom setting. However, condition 5 is specific in that the WHO Night Noise Guidelines (NNG) should be applied which are specific to bedrooms and only for the night time period.

Having reviewed the LT2 guidance for the rear, this equates to an SRI of 33dB for the night time period.

It is noted that there are no bedrooms which directly overlook The Broadway at the front of the site. Bedroom 2 at the first floor is the closest to the road, albeit it is set back from the roadside by 6m from the front façade.

The distance between the front façade and the edge of the kerbside for the Broadway is 7.5m in distance. The reporting information indicates that the survey position was 1m from the façade, making the distance to the sound source as 6.5m.

Therefore, to correct to a position a further 6m away, a calculation can be made as follows, which uses a 10log relationship due to the line source characteristics of the Broadway road traffic:

$10\log(12.5/6.5)$ = a subtraction of 2.8dB.

With the revised night time L_{Amax} data, this provides for an SRI of 48dB which is very high and difficult to achieve.

The relatively high SRI also creates incredibly low L_{Aeq} levels within the room spaces.

By way of an example, Bedroom 2, is set back from the roadside and is predicted to be circa 58dB $L_{Aeq, 16 \text{ hour}}$ for the daytime period. Applying MVHR and high specification glazing (12.8-20-16.8), an SRI of 46 is capable of being achieved, albeit the internal bedroom L_{Aeq} is only 12dB. If the SRI were to be raised an additional 2dB, this will further reduce the L_{Aeq} inside the bedroom to 10dB during the daytime period, and further still during the night time period, circa 7dB $L_{Aeq, 8 \text{ hour}}$ which is unrealistic.

As can be seen from an L_{Amax} plot from the 5 nights measured at the front of 43 The Broadway below, the L_{Amax} events generating such a high SRI are not frequent occurrences.

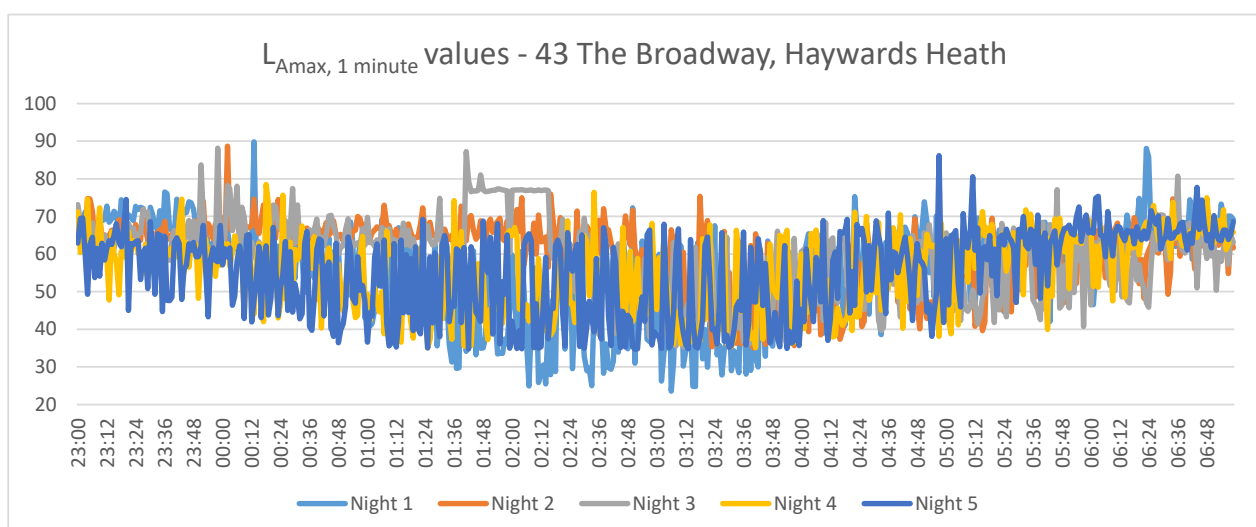


Figure 6. L_{Amax} Events Measured (Freefield) at 43 The Broadway

It is contended that the WHO Night Noise Guidelines for Europe (2009) have effectively been superseded by ProPG2017 (See Appendix A1-A23). ProPG2017 Appendix A concludes as follows

“Further advice from the WHO (e.g. Table 1 in the WHO Night Noise Guidelines for Europe) and the relevant underlying studies indicates that more stringent control of maximum noise levels could eliminate all risk of any detectable physiological effect i.e. achieve NOEL – No Observed Effect Level.

However, controlling to these values is not at present required by policy in England; or considered to be a realistic or achievable goal given there is substantial uncertainty regarding any resulting significant pathological effects at these lower maximum noise levels; and in the context of the current night time acoustic environment across most of urban England¹⁸ which shows that such low values are likely to be exceeded in bedrooms with windows partially open in all but the most remote and quietest parts of the country.”

If ProPG2017 were to be applied for bedroom 2, the SRI would be 32dB.

4.5 Openable Windows

Condition 5 makes specific reference to openable windows.

Whilst windows may be opened for short term purge ventilation (see below), they should not be relied upon for long term background ventilation.

It is not likely to be able to open windows in an urban/town/city centre setting. To demonstrate this, the measured values have been tabulated for comparison against BS8233:2014 Table 4 values as well as the 5dB tolerance discussed as a footnote (7) to Table 4 in BS8233:2014. It is noted that for the application immediately adjacent, reference is made to where internal levels are exceeded by more than 5dB, alternative ventilation proposals shall be considered.

Assessment of Openable Windows					
Openable Window Assessment-DAY					
Location	Measured <u>Daytime</u> External Sound Pressure Level ($L_{Aeq, 16 \text{ hour}}$)- Rounded	Open Window (-13dB)	BS8233:2014 Daytime Criterion	BS8233:2014 Daytime Criterion (5dB Tolerance)	Openable
Front	61	48	35 dB $L_{Aeq, 16 \text{ hour}}$	40 dB $L_{Aeq, 16 \text{ hour}}$	No
Rear	54	41	35 dB $L_{Aeq, 16 \text{ hour}}$	40 dB $L_{Aeq, 16 \text{ hour}}$	No
Openable Window Assessment-NIGHT TIME					
Location	Measured <u>Night Time</u> External Sound Pressure Level ($L_{Aeq, 16 \text{ hour}}$)- Rounded	Open Window (-13dB)	BS8233:2014 Night Time Criterion	BS8233:2014 Night Time Criterion (5dB Tolerance)	Openable
Front	59	46	30dB $L_{Aeq, 16 \text{ hour}}$	35 dB $L_{Aeq, 8 \text{ hour}}$	No
Rear	48	35	30dB $L_{Aeq, 16 \text{ hour}}$	35 dB $L_{Aeq, 8 \text{ hour}}$	Possible

Figure 7. Openable Window Assessment

Figure 7 above therefore shows that openable windows would not likely achieve BS8233:2014 table 4 values. As discussed, the client proposed MVHR to provide the necessary ventilation to the property.

It is also recognised that the concept of open windows for a new build next to a busy road, there would have to be a significant distance from the road. By way of an example, for 35dB $L_{Aeq, 16 \text{ hour}}$ to be achieved internally for the daytime period, with an open window, this would equate to a freefield external sound pressure level no louder than 48dB $L_{Aeq, 16 \text{ hour}}$.

The measured external sound pressure level at the front façade, ie The Broadway was 61dB $L_{Aeq, 16 \text{ hour}}$. Therefore, a reduction of 13dB is required and it is recognised that roads as a line source attenuate poorly with distance. The measurements were made at 6.5m from the roadside. Therefore, to achieve a reduction of 13dB, a set back of over 100metres would be required. In an urban setting, this is not likely to be achievable.

Notwithstanding the above, it is vitally important that all windows are capable of being opened to provide future residents with a connection to the external environment and to allow for purge ventilation, ie the removal of burnt toast smell for example.

4.6 Rigorous Calculations

Rigorous calculations have been undertaken to identify the relevant glazing for the bedrooms and kitchen living diners. These are summarised as follows in Figure 8 below and the full calculations can be seen in Appendix A.

The following assumptions are made:

- The walls have assumed a masonry cavity wall with inner block work for the East and North facing existing brick-built facades.
- For new build elements, masonry and tile hung build ups were used, based on information provided from the architect and constructed in INSUL. These are shown in
- The external Sound Pressure Levels are freefield.
- Where there is glazing on more than one elevation this has been combined and assessed against the noisiest façade.
- Kitchen/Living/Diner rooms have been assessed against the BS8233:2014 table 4 value of 35dB $L_{Aeq, 16 \text{ hour}}$.
- Bedrooms have been considered against the enhanced WHO Night Noise Guidelines 2009 which do not account for any L_{Amax} events above 42dB during the night time period.
- As expected, where there are bedrooms with more than one window, the glazing specification is likely to be higher than that of a Kitchen/Living/Dining Room on the same façade as the latter is only assessed against the daytime values.
- For bedroom 2, located on the first floor, a number of calculations have been run using both double and secondary glazing. Note that the glazing thickness is significant in that for double glazing, this accounts for 50mm in width, but for secondary glazing, this extends to a maximum of 217mm(rounded).

Outcomes of the Rigorous Calculations To Achieve NNG2009 Requirements							
Orientation	Rooms	External SPL	SRI Required	Window	Vent	Internal SPL	SRI Achieved
North	Bedroom 2 (First Floor)	58	48	12.8-20-16.8	None	12	46
North	Bedroom 2 (First Floor)	58	48	10\200\6 (Pilkington)	None	12	46
North	Bedroom 2 (First Floor)	58	48	6\200\10.8 (Granada)	None	12	46
East	Kitchen/Living/Diner-First Floor	61	26	4\12\4	None	33	28
East	Kitchen/Living/Diner-Second Floor	61	26	4\12\4	None	30	31
West	Rear Bedroom - 1st floor	54	33	10\12\6.4	None	19	35
West	Rear Bedroom- 2nd Floor	54	33	12.8-20-16.8	none	21	32
West	Ground-Rear KLD	54	19	4\12\4	None	27	27
West	Lower Ground KLD	54	19	4\12\4	None	27	27

Figure 8. Outcome of Rigorous Calculations

It should be noted that Figure 8 above provides a specification in order to achieve the WHO Night Noise Guidelines dated 2009, as specified within the condition.

As stated, in section 4.4 above, if ProPG2017 were used, the SRI for bedroom 2 would reduce to a much more manageable 32dB. With standard thermal double glazing (ie 4\12\4) and MVHR, this would achieve a daytime sound pressure level internally of 24dB inside the bedroom and an SRI of 23dB. Similarly, where significantly thick glazing has been used for the rear 2nd floor bedroom, the application of the ProPG2017 guidance would also reduce the SRI by a significant amount to more achievable and sustainable glass types.

5 Recommendations

5.1 Glazing

It must be noted that whilst Pilkington and Granada glazing has been used within the assessment, the future developer is likely to approach alternative glazing providers. It is key to understand that the only comparable metric for glazing providers is referenced as either R_w+C_{tr} or $R_{traffic}$. To ensure an easy comparison, the $R_{traffic}$ values are presented below.

Sound Insulation Performance of Window Units			
Brand	Window Specification	R_w	$R_{traffic}$
Pilkington Double	4\12\4	31	25
Pilkington Double	10\12\6.4	40	34
Pilkington Double	12.8\20\16.8	51	47
Secondary Glazing	10\200\6	49	45

Figure 9. Glazing $R_{traffic}$ Values

It is recognised that the glazing calculations, specifically for the bedroom set back from the front Broadway façade could well be reduced to accommodate the ProPG2017 guidance, as opposed to the WHO Night Noise Guidelines for Europe dated 2009. This is the difference between an SRI of 35dB under the ProPG2017 guidelines as opposed to an uplift of 13dB to 48dB SRI using the Night Noise Guidelines.

5.2 Ventilation

In considering MVHR, the client should be aware of design criteria listed in the Acoustics, Ventilation and Overheating Guide dated Jan 2020 in 3.3.1:

“Evidence [20] indicates that “a more prudent limit for mechanical services noise around 24 – 26 dB(A) is likely to be required to prevent an adverse reaction from most occupants while falling asleep”. The selection of MVHR units should therefore be as quiet as possible when placed into the residential demise.

It is advised that when considering placement of intakes and exhausts, that these consider the quieter rear facades.

6 Conclusion

Mid Sussex District Council approved planning application DM/25/0196 on 5th November 2025. This was to demolish an outbuilding and create residential apartments at lower ground, ground, first and second floors. Condition 5 contained numerous components which the report has sought to address.

The noisier façade is that of the Broadway with passing road traffic noise. The rear façade to the West is subject to railway noise, and is the quieter of the facades. Measurements have been used from two different surveys carried out at 43 and 57 The Broadway in 2025 by Acoustic South East.

The report has considered the WHO Night Noise Guidelines (2009) as well as BS8233:2014 Table 4 values for internal criterion. Examples have been presented to demonstrate that due to the urban town centre setting, the soundscape is such that windows would not likely be openable during the daytime or night time periods and thus the client's proposed method of ventilation is to consider Mechanical Ventilation and Heat Recovery (MVHR).

With this in mind, calculations have been derived for the glazing needed to protect future occupants against adverse noise levels. For bedrooms which are subject to high levels of attenuation to achieve the Night Noise Guidelines 2009, these utilise high specification glazing.

It is however recognised that should the ProPG2017 guidance be applied in terms of protecting future occupants during the night time period as opposed to the WHO Night Noise Guidelines (NNG 2009), there will be a drastic reduction in the Sound Reduction Index Required for bedrooms. Bedroom 2 is used as an example whereby using ProPG2017 an SRI of 35 is warranted, yet for the NNG(2009), this increases to 48dB and creates unrealistic internal sound pressure levels of below 10dB LAeq,8 hour. The ProPG2017 guidance also recognises that the NNG2009 are not likely to be achieved in all but the most remote and quietest parts of the country.

Based on the information presented, condition 5 of DM/25/0196 is capable of being discharged.

7 Appendix A – Rigorous Calculations

Non Frequency Dependent Variables			Key for Table Below				
Term	Derivation	Value	R _{wi}	Sound Reduction of Window (Octave)			
A _o	Given in BS EN 20140-10 = 10 (m^2)	10	R _{ew}	Sound Reduction Index of External Wall (Oct)			
S _f	Total Facade Area (m^2)	7.2	R _{rr}	Sound Reduction Index of Roof/Ceiling (Oct)			
S _{wi}	Window Area (m^2)	1.53	A	Equivalent Absorption Area of Rx Room			
S _{ew}	External Wall Area (m^2)	5.67	D _{n,e}	Insulation of Trickle Vent (BS EN 20140-10)			
S _{rr}	Ceiling Area (m^2)	0.00001					
S	Total Area sound enters the room (m^2)	7.20001					
Frequency Dependent Variables							
Term	Description	Octave Band Centre Frequency					
		125	250	500	1000	2000	4000
Leq,ff	Free-Field External Noise Level	60	56	54	54	51	44
D _{n,e}	No Vent	100	100	100	100	100	100
R _{wi}	12.8-20-16.8	35	45	49	50	54	65
R _{ew}	Cavity Masonry (Brick Cavity with Insulation lightweight block)	41	39	44	52	60	65
R _{rr}	No Roof	28	34	100	100	100	100
A	Equivalent Absorption Area of Room (Copied from BS8233)	11.00	14.00	16.00	16.00	15.00	15.00
BS8233 Calculation Details							
Term From Equation Below		Octave Band Centre Frequency					
		125	250	500	1000	2000	4000
Leq,ff		60	56	54	54	51	44
A _o /S . 10^(-D _{n,e} /10)		1.39E-10	1.39E-10	1.39E-10	1.39E-10	1.39E-10	1.39E-10
S _{wi} /S . 10^(-R _{wi} /10)		6.72E-05	6.72E-06	2.68E-06	2.12E-06	8.46E-07	6.72E-08
S _{ew} /S . 10^(-R _{ew} /10)		6.26E-05	9.91E-05	3.14E-05	4.97E-06	7.87E-07	2.49E-07
S _{rr} /S . 10^(-R _{rr} /10)		2.2E-09	5.53E-10	1.39E-16	1.39E-16	1.39E-16	1.39E-16
10log10(S/A)+3		1.159404	0.112051	-0.46787	-0.46787	-0.18758	-0.18758
Leq,2		22.29061	16.3594	8.850272	2.040993	-7.05609	-21.1857
A-Weighting		-16.1	-8.6	-3.2	0	1.2	1
A-Weighted Leq		6.190609	7.759401	5.650272	2.040993	-5.85609	-20.1857
A-Weighted Level Outside		58					
BS8233 Predicted Internal A-Weighted Level		12					
Predicted Building Envelope SRI		46					
BS8233 Calculation can be seen below:							
$L_{eq,2} \approx L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S} 10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S} 10^{\frac{-R_{rr}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$							

Non Frequency Dependent Variables			Key for Table Below	
Term	Derivation	Value	R _{wi}	Sound Reduction of Window (Octave)
A ₀	Given in BS EN 20140-10 = 10 (m ²)	10	R _{ew}	Sound Reduction Index of External Wall (Octave)
S _r	Total Facade Area (m ²)	27.12	R _{rr}	Sound Reduction Index of Roof/Ceiling (Octave)
S _{wi}	Window Area (m ²)	6.46	A	Equivalent Absorption Area of Rx Room
S _{ew}	External Wall Area (m ²)	20.66	D _{n,e}	Insulation of Trickle Vent (BS EN 20140-10)
S _{rr}	Ceiling Area (m ²)	0.00001		
S	Total Area sound enters the room (m ²)	27.12001		

Frequency Dependent Variables							
Term	Description	Octave Band Centre Frequency					
		125	250	500	1000	2000	4000
Leq,ff	Free-Field External Noise Level	63	59	57	57	54	47
D _{n,e}	No Vent	100	100	100	100	100	100
R _{wi}	4_12_4	24	20	25	35	38	35
R _{ew}	Cavity Masonry (Brick Cavity with Insulation lightweight block)	41	39	44	52	60	65
R _{rr}	No Roof	28	34	100	100	100	100
A	Equivalent Absorption Area of Room (Copied from BS8233)	11.00	14.00	16.00	16.00	15.00	15.00

BS8233 Calculation Details						
Term From Equation Below	Octave Band Centre Frequency					
	125	250	500	1000	2000	4000
Leq,ff	63	59	57	57	54	47
Ao/S . 10^(-Dn,e/10)	3.69E-11	3.69E-11	3.69E-11	3.69E-11	3.69E-11	3.69E-11
Swi/S . 10^(-Rwi/10)	0.000948	0.002382	0.000753	7.53E-05	3.78E-05	7.53E-05
Sew/S . 10^(-Rew/10)	6.05E-05	9.59E-05	3.03E-05	4.81E-06	7.62E-07	2.41E-07
Srr/S . 10^(-Rrr/10)	5.84E-10	1.47E-10	3.69E-17	3.69E-17	3.69E-17	3.69E-17
10log10(S/A)+3	6.918972	5.871618	5.291699	5.291699	5.571986	5.571986
Leq,2	39.95705	38.81247	31.23255	21.32977	15.42818	11.35528
A-Weighting	-16.1	-8.6	-3.2	0	1.2	1
A-Weighted Leq	23.85705	30.21247	28.03255	21.32977	16.62818	12.35528

A-Weighted Level Outside	61
BS8233 Predicted Internal A-Weighted Level	33
Predicted Building Envelope SRI	28

KLD-First Floor

BS8233 Calculation can be seen below:

$$L_{eq,2} \approx L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S} 10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S} 10^{\frac{-R_{rr}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

Non Frequency Dependent Variables			Key for Table Below					
Term	Derivation	Value	R _{wi}	Sound Reduction of Table Window (Octave)				
A _o	Given in BS EN 20140-10 = 10 (m^2)	10	R _{ew}	Sound Reduction Index of External Wall (Octave)				
S _f	Total Facade Area (m^2)	39.84	R _{rr}	Sound Reduction Index of Roof/Ceiling (Octave)				
S _{wi}	Window Area (m^2)	2.6	A	Equivalent Absorption Area of Rx Room				
S _{ew}	External Wall Area (m^2)	37.24	D _{n,e}	Insulation of Trickle Vent (BS EN 20140-10)				
S _{rr}	Ceiling Area (m^2)	0.00001						
S	Total Area sound enters the room (m^2)	39.84001						
Frequency Dependent Variables								
Term	Description	Octave Band Centre Frequency						
		125	250	500	1000	2000	4000	
Leq,ff	Free-Field External Noise Level	63	59	57	57	54	47	
D _{n,e}	No Vent	100	100	100	100	100	100	
R _{wi}	4_12_4	24	20	25	35	38	35	
R _{ew}	Cavity Masonry (Brick Cavity with Insulation lightweight block)	41	39	44	52	60	65	
R _{rr}	No Roof	28	34	100	100	100	100	
A	Equivalent Absorption Area of Room (Copied from BS8233)	11.00	14.00	16.00	16.00	15.00	15.00	
BS8233 Calculation Details								
Term From Equation Below	Octave Band Centre Frequency							
	125	250	500	1000	2000	4000		
Leq,ff	63	59	57	57	54	47		
A _o /S . 10^(-D _{n,e} /10)	2.51E-11	2.51E-11	2.51E-11	2.51E-11	2.51E-11	2.51E-11		
S _{wi} /S . 10^(-R _{wi} /10)	0.00026	0.000653	0.000206	2.06E-05	1.03E-05	2.06E-05		
S _{ew} /S . 10^(-R _{ew} /10)	7.42E-05	0.000118	3.72E-05	5.9E-06	9.35E-07	2.96E-07		
S _{rr} /S . 10^(-R _{rr} /10)	3.98E-10	9.99E-11	2.51E-17	2.51E-17	2.51E-17	2.51E-17		
10log10(S/A)+3	8.589268	7.541914	6.961995	6.961995	7.242282	7.242282		
Leq,2	36.82749	35.40844	27.82852	18.20021	11.76458	7.450589		
A-Weighting	-16.1	-8.6	-3.2	0	1.2	1		
A-Weighted Leq	20.72749	26.80844	24.62852	18.20021	12.96458	8.450589		
A-Weighted Level Outside		61					KLD-Second Floor	
BS8233 Predicted Internal A-Weighted Level		30						
Predicted Building Envelope SRI		31						
BS8233 Calculation can be seen below:								
$L_{eq,2} \approx L_{eq,ff} + 10 \log_{10} \left(\frac{A_o}{S} 10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S} 10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S} 10^{\frac{-R_{rr}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$								

Non Frequency Dependent Variables			Key for Table Below				
Term	Derivation	Value	R _{wi}	Sound Reduction of Window (Octave)			
A _o	Given in BS EN 20140-10 = 10 (m^2)	10	R _{ew}	Sound Reduction Index of External Wall (Octave)			
S _f	Total Facade Area (m^2)	17.76	R _{rr}	Sound Reduction Index of Roof/Ceiling (Octave)			
S _{wi}	Window Area (m^2)	5.21	A	Equivalent Absorption Area of Rx Room			
S _{ew}	External Wall Area (m^2)	12.55	D _{n,e}	Insulation of Trickle Vent (BS EN 20140-10)			
S _{rr}	Ceiling Area (m^2)	0.00001					
S	Total Area sound enters the room (m^2)	17.76001					
Frequency Dependent Variables							
Term	Description	Octave Band Centre Frequency					
		125	250	500	1000	2000	4000
Leq,ff	Free-Field External Noise Level	56	52	50	50	47	40
D _{n,e}	No Vent	100	100	100	100	100	100
R _{wi}	10_12_6.4	27	29	36	41	42	52
R _{ew}	Type 1 - Masonry	33	37	45	53	59	62
R _{rr}	No Roof	28	34	100	100	100	100
A	Equivalent Absorption Area of Room (Copied from BS8233)	11.00	14.00	16.00	16.00	15.00	15.00
BS8233 Calculation Details							
Term From Equation Below		Octave Band Centre Frequency					
		125	250	500	1000	2000	4000
Leq,ff		56	52	50	50	47	40
A _o /S . 10^(-D _{n,e} /10)		5.63E-11	5.63E-11	5.63E-11	5.63E-11	5.63E-11	5.63E-11
S _{wi} /S . 10^(-R _{wi} /10)		0.000585	0.000369	7.37E-05	2.33E-05	1.85E-05	1.85E-06
S _{ew} /S . 10^(-R _{ew} /10)		0.000354	0.000141	2.23E-05	3.54E-06	8.9E-07	4.46E-07
S _{rr} /S . 10^(-R _{rr} /10)		8.92E-10	2.24E-10	5.63E-17	5.63E-17	5.63E-17	5.63E-17
10log10(S/A)+3		5.080505	4.033152	3.453232	3.453232	3.733519	3.733519
Leq,2		30.8094	23.11147	13.27747	7.741662	3.611349	-12.6551
A-Weighting		-16.1	-8.6	-3.2	0	1.2	1
A-Weighted Leq		14.7094	14.51147	10.07747	7.741662	4.811349	-11.6551
A-Weighted Level Outside		54	Rear Bedroom First Floor				
BS8233 Predicted Internal A-Weighted Level		19					
Predicted Building Envelope SRI		35					
BS8233 Calculation can be seen below:							
$L_{eq,2} \approx L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S} 10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S} 10^{\frac{-R_{rr}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$							

Non Frequency Dependent Variables			Key for Table Below				
Term	Derivation	Value	R _{wi}	Sound Reduction of Window (Octave)			
A _o	Given in BS EN 20140-10 = 10 (m^2)	10	R _{ew}	Sound Reduction Index of External Wall (Octave)			
S _f	Total Facade Area (m^2)	45.36	R _{rr}	Sound Reduction Index of Roof/Ceiling (Octave)			
S _{wi}	Window Area (m^2)	7.74	A	Equivalent Absorption Area of Rx Room			
S _{ew}	External Wall Area (m^2)	37.62	D _{n,e}	Insulation of Trickle Vent (BS EN 20140-10)			
S _{rr}	Ceiling Area (m^2)	0.00001					
S	Total Area sound enters the room (m^2)	45.36001					
Frequency Dependent Variables							
Term	Description	Octave Band Centre Frequency					
		125	250	500	1000	2000	4000
Leq,ff	Free-Field External Noise Level	56	52	50	50	47	40
D _{n,e}	No Vent	100	100	100	100	100	100
R _{wi}	4_12_4	24	20	25	35	38	35
R _{ew}	Type 1 - Masonry	33	37	45	53	59	62
R _{rr}	No Roof	28	34	100	100	100	100
A	Equivalent Absorption Area of Room (Copied from BS8233)	11.00	14.00	16.00	16.00	15.00	15.00
BS8233 Calculation Details							
Term From Equation Below	Octave Band Centre Frequency						
	125	250	500	1000	2000	4000	
Leq,ff	56	52	50	50	47	40	
A _o /S . 10^(-D _{n,e} /10)	2.2E-11	2.2E-11	2.2E-11	2.2E-11	2.2E-11	2.2E-11	
S _{wi} /S . 10^(-R _{wi} /10)	0.000679	0.001706	0.00054	5.4E-05	2.7E-05	5.4E-05	
S _{ew} /S . 10^(-R _{ew} /10)	0.000416	0.000165	2.62E-05	4.16E-06	1.04E-06	5.23E-07	
S _{rr} /S . 10^(-R _{rr} /10)	3.49E-10	8.78E-11	2.2E-17	2.2E-17	2.2E-17	2.2E-17	
10log10(S/A)+3	9.152805	8.105451	7.525532	7.525532	7.805819	7.805819	
Leq,2	35.54686	32.82811	25.05233	15.1685	9.291017	5.168413	
A-Weighting	-16.1	-8.6	-3.2	0	1.2	1	
A-Weighted Leq	19.44686	24.22811	21.85233	15.1685	10.49102	6.168413	
A-Weighted Level Outside	54	Rear Ground Floor KLD					
BS8233 Predicted Internal A-Weighted Level	27						
Predicted Building Envelope SRI	27						
BS8233 Calculation can be seen below:							
$L_{eq,2} \approx L_{eq,ff} + 10 \log_{10} \left(\frac{A_o}{S} 10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S} 10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S} 10^{\frac{-R_{rr}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$							

Non Frequency Dependent Variables			Key for Table Below					
Term	Derivation	Value	R _{wi}	Sound Reduction of Window (Octave)				
A _o	Given in BS EN 20140-10 = 10 (m^2)	10	R _{ew}	Sound Reduction Index of External Wall (Octave)				
S _f	Total Facade Area (m^2)	38.64	R _{rr}	Sound Reduction Index of Roof/Ceiling (Octave)				
S _{wi}	Window Area (m^2)	6.9	A	Equivalent Absorption Area of Rx Room				
S _{ew}	External Wall Area (m^2)	31.74	D _{n,e}	Insulation of Trickle Vent (BS EN 20140-10)				
S _{rr}	Ceiling Area (m^2)	0.00001						
S	Total Area sound enters the room (m^2)	38.64001						
Frequency Dependent Variables								
Term	Description	Octave Band Centre Frequency						
		125	250	500	1000	2000	4000	
Leq,ff	Free-Field External Noise Level	56	52	50	50	47	40	
D _{n,e}	No Vent	100	100	100	100	100	100	
R _{wi}	4_12_4	24	20	25	35	38	35	
R _{ew}	Type 1 - Masonry	33	37	45	53	59	62	
R _{rr}	No Roof	28	34	100	100	100	100	
A	Equivalent Absorption Area of Room (Copied from BS8233)	11.00	14.00	16.00	16.00	15.00	15.00	
BS8233 Calculation Details								
Term From Equation Below		Octave Band Centre Frequency						
		125	250	500	1000	2000	4000	
Leq,ff		56	52	50	50	47	40	
A _o /S . 10^(-D _{n,e} /10)		2.59E-11	2.59E-11	2.59E-11	2.59E-11	2.59E-11	2.59E-11	
S _{wi} /S . 10^(-R _{wi} /10)		0.000711	0.001786	0.000565	5.65E-05	2.83E-05	5.65E-05	
S _{ew} /S . 10^(-R _{ew} /10)		0.000412	0.000164	2.6E-05	4.12E-06	1.03E-06	5.18E-07	
S _{rr} /S . 10^(-R _{rr} /10)		4.1E-10	1.03E-10	2.59E-17	2.59E-17	2.59E-17	2.59E-17	
10log ₁₀ (S/A)+3		8.456445	7.409092	6.829172	6.829172	7.10946	7.10946	
Leq,2		34.95868	32.30857	24.54261	14.65291	8.783439	4.667259	
A-Weighting		-16.1	-8.6	-3.2	0	1.2	1	
A-Weighted Leq		18.85868	23.70857	21.34261	14.65291	9.983439	5.667259	
A-Weighted Level Outside		54						Rear Lower Ground Floor KLD
BS8233 Predicted Internal A-Weighted Level		27						
Predicted Building Envelope SRI		27						
BS8233 Calculation can be seen below:								
$L_{eq,2} \approx L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S} 10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S} 10^{\frac{-R_{rr}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$								

Non Frequency Dependent Variables			Key for Table Below				
Term	Derivation	Value	R _{wi}	Sound Reduction of Window (Octave)			
A _o	Given in BS EN 20140-10 = 10 (m^2)	10	R _{ew}	Sound Reduction Index of External Wall (Octave)			
S _f	Total Facade Area (m^2)	7.2	R _{rr}	Sound Reduction Index of Roof/Ceiling (Octave)			
S _{wi}	Window Area (m^2)	1.53	A	Equivalent Absorption Area of Rx Room			
S _{ew}	External Wall Area (m^2)	5.67	D _{n,e}	Insulation of Trickle Vent (BS EN 20140-10)			
S _{rr}	Ceiling Area (m^2)	0.00001					
S	Total Area sound enters the room (m^2)	7.20001					

Frequency Dependent Variables							
Term	Description	Octave Band Centre Frequency					
		125	250	500	1000	2000	4000
Leq,ff	Free-Field External Noise Level	60	56	54	54	51	44
D _{n,e}	No Vent	100	100	100	100	100	100
R _{wi}	4_12_4	24	20	25	35	38	35
R _{ew}	Cavity Masonry (Brick Cavity with Insulation lightweight block)	41	39	44	52	60	65
R _{rr}	No Roof	28	34	100	100	100	100
A	Equivalent Absorption Area of Room (Copied from BS8233)	11.00	14.00	16.00	16.00	15.00	15.00

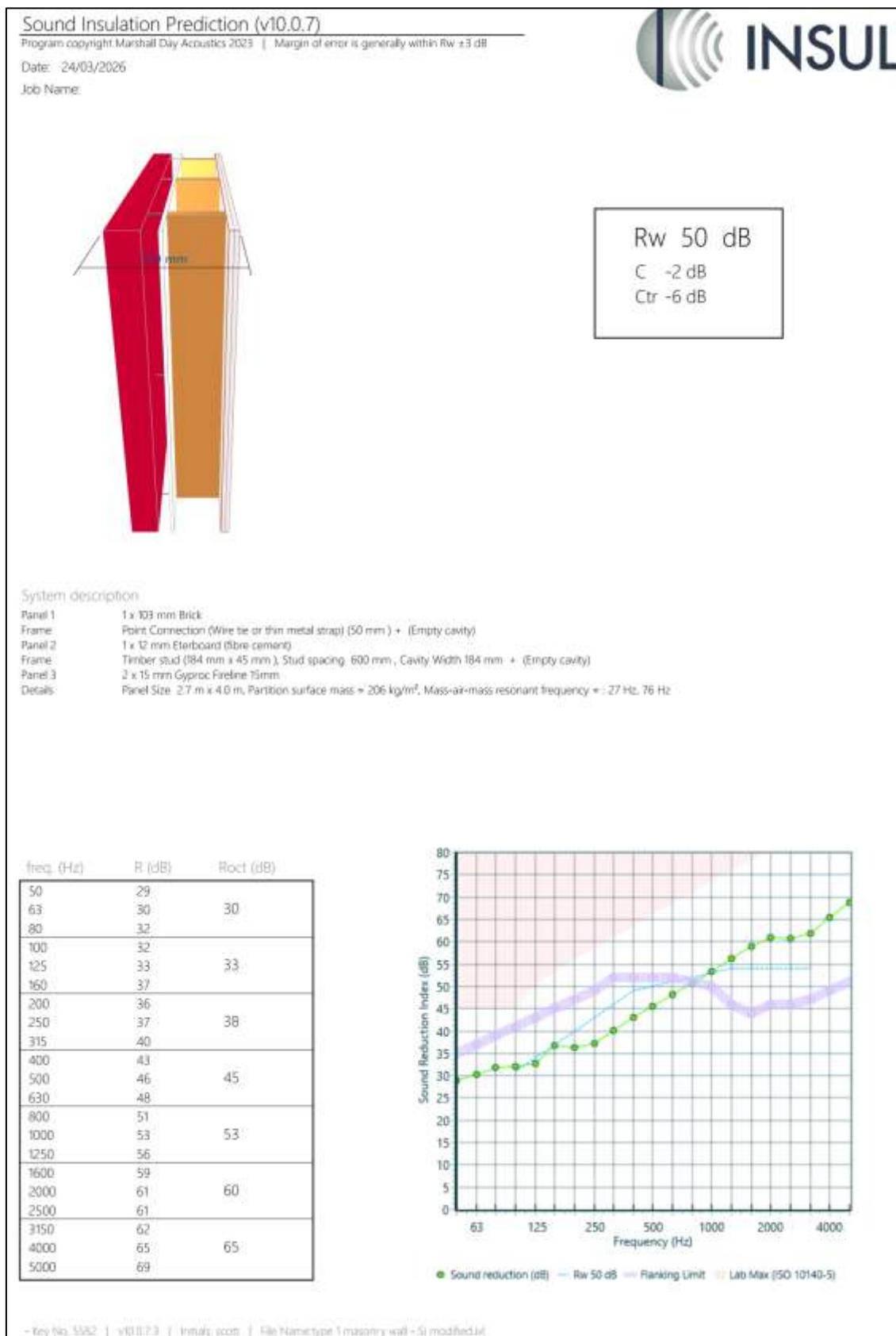
BS8233 Calculation Details							
Term From Equation Below	Octave Band Centre Frequency						
	125	250	500	1000	2000	4000	
Leq,ff	60	56	54	54	51	44	
A _o /S . 10^(-D _{n,e} /10)	1.39E-10	1.39E-10	1.39E-10	1.39E-10	1.39E-10	1.39E-10	
S _{wi} /S . 10^(-R _{wi} /10)	0.000846	0.002125	0.000672	6.72E-05	3.37E-05	6.72E-05	
S _{ew} /S . 10^(-R _{ew} /10)	6.26E-05	9.91E-05	3.14E-05	4.97E-06	7.87E-07	2.49E-07	
S _{rr} /S . 10^(-R _{rr} /10)	2.2E-09	5.53E-10	1.39E-16	1.39E-16	1.39E-16	1.39E-16	
10log10(S/A)+3	1.159404	0.112051	-0.46787	-0.46787	-0.18758	-0.18758	
Leq,2	30.74281	29.58367	22.00375	12.11553	6.186399	2.102075	
A-Weighting	-16.1	-8.6	-3.2	0	1.2	1	
A-Weighted Leq	14.64281	20.98367	18.80375	12.11553	7.386399	3.102075	

A-Weighted Level Outside	58	Bedroom 2, north Façade, First Floor
BS8233 Predicted Internal A-Weighted Level	24	
Predicted Building Envelope SRI	34	

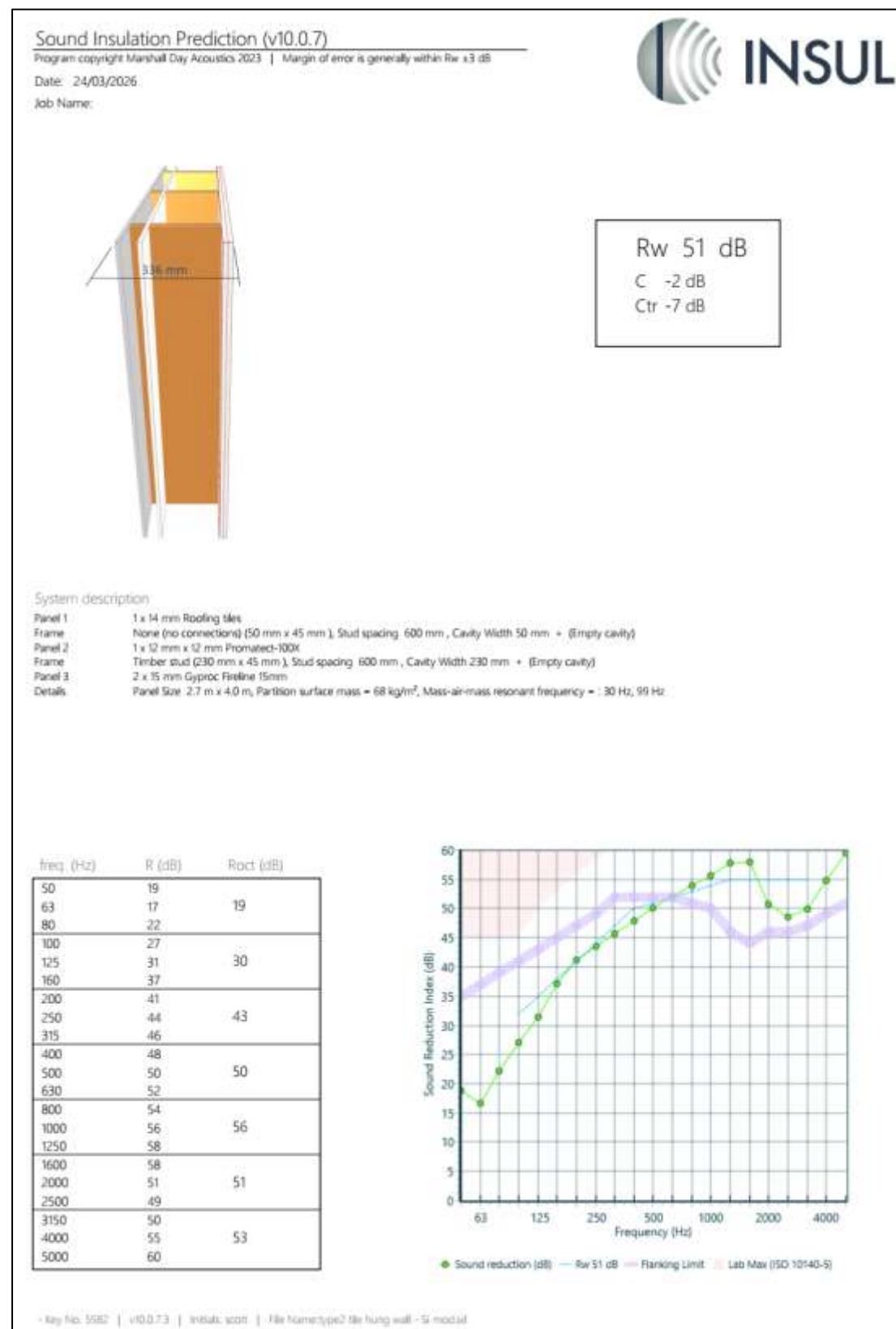
BS8233 Calculation can be seen below:	
$L_{eq,2} \approx L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S} 10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S} 10^{\frac{-R_{rr}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$	

8 Appendix B- INSUL Calculations for Masonry and Tile Hung Facades

8.1 Masonry Type 1 Wall



8.2 Tile Hung Wall – Bedroom 2, Rear Elevation, Second Floor



8.3 Flat Roof – 2nd Floor Rear Elevation, Bedroom 2

