Chartered Building Consultancy

Acoustic South East

Desktop Noise Impact Assessment

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

Date: **28/02/2024**

Project: **J3798**

Issue **1**

Site: **49 Grand Parade, Brighton. BN2 9QA**

Client: **Sussex Heritage Properties**

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1 Introduction and Executive Summary

Acoustic South East Ltd have been appointed to undertake an acoustic assessment to support a planning application for a permitted development. Specifically, a change of use is proposed from a commercial to residential premises (C3) at 49 Grand Parade in Brighton. It is required that the application take account of commercially generated noise.

Standards and guidance referenced for this assessment include:

- BS8233 (Sound insulation and noise reduction for buildings) 2014
- National Planning Policy Framework (NPPF), 2023
- BSEN ISO9921:2003- *Ergonomics – Assessment of Speech Communication*

For the assessment of the commercial soundscape, the report has considered the proximity of the Brewdog premises at 52-54 Grand Parade, Brighton. Brewdog, aside from having a late licence, also has external seating for patrons and is licensed for live music.

Under section 191 of the National Planning Policy Framework (Dec, 2023), and specifically, the agent of change principal, it is necessary to protect future occupants from commercial sound sources.

Using worst case assumptions of maximum occupancy of the external tables, patrons speaking loudly and live music occurring (100dB L_{AeqT} internally) simultaneously with doors to the Brewdog premises open, the resulting sound pressure level from commercial activities at the Brewdog premises received at the application site is 65dB $L_{Aeq,1\ hour}$.

With single 4mm pane glazing assumed as the current glass configuration, this is not likely to provide sufficient attenuation against the received commercial soundscape. It is strongly recommended that the glazed areas be upgraded internally using secondary glazing (6-100-4) to protect the future occupants against adverse noise levels. It is noted that residential demises already exist at the upper floors.

It is noted that the client proposes mechanical ventilation which will source and extract air from the quieter Circus Street to the rear. The application also demonstrates good acoustic design in that the sensitive habitable space for the bedroom has been located away from the Grand Parade façade.

On the basis of the information presented, planning permission should not be withheld on noise grounds.

2 Context, Noise Criteria & Noise Assessment Methodology

2.1 Context

A prior approval change of use is proposed at 49 Grand Parade in Brighton. It is required that only commercial soundscapes be considered as part of the assessment.

In reviewing the site and uses in close proximity, the Brewdog premises at 52-54 Grand Parade, is in use. It will be necessary to consider external patron noise as well as break out noise and entertainment noise from the premises.

The change of use application occurs at a busy arterial route into Brighton City Centre on Grand Parade which is likely to experience high traffic noise from passing vehicles.

It is relevant to note that if one were to carry out a noise assessment for the site, it would not be possible to extract what sound from the dataset arises from the busy road traffic noise and what is generated from external patrons and/or break out noise from the Brewdog premises. It is therefore proposed to consider a desktop assessment accordingly and identify what, if any, mitigation measures are needed to protect the future occupants of 49 Grand Parade.

It is relevant to note that the first and second floors at 49 Grand Parade are also residential dwellings (2014/01337).

Under the Agent of Change Principal (para 193 of NPPF, 2023), the onus is on the applicant to ensure that sufficient mitigation measures remain in place to protect the future occupants from commercial noise, but equally Brewdog from receiving noise complaints.

It is likely given the location that the existing fenestration will remain in place. Proposals for secondary glazing to be added to the interior of the proposed dwelling are presented in sections 4.2 and 5 of the report. It is likely that mechanical ventilation will be used to draw air from the quieter Circus Parade to the rear.

2.2 Site Location

The site is located in Figure 1.

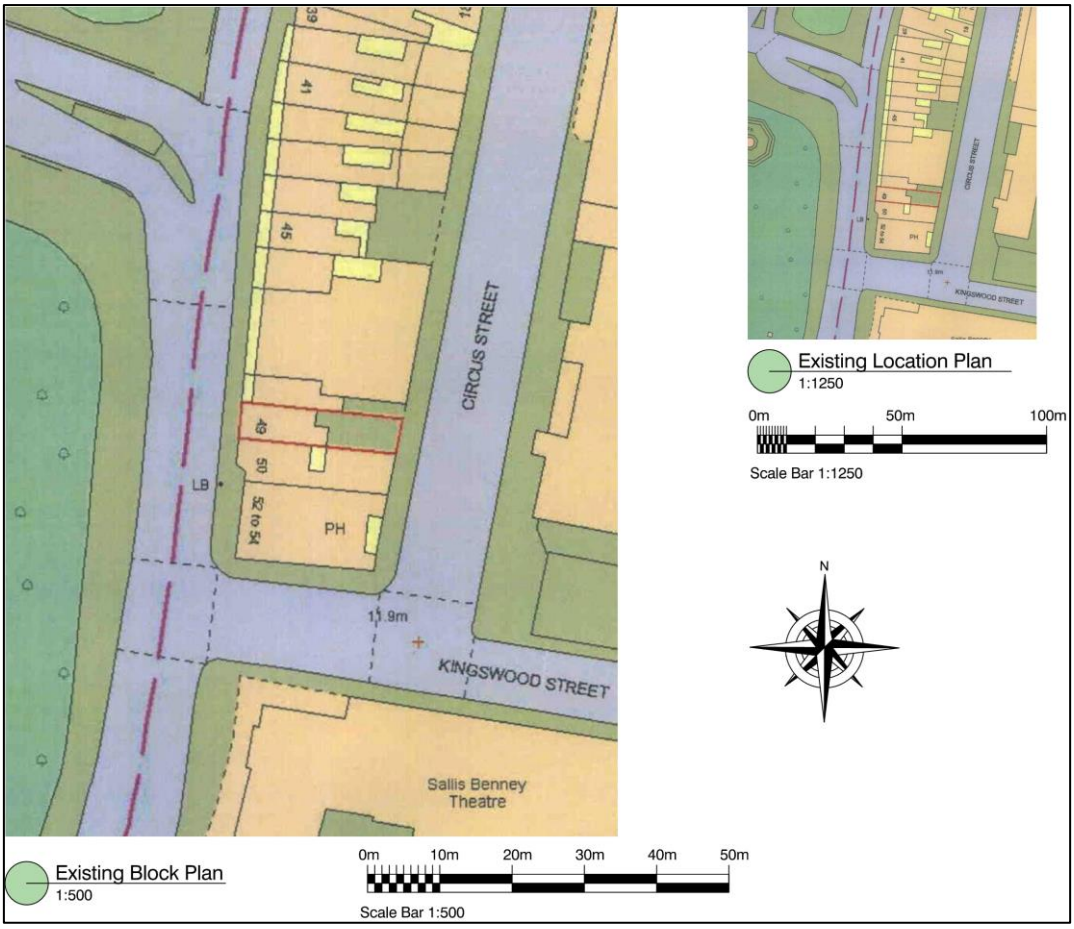

Figure 1. Site Location Plan

2.3 Proposed Layout and Elevations

2.3.1 Floorplans

Note that good acoustic design has been followed with the more sensitive bedroom space being located away from the Grand Parade Façade and the kitchen/living/diner being utilised as a buffer space.

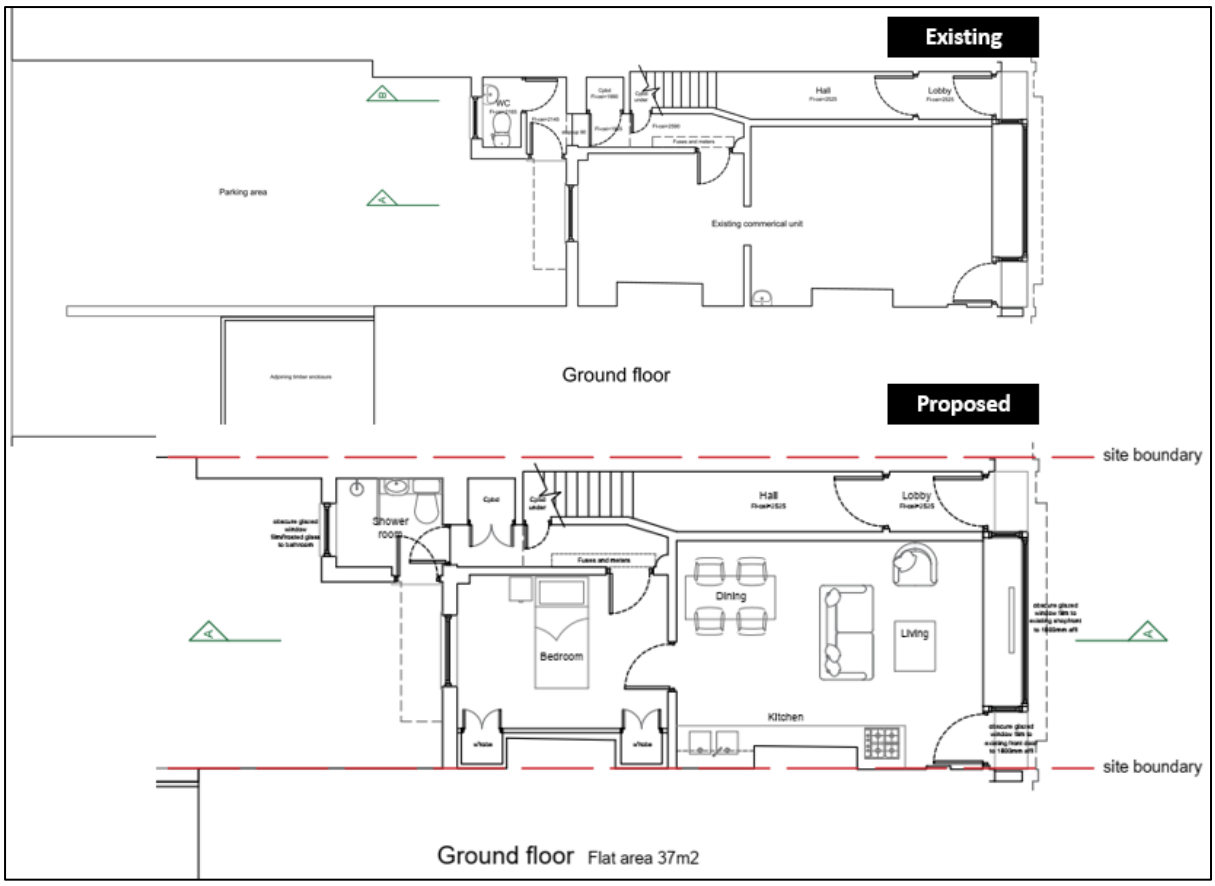

Figure 2. Existing and Proposed Floorplans

2.4 Brewdog

The premises is a licenced premises for alcohol and entertainment. Having liaised with the City Council licensing and Pavement teams (in respect of external tables and chairs), the following information is apparent.

Time	Activity
09:00-02:00 Friday - Saturday	Live Music/Recorded Music/Performance of Dance
09:00-01:00 Sunday to Thursday	Live Music/Recorded Music/Performance of Dance
09:00-02:00 Friday - Saturday	Opening Hours
09:00-01:00 Sunday to Thursday	Opening Hours

Figure 3. Brewdog Premises Licence Information

It is noted that for the prevention of public nuisance, all windows will be kept closed after 23:30 hours.

It is also relevant that the external chairs and tables for seated patrons allows for the same hours as the licence.

As discussed, it will be necessary to assess both entertainment noise as well as externally seated patrons.

2.4.1 Entertainment Noise

Given that live music is permitted, it is reasonable to consider brief periods of increased sound levels when bands are playing. It is not uncommon to find internal sound pressure levels for live music around 100dB $L_{Aeq,T}$ internally.

Given the snapshot images seen on google streetview it is reasonable to consider that the doors might be opened to allow for access and egress, albeit the door closest to the application site is stated as being a fire exit and potentially should remain closed.

It is possible to use a spectral profile to determine an indoor sound pressure level of 100dB for entertainment noise and consider how this propagates to the application site at 49 Grand Parade. The spectral profile was constructed using INSUL software and equates to 100dB $L_{Aeq,T}$

Frequency-Linear(Hz)	63	125	250	500	1000	2000	4000
Internal Entertainment	110.4	109.4	99.4	98.4	93.4	86.4	82.4

Figure 4. Spectral Profile for Indoor Live Music

2.4.2 Patron Noise

In numerous images from Google streetview, it is observed that there are 5 tables present, which would each at maximum occupancy take 4 persons. It is therefore a robust assumption of 20 external patrons and to present a worst case, a speaker to listener ratio of 1:1 has been assumed which allows for 10 individuals to be speaking and 10 to be listening. For those speaking it is reasonable to consider 50% ie 5 individuals to be speaking at a normal vocal effort and for 5 at a raised vocal effort.

2.5 Methodology

Given that it will not be possible to measure the commercial soundscape, a desktop assessment is necessary with worst case assumptions being applied to ensure that future occupants remain protected from adverse noise levels.

A noise modelling approach has been used which has allowed the worst-case information to be entered into the model and also for the model outputs to be quantified using rigorous calculations.

2.6 BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

Table 4 of BS8233:2014 provides the following guideline values:

Activity	Location	Time period of day	
		07:00-23:00	23:00-07:00
Resting	Living Rooms	35dB $L_{Aeq,16hour}$	-
Dining	Dining Room/Area	40dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$

Table 1. BS8233:2014 Criteria

It is relevant to note that Table 4 criteria in BS8233:2014 relates to continuous and anonymous sound. However, the soundscape generated by patron noise and/or live music propagating outside the premises might not be continuous and anonymous and it is therefore relevant to consider a worst-case hour against the 35dB $L_{Aeq,1\ hour}$ criteria.

2.7 National Planning Policy Framework – Dec 2023

The National Planning Policy Framework (Sept 2023) defines the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so.

The following paragraphs are relevant within NPPF Section 15 (Conserving and enhancing the natural environment) states the following:

Paragraph 180(e) - Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability, and

Paragraph 191 - 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; and

Paragraph 193– 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.

Of particular importance here is paragraph 193 whereby the client must safeguard future residents against adverse noise levels and by doing so, protects the Brewdog from complaints.

3 Noise Modelling Software

In order to see how noise varies at different positions around the proposed development it is possible to produce a noise contour map. A computer noise model has been completed using the computer package IMMI. Drawings of the area have been used to complete the noise

models and the topography of the location recreated. IMMI faithfully implements the propagation method of ISO-9613:1996; Acoustics – Attenuation of sound during propagation outdoors.

The noise modelling software predicts freefield and A weighted dB values.

3.1 Noise Model Inputs

The following modelling inputs were created.

- An area sound source was created for the footprint of the Brewdog premises.
- Inside the space, the indoor sound pressure level was set to 100dB $L_{Aeq,T}$ with a spectral profile consistent with entertainment noise
- In respect of external patrons, 10 individuals were located at the front of the premises, with 5 speaking in normal voices (ie 60dB $L_{Aeq,T}$ measured at 1m) and 5 speaking with a raised vocal effort (ie 66dB $L_{Aeq,T}$ measured at 1m). This represents full occupancy of the tables and a worst case of speakers/listeners ratio ie 1-1. The point sources for the external were entered as 1.5m above ground level.
- The model was set to include both live music and external patrons occurring simultaneously.
- The walls were stated as being cavity masonry with brick externally and lightweight block internally.
- The two doors opening onto Grand Parade were constructed into the Western elevation with these being 2.1m high and 1m wide. These included the fire door and the main access/egress door.
- The doors were assumed as a worst case to be open without any attenuation applied.
- A receptor position was placed at 1.5m in front of 49 Grand Parade to allow the model to consider the received sound pressure level at the application site.
- All noise data and additionally construction (ie walls) were entered with spectral content.
- Whilst the noise model inputs represent a worst case, it is still worth remembering that there remains a duty on the Brewdog premises not to cause a noise nuisance and ensure that their premises licence and any attached conditions remain complied with.

3.2 Noise Model Output

The noise model predicts 64.9dB L_{AeqT} at the application site. The benefit of using a noise modelling approach is that the spectral data can be extracted from the receive position.

The received noise spectra was as follows and has been used as part of a rigorous calculation to assess how sound is likely to enter 49 Grand Parade.

Frequency Spectra (Hz)-Linear	125	250	500	1000	2000	4000
Received spectra at 49 Grand Parade	89.7	78.7	76.8	70.8	62.6	56.9

Figure 5. Received Sound Pressure Level (linear-Hz)

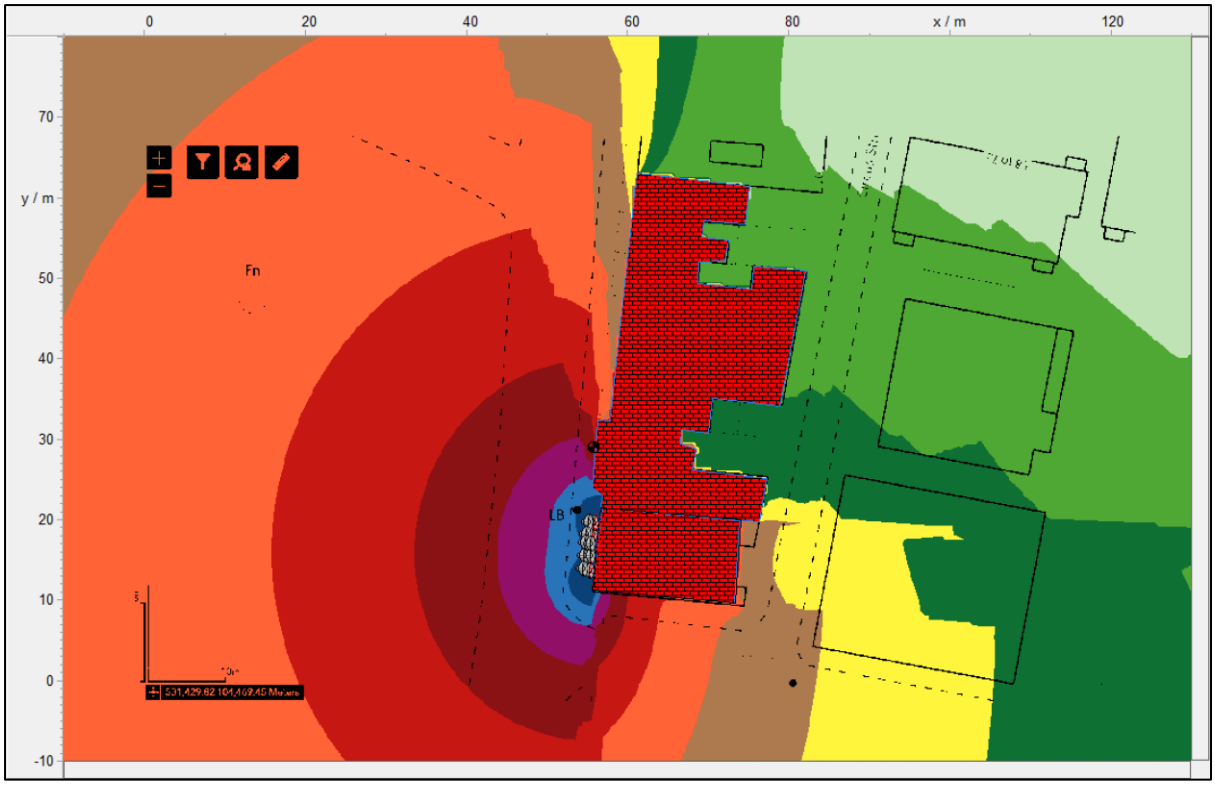

Figure 6. 2D Noise Model showing Contours

4 Rigorous Calculations for Noise Transfer, Outside to Inside

A rigorous calculation was made with the following information

- Freefield external Sound Pressure Level – 65dB $L_{Aeq,T}$
- Total Façade – 15.3m^2
- Total Glazed Area – 7.66m^2
- Available remaining façade – 7.64m^2
- A cavity masonry wall was assumed with brickwork exterior and lightweight blockwork internally.
- No Ceiling area calculation was necessary and as stated, the client's intention is for mechanical ventilation to duct from the quieter rear façade.
- An assumption was made that the current glazing is single glazed and present a worst-case scenario, 4mm was chosen.
- It is relevant to note that only commercial noise as required by the prior approval process has been assessed. The reality, is that road traffic noise levels at the site will be noticeable.

4.1 Existing Attenuation

Non Frequency Dependent Variables		
Term	Derivation	Value
A_o	Given in BS EN 20140-10 = 10 (m^2)	10
S_f	Total Facade Area (m^2)	15.3
S_{wi}	Window Area (m^2)	7.66
S_{ew}	External Wall Area (m^2)	7.64
S_{rr}	Ceiling Area (m^2)	0.0001
S	Total Area sound enters the room (m^2)	15.3001

Key for Table Below	
R_{wi}	Sound Reduction of Window (Octave)
R_{ew}	Sound Reduction Index of External Wall (Octa
R_{rr}	Sound Reduction Index of Roof/Ceiling (Octav
A	Equivalent Absorbtion Area of Rx Room
$D_{n,e}$	Insulation of Trickle Vent (BS EN 20140-10)

Frequency Dependent Variables							
		Octave Band Centre Frequency					
Term	Description	125	250	500	1000	2000	4000
$L_{eq,ff}$	Free-Field External Noise Level	75.3	65	63.6	57.5	49.7	44.1
$D_{n,e}$	No Vent	100	100	100	100	100	100
R_{wi}	4mm Single glazing	20	22	28	33	34	28
R_{ew}	Cavity Masonry (Brick Cavity with Insulation lightweight block)	41	39	44	52	60	65
R_{rr}	No Roof	100	100	100	100	100	100
A	Equivalent Absorbtion Area of Room (Copied from BS8233)	11.00	14.00	16.00	16.00	15.00	15.00

BS8233 Calculation Details						
	Octave Band Centre Frequency					
Term From Equation Below	125	250	500	1000	2000	4000
$L_{eq,ff}$	75.3	65	63.6	57.5	49.7	44.1
Ao/S . 10^(-Dn,e/10)	6.54E-11	6.54E-11	6.54E-11	6.54E-11	6.54E-11	6.54E-11
Swi/S . 10^(-Rwi/10)	0.005007	0.003159	0.000793	0.000251	0.000199	0.000793
Sew/S . 10^(-Rew/10)	3.97E-05	6.29E-05	1.99E-05	3.15E-06	4.99E-07	1.58E-07
Srr/S . 10^(-Rrr/10)	6.54E-16	6.54E-16	6.54E-16	6.54E-16	6.54E-16	6.54E-16
10log10(S/A)+3	4.433016	3.385662	2.805743	2.805743	3.08603	3.08603
Leq,2	56.76263	43.46659	35.50855	24.35528	15.79224	16.18224
A-Weighting	-16.1	-8.6	-3.2	0	1.2	1
A-Weighted Leq	**40.66263**	**34.86659**	**32.30855**	**24.35528**	**16.99224**	**17.18224**

A-Weigted Level Outside	**65**
BS8233 Predicted Internal A-Weigted Level	**42**
Prediced Building Envelope SRI	**23**

Living Room-49 Grand Parade

BS8233 Calculation can be seen below:

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

Figure 7. Rigorous Calculation - Likely Current Situation - No Mitigation Measures

The assessment indicates that a further reduction (7dB) is needed to achieve an internal sound pressure level of 35dB $L_{Aeq,1\ hour}$.

4.2 Proposed Attenuation

On the basis of the application site being in a likely conservation area, it is not likely that the glazing is capable of being replaced for a greater specification. Instead, it is plausible to remain in place and a secondary glazing system be applied to protect the end residents. For the avoidance of doubt, secondary glazing refers to leaving the current glazing in situ and adding a secondary layer behind/from the inside, where it is not noticeable.

The calculation was therefore changed to accommodate 6-100-4 (ie 6mm glass, 100mm airgap and 4mm glass).

Non Frequency Dependent Variables		
Term	**Derivation**	**Value**
A_o	Given in BS EN 20140-10 = 10 (m^2)	10
S_f	Total Facade Area (m^2)	15.3
S_{wi}	Window Area (m^2)	7.66
S_{ew}	External Wall Area (m^2)	7.64
S_{rr}	Ceiling Area (m^2)	0.0001
S	Total Area sound enters the room (m^2)	15.3001

Key for Table Below	
R_{wi}	Sound Reduction of Window (Octave)
R_{ew}	Sound Reduction Index of External Wall (Octa
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A	Equivalent Absorbtion Area of Rx Room
$D_{n,e}$	Insulation of Trickle Vent (BS EN 20140-10)

Frequency Dependent Variables							
		Octave Band Centre Frequency					
Term	**Description**	**125**	**250**	**500**	**1000**	**2000**	**4000**
$L_{eq,ff}$	Free-Field External Noise Level	75.3	65	63.6	57.5	49.7	44.1
$D_{n,e}$	No Vent	100	100	100	100	100	100
R_{wi}	6_100_4	26	34	44	56	53	52
R_{ew}	Cavity Masonry (Brick Cavity with Insulation lightweight block)	41	39	44	52	60	65
R_{rr}	No Roof	100	100	100	100	100	100
A	Equivalent Absorbtion Area of Room (Copied from BS8233)	11.00	14.00	16.00	16.00	15.00	15.00

BS8233 Calculation Details						
	Octave Band Centre Frequency					
Term From Equation Below	**125**	**250**	**500**	**1000**	**2000**	**4000**
$L_{eq,ff}$	75.3	65	63.6	57.5	49.7	44.1
Ao/S . 10^(-Dn,e/10)	6.54E-11	6.54E-11	6.54E-11	6.54E-11	6.54E-11	6.54E-11
Swi/S . 10^(-Rwi/10)	0.001258	0.000199	1.99E-05	1.26E-06	2.51E-06	3.16E-06
Sew/S . 10^(-Rew/10)	3.97E-05	6.29E-05	1.99E-05	3.15E-06	4.99E-07	1.58E-07
Srr/S . 10^(-Rrr/10)	6.54E-16	6.54E-16	6.54E-16	6.54E-16	6.54E-16	6.54E-16
10log10(S/A)+3	4.433016	3.385662	2.805743	2.805743	3.08603	3.08603
Leq,2	50.86322	32.57159	22.40572	6.748439	-2.43032	-7.6067
A-Weighting	-16.1	-8.6	-3.2	0	1.2	1
A-Weighted Leq	**34.76322**	**23.97159**	**19.20572**	**6.748439**	**-1.23032**	**-6.6067**

A-Weigted Level Outside	**65**
BS8233 Predicted Internal A-Weigted Level	**35**
Prediced Building Envelope SRI	**30**

Living Room-49 Grand Parade

BS8233 Calculation can be seen below:

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

Figure 8. Rigorous Calculation – Mitigation Measures Applied (Secondary Glazing)

It is evident that the use of secondary glazing and mechanical ventilation will achieve the required internal sound pressure level of 35dB $L_{Aeq,1\ hour}$. Thus, future residents remain protected from the commercial site soundscape.

5 Recommendations

It is strongly advised that secondary glazing is applied to protect the future occupants of 49 Grand Parade.

Whilst Pilkington glass was used in the assessment, the client is free to pursue alternative glazing providers. It is critical if doing so that the only metric for comparison is the $R_{traffic}$ which is also referred to as the $R_w+C_{tr.}$ The secondary glazing should have an $R_{traffic}$ of no less than 37dB (A). The $R_{traffic}$ would give an indication of attenuation performance against live music as well as external road traffic noise.

It is also advised that an absorbent material be placed in the window reveals between the glazing panels to ensure that the reverberant energy is capable of being absorbed.

Any mechanical extract ventilation would have to be carefully specified (a mechanical noise level of 24-26dB $L_{Aeq,T}$ or less) to ensure that it does not add to the internal soundscape and that future occupants do not switch the system off resulting in poor air quality.

If considering mechanical ventilation, 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 mechanical ventilation units should therefore be as quiet as possible when placed into the residential demise.

6 Conclusion

For the assessment of the commercial soundscape, the report has considered the proximity of the Brewdog premises at 52-54 Grand Parade, Brighton. Brewdog, aside from having a late licence, also has external seating for patrons and is licensed for live music.

Under section 191 of the National Planning Policy Framework (Dec, 2023), and specifically, the agent of change principal, it is necessary to protect future occupants from commercial sound sources.

Using worst case assumptions of maximum occupancy of the external tables, patrons speaking loudly and live music occurring (100dB L_{AeqT} internally) simultaneously with doors to the Brewdog premises open, the resulting sound pressure level from commercial activities at the Brewdog premises received at the application site is 65dB $L_{Aeq,1\ hour}$.

With single 4mm pane glazing assumed as the current glass configuration, this is not likely to provide sufficient attenuation against the received commercial soundscape. It is strongly recommended that the glazed areas be upgraded internally using secondary glazing (6-100-4) to protect the future occupants against adverse noise levels. It is noted that residential demises already exist at the upper floors.

It is noted that the client proposes mechanical ventilation which will source and extract air from the quieter Circus Street to the rear. The application also demonstrates good acoustic design in that the sensitive habitable space for the bedroom has been located away from the Grand Parade façade.

On the basis of the information presented, planning permission should not be withheld on noise grounds.