Chartered Building Consultancy

Acoustic South East

Noise Impact Assessment – Discharge of Condition

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Date: 02/08/2023

Project: J3404

Issue 1

Site: **2 Ann Street, Worthing**

Client: **Maplecroft Consultants Limited**

Constructionline Part of Capita plc

CQMS Safety Scheme

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Acoustic South East is a Trading Name of Acoustic Associates Sussex Ltd, Company Registration No: 5646519

Contents

1 Introduction and Executive Summary - 3 -

2 Context, Noise Criteria & Noise Assessment Methodology - 4 -

2.1 Context - 4 -
2.2 Consented Internal Layouts - 4 -
2.3 Previous Work Undertaken By Acoustic Associates Sussex Limited - 5 -
2.4 Building Works Implemented - 5 -
2.5 JD's Bar - 5 -
2.6 BS8233:2014 Noise Criteria - 6 -
2.7 CIBSE Guidance - 6 -
2.8 Methodology - 7 -

3 Environmental Sound Survey - 7 -

3.1 Unattended External Survey Methodology (Historic) - 7 -
3.2 Survey Details (Historic) - 8 -

4 Results of the Historic Unattended Sound Survey (External) - 8 -

4.1 Historic External Results for Ann Street (SP3) - 8 -
4.2 Required SRI for Ann Street Façade - 8 -

5 Measured Internal Sound Pressure Levels - 9 -

5.1 Worst Case Hour - 11 -
5.2 Worst Case Spectral Performance – 29/7/2023 – 22:00-23:00 hours - 11 -
5.3 Measured Internal Daytime/Night Time Sound Pressure Levels ($L_{Aeq,16hour}$/$L_{Aeq,\ 8\ hour}$) - 11 -

6 Inside to Outside Measurement - 12 -

7 Conclusion - 12 -

8 Appendix A – Reverberation Times - 13 -

Tables

Table 1: BS8233 Criteria - 6 -

Figures

Figure 1. Consented Internal Layout - 5 -
Figure 2. CIBSE Guide for Domestic NR Values - 6 -
Figure 3. Site Layout Showing Historic External Survey Locations - 7 -
Figure 4. Photographs of External Survey Locations - 8 -
Figure 5. Freefield results of Measured External Data - 8 -
Figure 6. Derived SRI Value for Ann Street Facade - 9 -
Figure 7. Location of Ground Floor Internal Survey. - 10 -

Figure 8. Measured Internal Hours (corrected) - 10 -
Figure 9. Spectral Content for Worst Case Hour (22:00-23:00 hours) - 11 -
Figure 10. Measured Internal Sound Pressure Levels (Kitchen/Lounge/Diner) - 11 -

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Issue 1	01/08/2023	Original Issue

1 Introduction and Executive Summary

Acoustic South East have been appointed to undertake an acoustic assessment to support the discharge of planning condition. Specifically, condition 2 of Notice/0015/21 relates to a scheme of works to protect the future occupants from noise. The permission granted by Adur and Worthing District Council allowed for the conversion of a workshop to residential properties.

Standards and guidance referenced for this assessment include:

- BS8233 (Sound insulation and noise reduction for buildings) 2014
- CIBSE Guide A, Environmental Design, 2015
- ProPG Planning Guidance, June 2017

Acoustic Associates Sussex Limited were previously engaged with the building adjacent at 7 Warwick Street and a historic external survey had been undertaken in July 2021 for the Ann Street Façade. Accordingly, a Sound Reduction Index (SRI) had been calculated for the Ann Street façade.

It should be noted that the ground floor of the converted premises relates to the kitchen/lounge/diner area and in both flats, the bedrooms are located at first floor level. There remains a commercial premises, JD's at basement level.

Internal measurements were made from 28th to 31st July 2023 in the ground floor lounge area. These identified daytime and night time sound pressure levels comfortably below the requirements of BS8233:2014 required by condition 2. For completeness, the L_{Amax} values were also reported and these remain comfortably below the requirements of ProPG2017.

Condition 2 also required a review of the Noise Rating values inside the property, albeit, a specific value had not been applied. For this reason, the CIBSE (Chartered Institution of Building Services Engineers) Guidance was consulted with an NR value of 30 for a kitchen lounge diner as being an appropriate threshold. When considering a worst-case measured hour (22:00-23:00 hours on Sat 29th July 2023), the measured spectral content was reviewed and was NR15, again comfortably below the CIBSE requirements of NR30.

The report therefore provides evidence that the requirements of condition 2 of Notice/0015/21 have been achieved and the local planning authority can therefore discharge condition 2 accordingly.

2 Context, Noise Criteria & Noise Assessment Methodology

2.1 Context

Planning consent has been granted by Adur and Worthing Council to change the use from a light industrial workshop (class E(G(III) to form 2 residential units (class C3) at 2 Ann Street. The consent was NOTICE/0015/21 and was dated 19/1/2022. Specifically, condition 2 is replicated for ease of reference below.

"02. Works for implementation of the development shall not commence until a scheme for protecting the proposed noise sensitive development from commercial noise (internal and external) has been submitted to and approved in writing by the local planning authority. The scheme shall have regard to the principles contained within the World Health Organisation community noise guidelines and achieve the good indoor ambient noise levels for dwellings specified in BS:8233:2014. The scheme should consider the frequency element of music and the use of NR curves. The scheme shall include full details of glazing and a strategy to prevent overheating. The noise level of any ventilation units when in use should not exceed the levels specified in BS:8233:2014 and all duct work should be fitted on anti-vibration mountings. No dwelling shall be occupied unless and until the approved scheme has been implemented. Within 1 month of implementation a test shall be carried out to demonstrate that the attenuation measures carried out as part of the approved scheme are effective and achieve the specified criteria, and any consequential modifications to the noise insulation scheme shall be completed."

Whilst the planning condition states that the scheme should include a strategy to prevent overheating, it should be noted that overheating does not apply for a change of use.

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).

2.2 Consented Internal Layouts

The consented layout is seen below in Figure 1 and attention is drawn to the fact that bedrooms are located on upper levels.



Figure 1. Consented Internal Layout

2.3 Previous Work Undertaken By Acoustic Associates Sussex Limited

It is noted that survey work was previously undertaken by Acoustic Associates Sussex Limited in July 2021 for 7 Warwick Street, which included survey positions relevant to this current assessment and which will be applied from **Report Number** J3221 dated 26th July 2021.

2.4 Building Works Implemented

It is understood from the client's builders than enhanced flooring at ground floor level has been applied, and that secondary glazing has been implemented. The secondary glazing was noted to utilise 210mm between glazing for the kitchen/living/diner and 220mm for the bedrooms at first floor level.

2.5 JD's Bar

From the previous assessment, the following is understood and has been confirmed with the business to ensure that the information remains relevant.

Closed Monday and Tuesday

Open –

Wednesday-18:00 to 00:00

Thursday – Saturday – 18:00-02:30

Sunday -18:00-23:30

2.6 BS8233:2014 Noise Criteria

Table 4 of BS8233 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 Criteria

It is relevant to note that Table 4 criteria in BS8233:2014 relates to continuous and anonymous sound. Where there is sound which has qualities which might attract a listener's attention, it may be relevant to consider a lower internal sound pressure level requirement. Alternatively, a worst-case hour approach may also be considered.

2.7 CIBSE Guidance

Condition 2 of the planning permission makes reference to consideration of Noise Rating Curves or NR Curves, but is silent on what these should be. Therefore, the Chartered Institution of Building Services Engineers has been referenced to identify relevant criterion to apply. From Figure 2 below it is seen that NR30 will be appropriate to apply ensuring protective levels inside the ground floor kitchen/lounge/diner.

Table 1.5 Recommended comfort criteria for specific applications

Building/room type	Customary winter operative temperatures for stated activity and clothing levels*			Customary summer operative temperatures (air conditioned buildings†) for stated activity and clothing levels*			Suggested air supply rate / ($L \cdot s^{-1}$ per person unless stated otherwise)	Filtration grade‡	Maintained illuminance¶ / lux	Noise criterion§		
	Temp. / °C	Activity / met	Clothing / clo	Temp. / °C	Activity / met	Clothing / clo				NR	dBA§	dBC§
Airport terminals:												
— baggage reclaim	12–19[1]	1.8	1.2	21–25	1.3	0.6	10[2]	F6–F7	200	45	50	75
— check-in areas[3]	18–20	1.4	1.2	21–25	1.3	0.6	10[2]	F6–F7	500[4]	45	50	75
— concourse (no seats)	19–24[1]	1.8	1.2	21–25	1.3	0.6	10[2]	F6–F7	200	45	50	75
— customs area	18–20	1.4	1.2	21–25	1.3	0.6	10[2]	F6–F7	500	45	50	75
— departure lounge	19–21	1.3	1.2	22–25	1.2	0.6	10[2]	F6–F7	200	40	45	70
Art galleries — see Museums and art galleries												
Banks, building societies, post offices:												
— counters	19–21	1.4	1.0	21–25	1.3	0.6	10[2]	F6–F7	500	35–40	40–45	65–70
— public areas	19–21	1.4	1.0	21–25	1.3	0.6	10[2]	F5–F7	300	35–45	40–45	65–70
Bars/lounges	20–22	1.3	1.0	22–25	1.3	0.6	10[2]	F5–F7	100–200[5]	30–40	35–45	60–70
Bus/coach stations — see Railway/coach stations												
Churches	19–21	1.3	1.2	22–25	1.3	0.6	10[2]	G4–F6	100–200	25–30[6]	30–35	55–60
Computer rooms[7]	19–21	1.4	1.0	21–25	1.3	0.6	10[2]	F7–F9	300	35–45	40–50	65–75
Conference/board rooms	22–23	1.1	1.0	23–25	1.1	0.6	10[2]	F6–F7	300/500[8]	25–30	30–35	55–60
Drawing offices	19–21	1.4	1.0	21–25	1.3	0.6	10[2]	F7	750	35–45	40–50	65–75
Dwellings:												
— bathrooms	20–22	—	—	23–25	—	—	15 $L \cdot s^{-1}$	G2–G4 (extract)[9]	150[4]	—	—	—
— bedrooms	17–19	0.9	2.5	23–25	0.9	1.2	0.4–1 ACH to control moisture[9]	G2–G4	100[4]	25	30	55
— hall/stairs/landings	19–24[1]	—	—	21–25[1]	—	—	—	—	100	—	—	—
— kitchen	17–19	1.6	1.0	21–25	1.5	0.5	60 $L \cdot s^{-1}$	G2–G4 (extract)[9]	150–300	40–45	45–50	70–75
— living rooms	22–23	1.1	1.0	23–25	1.1	0.6	0.4–1 ACH to control moisture[9]	G2–G4	50–300	30	35	60

Figure 2. CIBSE Guide for Domestic NR Values

2.8 Methodology

To understand the noise impact of the commercial premises, a class 1 sound level meter was left in the ground floor flat over a weekend, when the bar was known to have been open. The sound level meter recorded both $L_{Aeq,T}$ and L_{Amax} parameters as well as spectral content which was post processed in 1 minute readings.

The measured spectral content was used to derive a noise rating curve value or NR value inside the vacant ground floor kitchen/lounge/diner.

3 Environmental Sound Survey

3.1 Unattended External Survey Methodology (Historic)

Unattended external surveys were conducted over the weekend of the 9th to the 12th of July 2021. The weekend dates were chosen as it is the dates when Warwick Street is at its busiest and venues such as Cheers 2/JD's were open. Of specific note for this assessment is SP3 for the assessment of Ann Street.

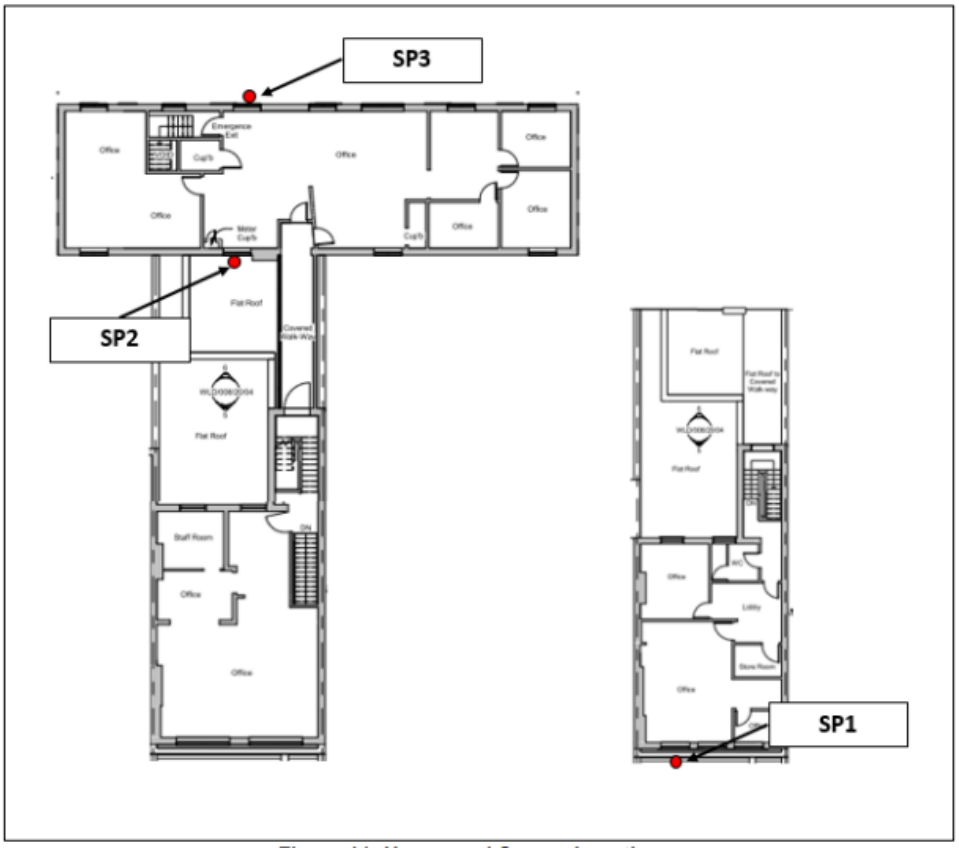

Figure 3. Site Layout Showing Historic External Survey Locations



Figure 4. Photographs of External Survey Locations

3.2 Survey Details (Historic)

Survey carried out by:
- Martyn Chambers BA (Hons) MSc PGDip: Acoustics AMIOA

Equipment used:
- SP3: 01dB Symphonie (Channel 2)

Weather conditions:
- Dry and below 5ms in terms of wind speed.

At all the unattended survey locations the measurements were taken approximately 0.5m from the façade and were therefore façade measurements. These were subsequently converted to freefield measurements with a 3dB has been subtraction from the dataset.

4 Results of the Historic Unattended Sound Survey (External)

4.1 Historic External Results for Ann Street (SP3)

Date (2021) July	Day	Time Period	Freefield Level $L_{Aeq,16hr/8hr}$ – dB(A)		
			SP1	SP2	SP3
10th	Saturday	07:00-23:00hrs	57.9	55.0	60.9
11th	Sunday	07:00-23:00hrs	56.6	54.6	59.9
Arithmetic Average	**All days**	**07:00-23:00hrs**	**57.3**	**54.8**	**60.4**
9th/10th	Fri/Sat	23:00-07:00hrs	54.8	54.7	60.0
10th/11th	Sat/Sun	23:00-07:00hrs	54.6	56.1	59.5
11th/12th	Sun/Mon	23:00-07:00hrs	55.6	54.8	62.9
Arithmetic Average	**All Nights**	**23:00-07:00hrs**	**55.0**	**55.2**	**60.8**

Figure 5. Freefield results of Measured External Data

4.2 Required SRI for Ann Street Façade

For the Ann Street façade, the necessary SRI was derived as 32.9dB.

Location	Worst-case LAeq,16Hour dB (DAY) Measured	Lowest BS8233 Criterion (Day)	Req SRI	Worst-case LAeq,8Hour dB (Night) Measured	Lowest BS8233 Criterion (Night)	Req SRI
Ann Street	60.9	35	25.9	62.9	30	32.9

Figure 6. Derived SRI Value for Ann Street Facade

5 Measured Internal Sound Pressure Levels

A class one sound level meter was left running inside 2 Ann Street from 13:00 on 28th July 2023 to 13:00 hours Monday 31st July 2023.

The measurements were made in the ground floor kitchen/lounge/diner area to specifically identify any noise breakthrough from the commercial JD's bar below. It is noted that the bedrooms for both residential units are all located on upper levels (first floor).

It was recognised that the living/dining room area where measurements took place was highly reverberant with hard finishes. To counter this, a number of reverberation time (RT) measurements were made in the space to allow an adjustment to be made to consider a furnished space. The reverberation time is the time taken for a sound signal to decay by 60dB.

A number of RT tests were carried out within the space and these are detailed in Appendix A. In summary, they show that the adjustment for a furnished residential premises would be a subtraction of 3.9dB from the measured values.

It was noted also on collection of the survey equipment that the door to the kitchen/lounge had been opened and that the builders had worked in or near the site on the Saturday morning. This is reflected in the measured data for the Saturday morning and lends credence to reviewing night time data as well as the Sunday when builders were not present.



Figure 7. Location of Ground Floor Internal Survey.

The measured internal sound pressure levels were as follows and are adjusted to take account of the reverberant space. Note the Saturday morning orange trace where construction work was being undertaken on the Saturday morning.

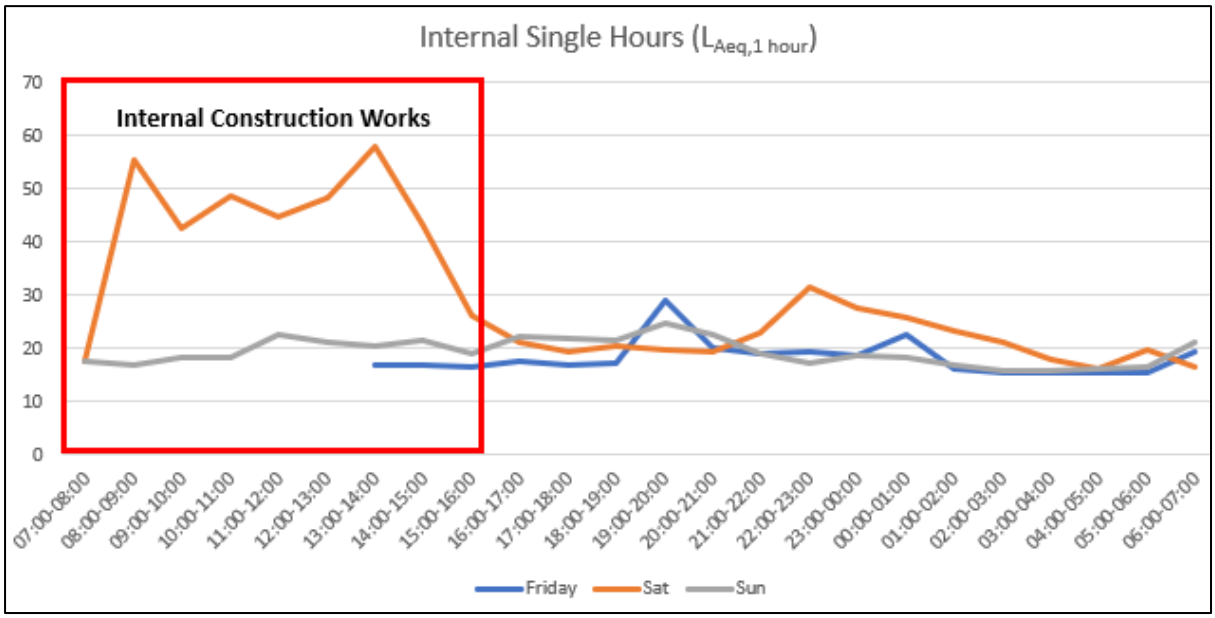

Figure 8. Measured Internal Hours (corrected)

5.1 Worst Case Hour

The worst-case hour was seen to be Saturday evening between 22:00 and 23:00 hours with a sound pressure level of 31.7 dB $L_{Aeq,1\ hour}$. This is comfortably below the table 4 values detailed in BS8233:2014 (see table 1 above) 35-40dB $L_{Aeq,16\ hour}$.

5.2 Worst Case Spectral Performance – 29/7/2023 – 22:00-23:00 hours

The spectral content to enable an NR curve to be calculated is as follows and has been calculated to include the reverberation time correction for the kitchen/lounge/diner.

Frequency (Linear)-Hz	31	63	125	250	500	1000	2000	4000	8000
Measured Internal Sound Pressure Level	29.8	33.0	31.7	25.6	18.5	14.5	9.3	8.7	1.1

Figure 9. Spectral Content for Worst Case Hour (22:00-23:00 hours)

The calculated NR curve based on the spectral content is NR15. This is comfortably below the CIBSE requirement for a kitchen lounge diner of NR30.

5.3 Measured Internal Daytime/Night Time Sound Pressure Levels ($L_{Aeq,16hour}$/$L_{Aeq,\ 8\ hour}$)

As discussed, internal construction site noise for other parts of the building impacted the data for the Saturday morning. However, the Sunday daytime period and the night time periods remain suitable for assessment. The reported data has been adjusted to take account of the reverberant surfaces/finish.

Period	Measured Internal Sound Pressure Level (dB $L_{Aeq,\ T}$)
Day 1 (Sat)	48.8
Day 2 (Sun)	20.9
Night 1 (Fri)	18.2
Night 2 (Sat)	22.9
Night 3 (Sun)	17.8
Daytime-$L_{Aeq,\ 16\ hour}$, Night Time $L_{Aeq,\ 8\ hour}$	

Figure 10. Measured Internal Sound Pressure Levels (Kitchen/Lounge/Diner)

The measured sound pressure levels comfortably achieve BS8233:2014 table 4 values. It is relevant to note that the table 4 BS8233:2014 values apply to sound which is continuous and anonymous and sounds from patrons/entertainment noise may require a lower value to be applied. Notwithstanding this, the measured internal values are comfortably achieved even with a lower value applied, and even considering an approach considering worst case hours, as these have been detailed in Figure 8 above.

Whilst not required by the condition, the dataset also included exceedances of L_{Amax} events inside the property. Strictly speaking, these would not apply to a lounge area, but with bedrooms above with a similar glazing configuration, there were only two single exceedances above 45dB L_{Amax} for night 1 and no exceedances for nights 2 and 3.

6 Inside to Outside Measurement

Whilst the internal survey was running inside F1, as detailed in section 5 above, a measurement was made at façade level also at ground floor on Ann Street. This detailed the sound pressure levels externally measured at exactly the same time period as the internal survey clock in order to demonstrate the level difference between inside and outside, and thus the measured sound reduction index (SRI). This was done for a 5-minute period.

The measured inside sound pressure level for the period was 21.8dB $L_{Aeq,\ 5minutes}$.

The measured outside sound pressure level for the same period was 54.6dB $L_{Aeq,5minutes}$.

The Sound Reduction Index (SRI) offered by the façade was therefore 32.8dB. This is consistent with the previous reporting by AASL albeit 0.1dB different which is negligible.

7 Conclusion

Acoustic Associates Sussex Limited were previously engaged with the building adjacent at 7 Warwick Street and a historic external survey had been undertaken in July 2021 for the Ann Street Façade. A sound reduction index had been recommended.

It should be noted that the ground floor of the converted premises relates to the kitchen/lounge/diner area and in both flats, the bedrooms are located at first floor level. There remains a commercial premises, JD's at basement level.

Internal measurements were made from 28th to 31st July 2023 in the ground floor lounge area. These identified daytime and night time sound pressure levels comfortably below the requirements of BS8233:2014 required by condition 2. For completeness, the L_{Amax} values were also reported and these remain comfortably below the requirements of ProPG2017.

Condition 2 also required a review of the Noise Rating values inside the property, albeit, a specific value had not been applied. For this reason, the CIBSE (Chartered Institution of Building Services Engineers) Guidance was consulted with an NR value of 30 for a kitchen lounge diner as being an appropriate threshold. When considering a worst-case measured hour (22:00-23:00 hours on Sat 29th July 2023), the measured spectral content was reviewed and was NR15, again comfortably below the CIBSE requirements of NR30.

The report therefore provides evidence that the requirements of condition 2 of Notice/0015/21 have been achieved and the local planning authority can therefore discharge condition 2 accordingly.

8 Appendix A – Reverberation Times

Frequency (Linear)-Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	
Reading 1	0.7	0.3	0.7	0.7	0.7	1.0	0.8	1.1	1.3	1.5	1.5	1.7	2.0	1.9	1.9	1.7	1.4	1.5	1.5	1.4	1.3	1.2	1.1	0.9	Arithmetic Average across Specrum
Reading 2	0.8	0.5	0.5	0.7	0.4	0.6	1.1	1.2	1.6	2.0	1.5	1.7	1.7	1.8	1.6	1.6	1.3	1.4	1.5	1.5	1.3	1.2	1.1	0.9	
Reading 3	0.8	0.7	0.5	0.3	0.4	0.7	1.0	1.6	1.7	1.4	1.5	1.8	1.9	1.8	1.5	1.4	1.3	1.4	1.5	1.4	1.3	1.2	1.0	0.8	
Reading 4	0.7	0.6	0.8	0.6	0.8	0.9	1.2	1.4	1.4	1.4	1.6	2.1	1.9	1.7	1.7	1.6	1.4	1.6	1.4	1.4	1.3	1.2	1.0	0.9	
Reading 5	0.6	0.3	0.4	0.5	0.6	0.8	0.9	1.9	1.5	1.6	1.7	1.9	1.7	1.7	1.6	1.6	1.3	1.6	1.6	1.4	1.5	1.2	1.0	0.8	
Reading 6	0.8	0.4	1.2	0.6	0.7	0.8	0.9	1.5	1.5	1.5	1.8	1.9	1.7	1.7	1.5	1.5	1.5	1.5	1.4	1.4	1.3	1.3	1.0	0.8	
Reading 7	0.7	0.4	0.4	0.5	0.6	0.3	0.8	1.5	1.5	1.3	1.7	1.9	2.1	1.8	1.7	1.6	1.4	1.5	1.5	1.4	1.3	1.2	1.0	0.8	
Reading 8	1.0	0.3	0.5	1.1	0.7	0.6	1.9	1.4	1.6	1.3	1.6	1.8	1.7	1.8	1.6	1.6	1.4	1.4	1.4	1.4	1.4	1.2	1.0	0.8	
Arithmetic Average	0.8	0.4	0.6	0.6	0.6	0.7	1.1	1.4	1.5	1.5	1.6	1.8	1.8	1.8	1.6	1.6	1.4	1.5	1.5	1.4	1.3	1.2	1.0	0.8	**1.2**
Ajustment	**3.92**																								