



Our ref: P4094/L01/DMT
Your ref:

02 February 2022

By email only: paul@astillassociates.com

Dear Paul,

White Lion, Stockport – Noise Assessment for Planning

1.0 INTRODUCTION

- 1.1 AEC has been instructed by Astill Associates to assess the potential noise impact of the proposed refurbishment of the ground floor public house at the White Lion, Stockport. As part of the refurbishment, kitchen extract and air condition plant will be located externally at the rear of the building.
- 1.2 The site is in the centre of Stockport at the junction of Great Underbank and Lower Hillgate and the upper floors have been converted to residential apartments. The first-floor apartments are the nearest noise sensitive receptors to the scheme.
- 1.3 AEC understand that the intension is for the venue to have a traditional pub atmosphere, with only low-level background music being played through small speakers. The venue will serve food and it is understood that it will have typical operating times.
- 1.4 The sound insulation performance of the separating floor between the ground and 1st floors has also been assessed, and a baseline noise survey was undertaken in the late evening/night period, to inform this assessment.
- 1.5 This report presents the following:
 - assessment criteria
 - baseline noise survey
 - assessment of external building services plant
 - assessment of pub noise break-out
 - assessment of internal sound transfer to the apartments above
- 1.6 Acoustic terminology using in this report is presented in Appendix A.

2.0 ASSESSMENT CRITERIA

External Building Services Plant

- 2.1 Based on previous schemes AEC has worked on for submission to Stockport Metropolitan Borough Council (SMBC), AEC understand that any items of building services plant should be assessed using BS4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*' (BS4142), and that the 'rating' level should be at least -5dB below the existing background noise level at the nearest noise sensitive residential receptor(s). BS4142 states that a 'rating' level below the background noise level indicates a low impact, depending on context.

Pub Noise Break-out

- 2.2 As the main source of noise will be patrons talking with some background music, it is recommended that the noise (L_{Aeq}) breaking out of the building envelope should be controlled such that it does not exceed the existing background noise levels (L_{A90}) at the nearby noise sensitive receptors. This approach may need to be agreed with SMBC.

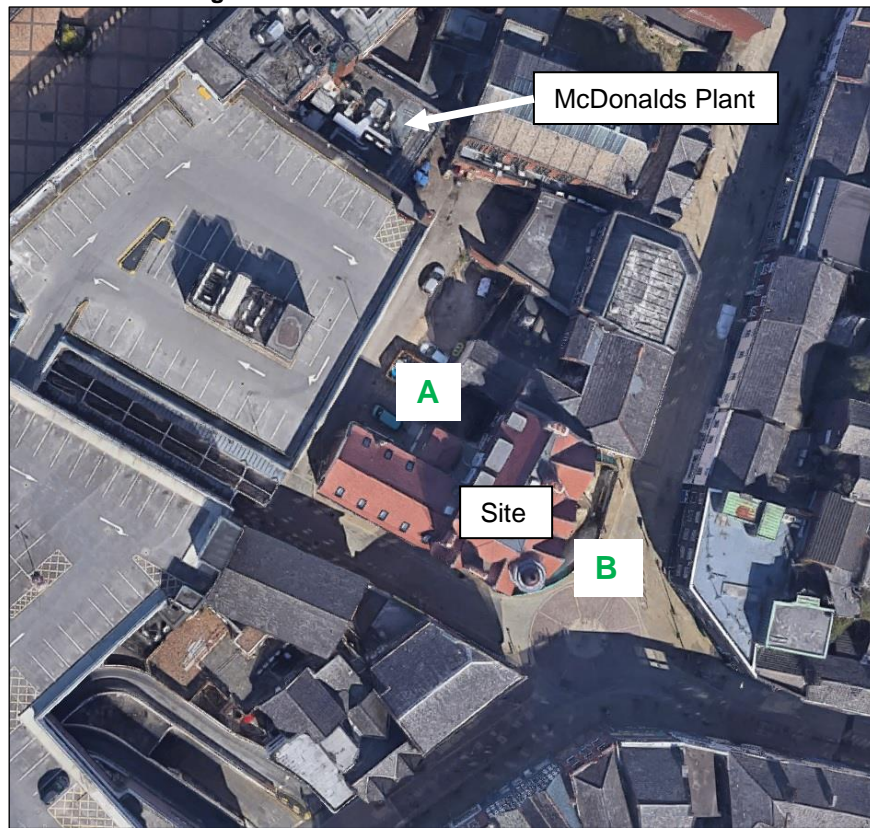
Internal Sound Transfer to the Residential Apartments Above

- 2.3 The separating floor between the ground floor and apartments above should achieve a minimum sound insulation performance of $43dBD_{nT,w}+C_{tr}$, to meet the requirements of Building Regulations, Approved Document E.
- 2.4 However, to further protect the residents of the apartments above, a suitable noise level limit should be set in the apartments above due to noise from the ground floor. A suitable limit would be for the average ambient noise level (L_{eq}) in the living rooms and bedrooms of the apartments, to not typically exceed the NR20 curve in each octave band between 63Hz and 4kHz (inclusive).

3.0 BASELINE NOISE SURVEY

- 3.1 Noise measurements were undertaken to the rear and front of the property (identified as 'A', and 'B' on Figure 3.1) by AEC between 2135h to 2330h on Tuesday 01 February 2022.
- 3.2 The measurement survey was undertaken in general accordance with BS7445-1: 2003 '*Description and measurement of environmental noise. Guide to quantities and procedures*'.
- 3.3 A full measurement procedure is presented in Appendix B and a summary of the measured data is presented in Table B1.
- 3.4 The noise climate was dominated by building services plant associated with the existing McDonalds located 30 metres to the north and road traffic noise from the M60 approximately 200 metres to the north and west. There were other local noise sources such as cars and pedestrians, and aircraft fly overs which are louder than all other noise sources.

Figure 3.1 – Measurement Locations



- 3.5 The typical measured ambient (L_{Aeq}) and background (L_{A90}) noise levels are summarised in Table 3.1 below.

Table 3.1 – Summary of Measured External Noise Levels (2100-2330h)

Location	Noise levels, dB	
	$L_{Aeq,T}$	$L_{A90,T}$
Rear 'A'	50*	49
Front 'B'	52*	50

*Ambient noise levels are around 10dB higher when including aircraft noise

- 3.6 The maximum noise levels from aircraft, affecting the existing apartments, are around $80dB L_{Amax,F..}$ Aircraft events were regular during the survey (approximately every 15 minutes) in the late evening and into the night-time period.

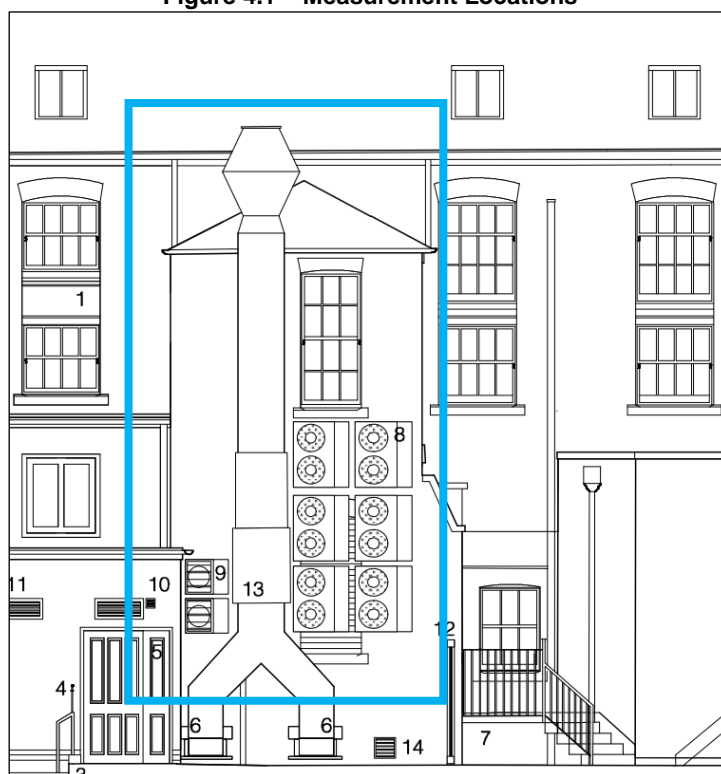
4.0 NOISE ASSESSMENT

- 4.1 This assessment considers external building services plant, noise break-out and internal noise transfer, associated with the proposed development.

External Building Services Plant

- 4.2 The external plant is located on the rear façade of the apartment stairs as shown in Figure 4.1 below. The window adjacent to the plant is only to a stairwell. The plant has been located to maximise the natural acoustic screening provided by the building, to the residential apartment windows.

Figure 4.1 – Measurement Locations



- 4.3 The plant to be installed, and its associated noise levels, are provided in Table 4.1 below:

Table 4.1 – Plant Noise Levels

Plant	Noise levels, dBA @1m	Comments
6 x Airconditioning Outdoor Units (SUZ-M60VAR2)	59	51dBA each unit
2 x Celler cooling units	54	51dBA each unit (assumed)
Extract Fan Case Breakout SEL355/4-1AC	40	Based on 48dBL _{WA} sound power level.
Outlet noise level SEL355/4-1AC Including 1D silencer	39	67dBL _{WA} Outlet sound power level.

4.4 Based on the above noise levels additional corrections have been made for:

- Distance attenuation to the nearest residential properties (at least 3 metres assumed)
- Acoustic screening provided by the building (-10dB)
- Flue noise only - 1 x duct diameter acoustic silencer (see indicative specification below)

4.5 The resulting noise levels at the nearest residential properties are calculated and presented below and compared to the criteria.

Table 4.2 – Plant Noise Level Assessment at Rear Apartments (Location A)

Plant	Noise levels, dBA @1m	Distance (dBA)	Screening (dBA)	Silencer (dBA)	Noise levels, dB $L_{Aeq,T}$ @ Receptors
6 x Airconditioning Outdoor Units (SUZ-M60VAR2)	59	-9	-10	-	40
2 x Celler cooling units	54	-9	-10	-	35
Extract Fan Case Breakout SEL355/4-1AC	40	-9	-10	-	21
Outlet noise level SEL355/4-1AC Including 1D silencer	39	-9	-	-10	20
Total Specific Noise Level (dBL _{Aeq,T})					41
Rating Correction (see below)					+3
Rating Level (dBL _{Ar,Tr})					44
Criteria (dBL _{Ar,Tr}) (Location A dBL _{A90,T} – 5dB)					44

4.6 A +3dB rating correction has been applied as the air conditioning units may have some character or intermittency, however, this is conservative as this character is unlikely to be detectable due to the relatively high existing background noise levels.

4.7 The assessment uncertainty is low because relatively robust and worst-case assumptions have been made regarding all plant operating at full duty. Therefore, SMBC's requirement that noise from building services plant is controlled to 5dB below background would be achieved.

4.8 The indicative atmosphere side silencer specification is presented below.

Table 4.3 – Indicative Minimum Silencer Insertion Loss Performance

Item length	Insertion Loss (dB) in Each Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
1 x Diameter	-2	-5	-6	-9	-13	-11	-6	-6

4.9 AEC should review any changes to final fan and silencer specifications to ensure the above assessment does not change.

Pub Noise Break-out

- 4.10 It is understood that internal ambient noise levels in the pub would need to be limited to around 87dBA to meet the suggested criteria. This ambient noise level limit (L_{Aeq}) would be suitable for a lively town centre public house with background music.
- 4.11 Based on the above worst case noise level, the elevations provided, and assuming double glazed windows are closed (approximately 30dBR_w), a noise break-out calculation has been undertaken which indicates that external noise levels at the nearest apartments above would be approximately 45dBL_{Aeq,T} outside the closest properties on the front elevation and around 40dBL_{Aeq,T} on the rear elevation.
- 4.12 This is significantly below the lowest ambient noise levels and below the lowest background noise levels measured during the baseline noise survey.
- 4.13 It is understood that the main entrance will have lobby door arrangement to ensure that noise break-out via the door is controlled. These doors should not be left open in the late evening.
- 4.14 Based on the above, noise break-out would be suitably controlled.

Internal sound transfer to the residential apartments above

- 4.15 In July 2021, sound insulation measurements were undertaken from the ground floor to the apartments above on the first-floor. The measured airborne sound insulation performances of the existing floor are presented in Table 4.4, below.

Table 4.4 – Measured Sound Insulation Performances (dB D_w) of Separating Floor

Source Room	Receiving Room	Octave Band Centre Frequency, Hz							Overall dB D _{nT,w} + C _{tr}
		63	125	250	500	1k	2k	4k	
Ground Floor Proposed Public House	First Floor Apartment Living Room	37	37	45	54	62	62	67	50
	First Floor Apartment Bedroom	36	39	45	55	63	66	70	52

- 4.16 Based on the measured sound insulation presented above the noise levels in the bedrooms (worst-case) of the apartments above are calculated and compared to the criteria in Table 4.5 below.

Table 4.5 – Comparison of Calculated Noise Level in the Main Bedroom with the Criteria

Noise Element	Noise Level, dB @ Octave Band Centre Frequency, Hz						
	63	125	250	500	1k	2k	4k
Noise Level in Ground Floor	85	85	82	82	82	80	80
Measured Level Difference of Floor	-36	-39	-45	-55	-63	-66	-70
[A] Resultant Noise Level in Second Floor Bedroom	49	46	37	27	19	14	10
[B] Criteria (NR20)	51	39	31	24	20	17	14
[A-B] Exceedance over Criteria	-2	+7	+6	+3	-1	-3	-4

- 4.5 It is understood that an additional ceiling will be formed below the existing ceiling comprising:
- 2 layers of 12.5mm British Gypsum SoundBloc (or board of equivalent mass) supported off acoustic hangers / or lightweight MF grid, forming a cavity of at least 100mm, partially filled with 50mm mineral wool (>30kg/m³).
- 4.6 The above ceiling (or similar) could be tapered up slightly where needed at the external windows. The proposed additional ceiling should provide the additional benefit needed to meet the suggested criteria above. The final performance of the full floor and ceiling will be tested once all works are completed and an appropriate noise level limit for background music can be set if needed.

Summary

- 4.8 Based on all the above, provided the mitigation measures discussed are implemented, the noise associated with the public house can be suitably controlled and should not be considered a determining factor when deciding on planning permission.

I trust the above is clear and of assistance.

Yours sincerely



David Terry

Checked by: *PSK*

APPENDIX A – Acoustic Terminology in Brief

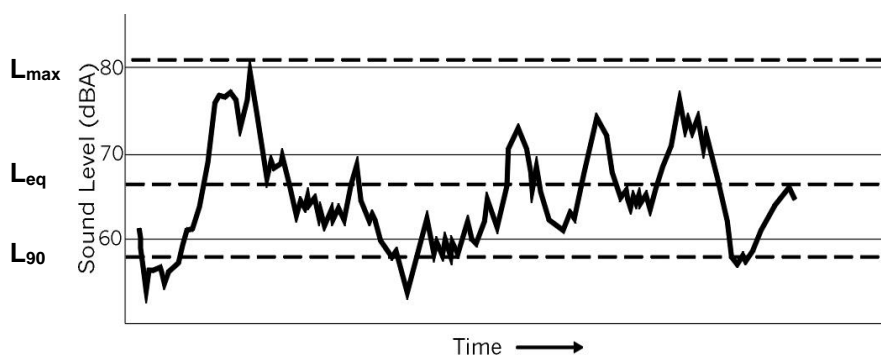
Sound is rapid pressure fluctuations in the air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz (*Hz*), that is, cycles per second. The human ear is sensitive to sounds from about 20Hz to 20kHz. Although sound can be of one discrete frequency (pure tone), most sound is made up of many frequencies.

The human ear is more sensitive to some frequencies than others, and modern instruments can measure sound in the same subjective way. This is the basis of the A-weighted sound pressure level *dBA*, normally used to assess the effect of noise on people. The dBA weighting emphasises or reduces the importance of certain frequencies within the audible range.

Sound Units

In order to assess environmental noise, measurements are carried out by sampling over specific periods of time, such as fifteen minutes or one hour, the statistically determined results being used to quantify various aspects of the sound.

The figure below shows an example of sound level varying with time. Because of this time variation the same period of sound can be described by several different levels. The most common of these are described below. It should be noted that in many instances in the main body of text, the unit will be preceded by a dB descriptor in the report e.g. $L_{Aeq,T}$ could be written $dBL_{Aeq,T}$.



Example of Sound Level Varying With Time

$L_{Aeq,T}$	The equivalent continuous (A-weighted) sound level. It may be thought of as the “average” sound level over a given time, T. It is used for assessing noise from various sources: industrial and commercial premises, construction sites, railways and other intermittent noises and can be considered as the “ambient” noise level.
$L_{A90,T}$	The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value often used to describe background noise.
L_{Amax}	The maximum (A-weighted) sound level measured during a given time. ‘Fast’ or ‘Slow’ meter response should be cited.
Free-field	The sound level measured outside, away from (>3.5m) reflecting surfaces.
Façade Level	This refers to the sound level measured outside, at 1m from a hard reflecting surface, typically 3dB greater than the free-field level.

APPENDIX B – Noise Survey Details

Date & Time of Survey:	Tuesday 01 February 2022 - 2135 to 2330h.					
Personnel:	David Terry (AEC).					
Equipment Used:	B&K 2250 Real Time Analyser (AEC Kit 1)					
Calibration:	The sound level analyser, which conforms to BS EN 61672-1: 2003 ' <i>Electro acoustics – sound level meters - Part 1 Specifications</i> ' for Class 1 Type Z meters, was in calibration and check calibrated before and after the measurement periods using a Brüel & Kjær type 4231 (94dB) calibrator. There was no significant drift of calibration. Calibration certificates are available on request.					
Weather Conditions:	Date	Period	Wet/Dry	Temp°C	Wind Speed & Direction	Cloud Cover
	01.02.22	Evening/Night	Dry	10°C	South-westerly Light 1-2m/s	60%
Measurement Location:	Location A – at the rear of the proposed development. Outside apartment windows. Location B – at the front of the proposed development. Outside apartment windows.					
Measurement Details:	Measurements were 5 to 10 minutes in duration.					
Façade / Free-Field:	Location A – Free-field (although generally a built-up area with reflections) Location B – Free-field (although generally a built-up area with reflections)					
	Full results for the attended measurements are given in Table B1.					
Measured Data:	Full 1/3 octave band frequency data was obtained for all measurements.					

TABLE B1 – Measured Evening Noise Levels

Location	Period, h	Noise Level, dB			Comments
		L _{Aeq}	L _{A90}	L _{Amax, F}	
A	2135-2145h	52.5	51.3	59.6	Constant plant from McDonalds and Distant Road Traffic Noise (RTN) on M60, reducing slightly in the later measurements.
	2200-2210h	51.4	50.3	58.8	
	2249-2259h	49.7	48.0	57.9	
	2325-2330h	50.0	48.8	53.1	
B	2145-2155h	61.8	51.1	79.5	Aircraft = maximum and dominant on L _{Aeq} .
	2215-2225h	52.4	49.8	63.1	Distant RTN
	2305-2310h	49.9	46.8	62.7	Distant RTN