Attachment C

Acoustic Report

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20 March 2024

6122R20240314asEllenCafe

Ellen Cafe

[redacted]

NOISE COMPLAINT REVIEW – ELLEN CAFE

153/18 Huntley Street, Alexandria

INTRODUCTION

Koikas Acoustics Pty Ltd was engaged by the operator/s of Ellen Café at U153 18 Huntley Street, Alexandria to conduct a compliance review of the existing Cafe operations in relation to potentially excessive noise impacts within Unit 20 of the same complex (the complainant). Unit 20 of 18 Huntley Street, Alexandria is located immediately above the café on the first-floor level of the building.

Should the acoustic review substantiate any breaches of the Café's consent or demonstrate noise levels that would otherwise exceed the City's standard commercial noise condition (as directed by the Council), acoustic controls will be recommended to mitigate any excessive noise impacting the affected apartment.

The trigger for this report was an email from the City of Sydney Council (dated 4 December 2023) in which the Council noted:

1. they had received an acoustic report indicating an exceedance of the café's consent.
2. they had investigated the operation of the café and identified acoustic non-compliances.

3. that they would like to provide the Café with the opportunity to voluntarily address the acoustic issues by engaging an acoustic consultant to assess the noise and provide recommendations to mitigate any excessive noise.

HISTORY

From what we can see, on 15 November 2022 the café was granted consent under **D/2022/716** to operate a food and drink premises at Lots 1-153 18 Huntley Street, Alexandria.

- **Condition 8** approves trading hours of 7 am to 10 pm Monday to Saturday and 7 am to 8 pm Sunday.
- **Condition 11** requires there to be no external speakers or for any internal speakers to be directed outside.
- **Condition 13** establishes the noise criteria applying to the café operation.

It is our understanding that the complainant has approached the Council with concerns over excessive noise levels transferring into their apartment, but it is unclear if a formal noise complaint was lodged. An acoustic investigation was commissioned by the complainant and was undertaken by Acoustic Directions (AD). Their report (ref: 230825_18HSA_d1.0, dated: 25 August 2023) was submitted to the Council and appears to have in some way contributed to the Council's correspondence with the café recommending further acoustic review/investigation.

Since the AD investigation and report, we are advised that a range of acoustic measures have been implemented at the café to assist in mitigating noise transfer into not only Unit 20 but all nearby residential unit/s. These include:

- Reduced music levels inside the café.
- Upgrade foam/rubber padding under the coffee knock-box.
- Installing a rubber mat on the countertop to address tapping of the milk jug.
- Installing felt pads under all chairs and tables.

The majority of these implemented acoustic measures were based on our discussions with the complainants, mitigated or resolved several of the noise issues. Not all acoustic issues have been fully resolved though and the fundamental complaint remains, which relates to transferred noise from moving furniture.

The key acoustic issues first raised by the complainants and investigated by AD related to moving furniture, music, patrons, the coffee knock-box, and tapping of the milk jug. Whilst the current stage of acoustic testing and investigations conducted by Koikas Acoustics covers operational noise sources during daily trade, our discussions with the complainant/s on several occasions have confirmed that several of the initial acoustic issues, such as the coffee knock-box and milk jug tapping have been resolved. A noise issue concerning the moving of furniture remains. Primary times of impact are advised as being:

1. First thing in the morning, corresponding with furniture establishment/setup, and
2. Last thing in the afternoon, corresponding with furniture pick-up.

As we understand the situation, the music level also tends to fluctuate between levels that are acceptable during normal café trading to far higher levels that are noted as excessive outside of normal trading hours, presumably during kitchen service preparation works.

THE ACOUSTIC DIRECTIONS REPORT

Although of little significance to this current investigation and report, it is worth identifying some key issues we have with the AD report:

- The noise data presented within Table 1 concerning café operations is presented as an L_{Aeq} noise level but only for the selected event. The noise condition that applies to the café (C13) requires an assessment of noise over 15 minutes and shall include all café noise but also periods of respite (no audible noise from the café). Only then can the noise be assessed appropriately against the relevant acoustic criteria.
- Table 2 presents the magnitude by which the L_{Aeq} event noise levels exceed the measured indoor background noise level. Whilst the authors appear to have been careful not to state that the table relates to an exceedance of the 'criteria', it is reasonable to expect that someone reading that table would infer it to mean an exceedance of the acoustic criteria. The acoustic criteria established pursuant to Condition 13 of the consent as it would apply to the café requires that the greater of either background + 0 or the 'threshold of hearing' be adopted as the assessment criteria. It is the 'threshold of hearing' that sets the criteria at low frequency at this site and not background + 0.

- Therefore, it can be concluded that Table 2 cannot be relied upon to demonstrate whether the café is or is not exceeding the respective noise criteria. The noise levels to which the exceedances relate are flawed in that:

    a. They are not $L_{Aeq,\ 15\text{-}minute}$ noise levels, but rather $L_{Aeq,\ event}$ noise levels.
    b. There is no cumulative 15-minute L_{Aeq} noise level presented.
    c. The background + 0 levels do not correctly establish the acoustic criteria for all octave band centre frequencies.

ACOUSTIC CRITERIA

Condition 13 of the consent limits noise emission from the café as follows:

(13) NOISE - ENTERTAINMENT

(a) The LAeq, 15 minute noise level from the use must not exceed the background noise level (LA90, 15minute) in any octave band (reference frequency 31.5 Hz to 8 kHz inclusive) by more than 5dB between 7.00am and 12.00 midnight when assessed at the boundary of any residential accommodation or tourist and visitor accommodation.

(b) The LAeq, 15 minute noise level from the use must not exceed the background noise level (LA90, 15 minute) in any octave band (reference frequency 31.5 Hz to 8 kHz inclusive) between 12.00 midnight and 7.00am when assessed at the boundary of any residential accommodation or tourist and visitor accommodation.

(c) Notwithstanding (a) above, the LAeq, 15 minute noise level from the use must not exceed the greater of the following levels between 7am and 12 midnight inside any habitable room of a residential accommodation or tourist and visitor accommodation, or at any time in an affected commercial premises:

(i) The existing internal LA90, 15 minute (from external sources excluding the use) in any octave band (reference frequency 31.5 Hz to 8 kHz inclusive). Or,

(ii) If the LZ90, 15 minute background level is below the hearing threshold curve (Tf - Table 1 of ISO 226 : 2003) in an above octave band, the lowest audible sound level (Lp) of the Tf curve in that octave band shall become that octave's LZeq 15 minute noise criteria level.

(d) Notwithstanding (b) above, the LA1 15 minute noise level from the use must not exceed the greater of the following sound pressure levels inside any habitable room between 12 midnight and 7am inside any habitable room of an affected residential accommodation or tourist and visitor accommodation:

(i) The existing internal LA90, 15 minute (from external sources excluding the use) minus 10 dB in any octave band (reference frequency 31.5 Hz to 8 kHz inclusive) inside a habitable room of an affected residential accommodation or tourist and visitor accommodation. Or,

(ii) If the LZ90, 15 minute minus 10 dB level is below the hearing threshold curve (Tf - Table 1 of ISO 226 : 2003) in an above octave band, the lowest audible sound level (Lp) of the Tf curve in that octave band shall become that octave's LZ1 15 minute noise criteria level.

Note: Leq, L01, and L90, metrics and 'A' (weightings) are as per the definitions in the standard AS1055-20148. 'Z' means unweighted noise. An internal LA90 level must be determined in the absence of noise emitted by the use and be sufficiently representative of the receiver in a low noise level quiet state. External LA90 levels for planning must be established as per the long-term methodology in Fact Sheet B of the NPfI unless otherwise agreed by the City's Area Planning Manager.

Further to the consent, the Council has requested consideration of their standard commercial noise condition which reads as follows:

NOISE – COMMERCIAL PLANT / INDUSTRIAL DEVELOPMENT

(a) Noise from commercial plant and industrial development must not exceed a project amenity/intrusiveness noise level or maximum noise level in accordance with relevant requirements of the NSW EPA Noise Policy for Industry 2017 (NPfI) unless agreed to by the City's Area Planning Manager. Further:

(i) Background noise monitoring must be carried out as per the long-term methodology in Fact Sheet B of the NPfI unless otherwise agreed by the City's Area Planning Manager.

(ii) Commercial plant is limited to heating, ventilation, air conditioning, refrigeration and energy generation equipment.

(b) An LAeq,15 minutes (noise level) emitted from the development must not exceed the LA90, 15 minutes (background noise level) by more than 3 dB when assessed inside any habitable room of any affected residence or noise sensitive commercial premises at any time. Further:

(i) The noise level and the background noise level shall both be measured with all external doors and windows of the affected residence closed.

(ii) Background noise measurements must not include noise from the development but may include noise from necessary ventilation at the affected premise.

(c) Corrections in Fact Sheet C of the NPfI apply to relevant noise from the development measured in accordance with this condition, however duration corrections are excluded from commercial noise.

BACKGROUND NOISE LEVELS

A key aspect of an assessment of existing acoustic compliance is understanding the background noise level inside the apartment and at its boundary. Several surveys have been completed by Koikas Acoustics and AD to quantify this. AD have reported background noise levels within their complaint report with their measurements being conducted on Saturday 12 August 2023. We have conducted surveys to establish background noise levels on several occasions, Saturday 10 February 2024, Sunday 3 March 2024, and Monday 4 March 2024.

Both the AD and Koikas measurements were conducted with calibrated NTi Audio XL2 sound level meters set to fast time response and one-third octave band frequency resolution. Koikas adopted a 1/10-second sampling rate whereas AD used a 1-second sampling rate.

For a complaint assessment and a compliance check, the short-term background noise survey methodology is appropriate per Table A1 - Fact Sheet A of the NPfI.

The following background levels have been measured. Our assessment adopts those levels shown shaded below which represent the lowest measured background noise levels.

Internal background levels were generally measured in the centre of each room.

External background levels reported by AD were not directly measured but were derived from the measured internal background noise level and an applied transfer function that assessed the relationship between measured noise levels inside the apartment and on the balcony. We do not agree with this methodology and have not relied upon the reported background noise levels in our assessment.

External background noise levels measured by Koikas Acoustics were taken at a location north-west of the café along Huntley Street (**Figure 1**) that was sufficiently removed from the café such that the measurements were not influenced by the café operations.

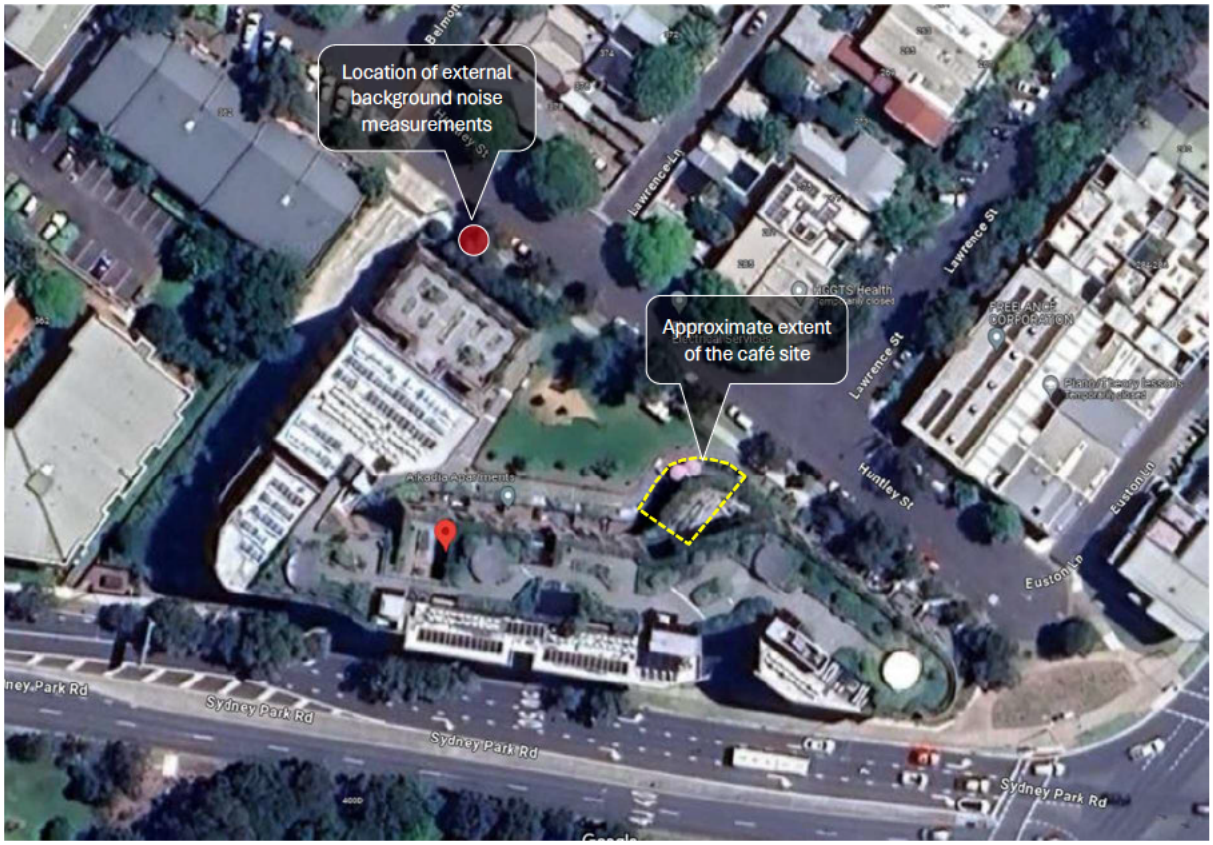

Figure 1. Location of external background noise measurements.

Table 1. Background noise levels [dB]											
Description	**Noise metric**	**1/1 octave band centre frequency [Hz]**									**dB(A)**
		31.5	**63**	**125**	**250**	**500**	**1 k**	**2 k**	**4 k**	**8 k**	
External											
Sun 3 Mar 7.00 am	$L_{A90\ 15\ min}$	8	19	24	29	31	32	29	23	14	37
Sun 3 Mar 7.40 am	$L_{A90\ 15\ min}$	10	21	26	30	32	34	31	24	14	39
Sat 10 Feb 2.00 pm	$L_{A90\ 15\ min}$	16	26	32	36	40	42	40	32	23	46
Sat 12 Aug 7.30 am [1]	$L_{A90\ 15\ min}$	14	29	34	37	40	45	46	41	33	50
Internal – Living Room											
Sat 12 Aug 7.45 am [1]	$L_{A90\ 15\ min}$	-5	2	8	12	10	11	12	13	12	20
Sat 10 Feb 1.55 pm	$L_{A90\ 15\ min}$	-4	8	12	16	18	14	11	12	11	23
Mon 4 Mar 3.24 pm	$L_{A90\ 15\ min}$	-4	3	12	17	17	12	10	11	10	22
Internal – Bedroom											
Sat 10 Feb 12.40 pm	$L_{A90\ 15\ min}$	6	5	13 [2]	13 [2]	8	7	10	11	10	20
Mon 4 Mar 4.05 pm	$L_{A90\ 15\ min}$	1	2	12 [2]	11 [2]	5	6	8	11	10	18
Expected min. [3]	$L_{A90\ 15\ min}$	1	2	6 [3]	6 [3]	5	6	8	11	10	17

Notes:
1. Data presented in the noise complaint report by Acoustic Directions.
2. Background noise levels affected by fan/mechanical noise.
3. Anticipated minimum background noise spectrum, excluding mechanical noise.

CAFE NOISE MEASUREMENTS AND ANALYSIS

Café noise measurements were taken on two separate occasions by Koikas Acoustics representatives.

The first set of measurements was conducted on Saturday 10 February 2024 between 12.30 pm and 2.20 pm. This was a time that the complainant had identified as being when the café was busiest thus it was selected for testing.

Noise and vibration were measured at a central location within the living room and bedroom of the residence, and within the outdoor balcony. The apartment was vacated during the measurements with access only provided to the Koikas engineer to enter/leave as needed to inspect the café operations.

Further measurements were taken contemporaneously with the apartment measurements inside the café with a third roaming sound level meter.

All noise measurements were conducted with calibrated NTi Audio XL2 sound level meters set to fast time response, one-third octave band frequency resolution, and 1/10 second sampling rate. Building vibration was measured in the apartment living room with a Svantek 958 sound and vibration meter/analyser with an SV 207B accelerometer installed on the existing timber floor in the main living area.

Within the living room, we could only identify furniture noise and occasional periods of patron noise. Within the bedroom, we could identify furniture noise, occasional periods of patron noise, and mechanical noise. Music from the café was not audible inside the apartment during our survey.

Our analysis of the measurement data finds the café is generating the following $L_{Aeq\ 15\text{-}minute}$ noise levels within the living room, bedroom, and balcony of the affected apartment:

Table 2. Cafe noise levels [dB]

Description	Noise metric	1/1 octave band centre frequency [Hz]									dB(A)
		31.5	63	125	250	500	1 k	2 k	4 k	8 k	
Living room	$L_{Aeq,\ 15\ min}$	-3	4	9	21	19	15	10	7	0	24
Bedroom	$L_{Aeq,\ 15\ min}$	12	12	18	22	10	5	-5	-	-	24
Balcony	$L_{Aeq,\ 15\ min}$	12	22	31	37	43	48	48	33	20	52

Vibration from the cafe was not perceptible in the apartment, however, the measurements did indicate vibration peaks matching the corresponding noise spectra during periods when the café furniture movement events were occurring. **Figure 2** is provided to demonstrate the correlation between the measured vibration (RMS acceleration, m/s^2) and noise ($L_{Zeq\ event}$, dB) events spectra.

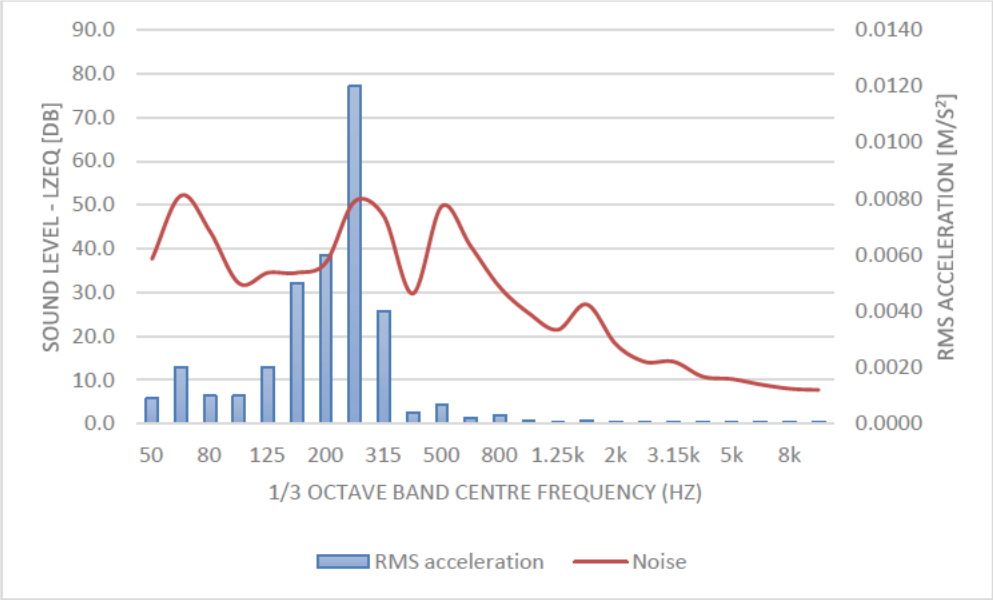

Figure 2. Furniture movement event noise and vibration spectra

Tables 3 and 4 present our assessment of the internal and external noise levels against the respective criteria from the consent and standard commercial noise condition.

We note that the acoustic requirements of C13 of the consent (Part 'a' and 'c') are more stringent than the requirements of the standard commercial noise condition, thus only an assessment of noise to the consent is presented. Compliance with the consent implies compliance with the standard condition.

Table 3. Internal noise level assessment [dB]

Description	Noise metric	1/1 octave band centre frequency [Hz]									dB(A)
		31.5	63	125	250	500	1 k	2 k	4 k	8 k	
Living room											
Background noise level	$L_{A90\ 15\ min}$	-5	2	8	12	10	11	12	13	12	20
A-weight threshold of hearing	-	17	9	5	2	1	1	-3	-5	6	-
Internal noise criteria	$L_{Aeq\ 15\ min}$	17	9	8	12	10	11	12	13	12	-
Café noise level in LIVING	$L_{Aeq\ 15\ min}$	-3	4	9	21	19	15	10	7	0	24
Exceedance	-	-	-	*1*	*9*	*9*	*4*	-	-	-	-
Bedroom											
Background noise level	$L_{A90\ 15\ min}$	1	2	6	6	5	6	8	11	10	17
A-weight threshold of hearing	-	17	9	5	2	1	1	-3	-5	6	-
Internal noise criteria	$L_{Aeq\ 15\ min}$	17	9	6	6	5	6	8	11	10	-
Café noise level in BEDROOM	$L_{Aeq\ 15\ min}$	12	12	18	22	10	5	-5	-	-	24
Exceedance	-	-	*3*	*12*	*16*	*5*	-	-	-	-	-

Noise levels inside the apartment are currently exceeding allowable levels in both the living room and bedroom. In the living room, the major source of observable noise was from furniture, however, there was some patron noise audible at times. In the bedroom, the key noise sources controlling the exceedance are furniture and mechanical noise.

Table 4. External noise level assessment [dB]

Description	Noise metric	1/1 octave band centre frequency [Hz]									dB(A)
		31.5	63	125	250	500	1 k	2 k	4 k	8 k	
Balcony											
Background noise level	$L_{A90\ 15\ min}$	8	19	24	29	31	32	29	23	14	37
External noise criteria	$L_{Aeq\ 15\ min}$	13	24	29	34	36	37	34	28	19	42
Café noise level on BALCONY	$L_{Aeq\ 15\ min}$	12	22	31	37	44	50	48	37	22	53
Exceedance	-	-	-	*2*	*3*	*8*	*13*	*14*	*9*	*3*	-

External noise levels assessed on the balcony are also exceeding the allowable levels. Patron's dining in outdoor areas is the source controlling the receiver level.

Between 7 am and 8 am on Sunday trade, a maximum noise level assessment is warranted under Part 'a' of the city's commercial noise condition. Our measurements found a maximum noise level on the balcony of L_{Amax} 77 dB. This is well above the maximum noise trigger level which is L_{Amax} 52 dB (background noise level of 37 dB + 15 dB).

Exceeding the maximum noise trigger level doesn't in itself mean that the use is non-compliant, but rather it 'triggers' a detailed maximum noise level assessment. Accordingly, we have assessed maximum noise levels inside the apartment.

Assessed inside the apartment, with a presumed façade noise reduction of 30 dB (living – 12.38 mm laminated glazing) and 38 dB (bedroom – double glazed with large air gap), internal maximum noise levels would be in the order of 47 dB (living) and 39 dB (bedroom). These levels are within the limits identified within the NSW EPA Road Noise Policy which in its review of sleep disturbance concludes that maximum internal noise levels of 50-55 dB are unlikely to awaken people from sleep.

ASSESSMENT OF MITIGATION

Having identified that the café is currently exceeding the allowable noise levels under their consent at Unit 20, we need to establish what controls need to be implemented to ensure that the cafe can

operate in compliance with the noise limits in their consent.

There are three noise sources identified as requiring mitigation, being:

- Patron noise from indoor and outdoor dining areas that are generating a minor noise impact inside and controlling the non-compliance outside the apartment.
- Moving of furniture which is generating noise impacts inside the apartment.
- Mechanical noise which is generating noise impacts inside the bedroom only.

Patrons and noise from inside the cafe

To determine if the existing ceiling/floor between the café and apartment is adequate in mitigating noise transfer, we have conducted noise reduction tests from the café into both the living room and bedroom of Unit 20. A pink noise signal was played at high volume within the café using a dodecahedron loudspeaker and measured simultaneously within both the café and the apartment (living room and bedroom). The difference between the source and receiver room measurements (Level difference – D) can then be subtracted from the measured internal café noise levels to calculate the component of patron noise transmitted directly through the floor-ceiling system into the apartment.

Table 5. Airborne noise transfer into the apartment [dB]

Description	Noise metric	1/1 octave band centre frequency [Hz]									dB(A)
		31.5	63	125	250	500	1 k	2 k	4 k	8 k	
Living room											
Noise level in the cafe	$L_{Aeq,\ 15\ min}$	30	38	51	59	68	70	68	63	57	74
Level difference between the café and apartment	D	38	39	46	56	56	67	73	75	80	-
Café noise level in LIVING (via floor/ceiling only)	$L_{Aeq,\ 15\ min}$	-8	-2	5	3	12	3	-5	-12	-23	14
Internal noise criteria	$L_{Aeq,\ 15\ min}$	17	9	8	12	10	11	12	13	12	-
Exceedance	-	-	-	-	-	*2*	-	-	-	-	-
Bedroom											
Noise level in the cafe	$L_{Aeq\ 15\ min}$	1	2	6	6	5	6	8	11	10	17
Level difference between the café and apartment	D	35	37	48	56	69	81	88	90	92	-
Café noise level in BEDROOM (via floor/ceiling only)	$L_{Aeq\ 15\ min}$	-5	0	3	3	-1	-11	-20	27	-35	8
Internal noise criteria	$L_{Aeq\ 15\ min}$	17	9	6	6	5	6	8	11	10	24
Exceedance	-	-	-	-	-	-	-	-	-	-	-

The minor non-compliance identified in **Table 5** indicates that the degree of acoustic separation provided between the café and the apartment living room is at this point not sufficient. The ceiling must be further treated to improve acoustic separation between the café and the living room. There is no issue with regard to sound transfer into the bedroom through the ceiling/floor.

On inspection, we observed portions of the existing café ceiling under the living room that appear to have no set plasterboard ceiling but rather appear to show a soft, paper-like infill material that has been painted to match the main ceiling colour. We expect that this is the acoustic weak point in the ceiling that is contributing to the transferred noise.

These areas should be upgraded to include 13 mm set plasterboard ceiling, sealed at all junctions and with 100 mm fibreglass or polyester insulation batts (14 kg/m^3) installed in the ceiling cavity.

Further to upgrading the ceiling within the café, we also recommend installing a noise limiter (DSP or otherwise) on the café audio system such that the following music levels when measured at 1.0 m below any speaker are not exceeded. The below levels are consistent with measurements taken by Koikas Acoustics inside the café that did not result in any music being heard within the apartment.

Table 6. Recommended music limits [dB]

Description	Noise metric	1/1 octave band centre frequency [Hz]									dB(A)
		31.5	63	125	250	500	1 k	2 k	4 k	8 k	
Music at 1 m from any speaker	$L_{Aeq\ 15\ min}$	23	34	50	56	63	66	64	62	53	70

External patron noise

The only means by which external patron noise can practically be mitigated to the extent required to comply with the noise criteria applied at the residential boundary (external balcony) is to install an acoustic screening device such as a solid awning over the entire outdoor seating area.

The proposed awning would need to extend the entire width of the outdoor seating area and be of solid construction, meaning retractable plastic sheet awnings or similar would not suffice.

A calculation of the receiver levels **with the proposed barrier** finds that a compliant outcome can be achieved when assessing noise against the external noise requirements of the consent.

Table 7. Awning barrier attenuation [dB]										
Description	**Noise metric**	**1/1 octave band centre frequency [Hz]**								**dB(A)**
		31.5	**63**	**125**	**250**	**500**	**1 k**	**2 k**	**4 k**	**8 k**	
Café noise level on BALCONY [Without attenuation]	$L_{Aeq\ 15\ min}$	12	22	31	37	44	50	48	37	22	53
Barrier attenuation	-	-5	-8	-9	-10	-11	-13	-15	-18	-20	-
Café noise level on BALCONY [With barrier attenuation]	$L_{Aeq\ 15\ min}$	7	16	22	27	33	37	33	19	2	40
External noise criteria	$L_{Aeq\ 15\ min}$	13	24	29	34	36	37	34	28	19	42

Furniture noise

Unpacking and packing away the furniture at the start and end of each day's trade, along with incidental furniture movements by patrons as they sit up and sit down from the cafe's tables are causing clear and identifiable noise events within the apartment.

We measured patrons moving furniture during our survey on 10 February 2024 to generate internal noise levels of $L_{Aeq\ (2\text{-sec event})}$ 36 dB in the living room and $L_{Aeq\ (2\text{-sec event})}$ 33 dB in the bedroom.

Whilst we could not obtain a measurement of the table and chairs being packed away during our 10 February survey, we conducted simulations of this activity during our 4 March 2024 survey and found this type of activity to generate noise levels of $L_{Aeq\ (4\text{-sec event})}$ 32 dB in the living room.

Mitigating this type of noise will require one of two options to be considered:

1. Apply vibro-isolating material under the tables/chairs to soften impacts with the floor, or
2. Re-finish the café floor to include an acoustic underlay beneath a new timber or tile finish.

We have investigated the acoustic benefit of both of the above. We tested the existing chairs for a control, then tested the following modified approaches to treating the furniture:

1. Installing new commercial-grade felt pads.
2. Installing 10 mm thick 2740 gsm (grams per square metre) PET panel off-cut material, fitted to the underside of the chair legs with heavy-duty self-adhesive Velcro.
3. 8 mm laminate flooring installed above 5 mm thick Uniroll RF700 rubber acoustic underlay (existing chairs – no alternate treatment under the chair legs).

The following results were obtained which demonstrate a substantial improvement by using new felt pads. However, the best results were obtained with the thick, high-density pads or new floor and underlay, both of which resulted in no audible noise within the apartment.

Table 8. Furniture impact noise transfer tests [dB]

Description	Noise metric	1/1 octave band centre frequency [Hz]									dB(A)
		31.5	63	125	250	500	1 k	2 k	4 k	8 k	
Living room											
Chairs with existing worn pads	$L_{Aeq\ event}$	-	-	37	34	30	17	-	-	-	-
New felt pads	$L_{Aeq\ event}$	-	-	28	10	19	17	-	-	-	-
10 mm high-density pads	$L_{Aeq\ event}$	Inaudible									-
New floor and underlay	$L_{Aeq\ event}$	Inaudible									-
Bedroom											
Chairs with existing worn pads	$L_{Aeq\ event}$	-	-	33	39	25	18	-	-	-	-
New felt pads	$L_{Aeq\ event}$	-	-	20	6	-	-	-	-	-	-
10 mm high-density pads	$L_{Aeq\ event}$	Inaudible									-
New floor and underlay	$L_{Aeq\ event}$	Inaudible									-

Notes:
1. "-" = noise levels negligible relative to ambient.

Installing new felt pads under the tables and chairs significantly reduces the level of noise in the apartment, however, it is not a permanent solution and we do not consider it an acceptable solution. Felt pads will wear over time, resulting in a gradual increase in noise transfer as a result.

Completely removing the existing tile floor and relaying a new floor over an acoustic underlay, whilst demonstrated to effectively minimise transferred furniture noise levels, does not seem reasonable to implement considering the considerable costs associated with the new building materials, labour and closure of the business for the building work. It would be hard to justify this substantial cost when there appear to be far simpler, cheaper, and more expeditious treatment options available.

We recommend installing high-density 8-10 mm thick PET pads, being off-cuts of acoustic panels such as Instyle Ecoustic Solid Colour or an approved similar product, to the underside of the café chairs and tables to mitigate noise and vibration from the cafe furniture. These would be cut to size and either glued to the underside of the furniture supports or affixed with a heavy-duty self-adhesive Velcro.

Additional moveable panels of that same pad product shall be used to load and store the tables and chairs at the end of service to mitigate the impact of this noise during setup and pack down.

Installing the proposed pads under the café furniture has been measured/assessed to result in no audible noise from these activities in the apartment which would resolve the furniture noise issue completely.

Mechanical noise

We assess that the mechanical noise, whilst not identified in the AD report nor raised by the residents as a source of complaint, is generating non-compliance in the bedroom. We have noted that the exhaust duct that passes exposed along the café ceiling and directly below the apartment bedroom vibrates due to the air volume passing through the duct. The mechanical supports for the duct that are fixed into the concrete slab transfer that vibration into the building structure generating a structure-borne noise in the bedroom.

To eliminate this noise from the bedroom we recommend:

1. Replacing the existing suspension rods that are supporting the exhaust duct beneath the bedroom with a new vibration-isolated hanger system consisting of Embelton RH/RHD resilient hangers.
2. Providing a resilient layer between the building structure and the exhaust duct/grille that penetrates the façade. This could be achieved with a layer of high-density polyester placed between the building structure and the duct, with the internal and external sides sealed with backer rods and a flexible sealing compound such as Bostik Fireban or the like.

SUMMARY OF ACOUSTIC RECOMMENDATIONS

Resulting from our measurements and assessment of café noise impacts on and within Unit 20 of 18 Huntley Street, Alexandria, we make the following recommendations for noise mitigation/control:

1. Upgraded the ceiling within the café to include 13 mm suspended plasterboard ceiling, sealed at all junctions and with 100 mm fibreglass or polyester insulation batts (14 kg/m^3) installed in the ceiling cavity.

2. The café audio system shall be controlled by a noise limiter (DSP or otherwise) such that music levels do not exceed an overall level of $L_{Aeq\ 15\ mins}$ 70 dB and spectrum as shown in **Tables 6 and 9** when measured at 1.0 m below any speaker.

Table 9. Recommended music limits [dB]

Description	Noise metric	1/1 octave band centre frequency [Hz]									dB(A)
		31.5	63	125	250	500	1 k	2 k	4 k	8 k	
Music at 1 m from any speaker	$L_{Aeq\ 15\ min}$	23	34	50	56	63	66	64	62	53	70

3. install an acoustic screening device such as a solid awning over the entire outdoor seating area. The proposed awning would need to extend the entire width of the outdoor seating area and be of solid construction.
4. install high-density 8-10 mm thick PET pads, being off-cuts of acoustic panels such as Instyle Ecoustic Solid Colour or an approved similar product, to the underside of the café chairs and tables to mitigate noise and vibration from the cafe furniture. These would be cut to size and either glued to the underside of the furniture supports or affixed with a heavy-duty self-adhesive Velcro.
5. Additional moveable panels of the same pad material, or an approved soft rubber equivalent, shall be used to load and store the tables and chairs at the end of service to mitigate the impact of this noise during setup and pack down.
6. Replace the existing suspension rods that are supporting the exhaust duct beneath the bedroom with a new vibration-isolated hanger system consisting of Embelton RH/RHD resilient hangers.
7. Provide a resilient layer between the building structure and the exhaust duct/grille that penetrates the façade. This could be achieved with a layer of high-density polyester placed between the building structure and the duct, with the internal and external sides sealed with backer rods and a flexible sealing compound such as Bostik Fireban or the likes.

CONCLUSION

Koikas Acoustics was engaged to conduct a compliance review of café noise impacts on a residential apartment within the same mixed-use building and to provide recommendations to address any identified non-compliances. The affected apartment is located directly above the café.

We have conducted several measurements of noise and vibration within the affected apartment and café to inform our assessment of the existing acoustic conditions on-site and to determine suitable noise controls to mitigate demonstrated acoustic exceedances.

Ultimately, we have determined that several acoustic controls are required to be implemented by the café to ensure that operational noise levels comply with the requirements of the consent.

Should you have any questions, please do not hesitate to contact the undersigned.

Kind regards,

Adam Semple M.A.A.S.

Senior Acoustical Consultant

Koikas Acoustics Pty Ltd