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PROJECT TECHNICAL MEMORANDUM

Project : Victoria House, Manchester
Our Ref : 28367-PTM5-JLS-R1
Date : 18 July 2022
Author : Joe Sinker
Issued to : DOMIS & Design Team

RE: PLANNING CONDITION 17 COMMERCIAL TO RESIDENTIAL NOISE TRANSFER

1.0 Planning Condition 17

This memorandum outlines the project's scheme of sound insulation between ground floor commercial units and first floor residential units in accordance with Planning Condition 17.

"Before the development commences a scheme for acoustically insulating the ground floor commercial to ensure that there is no unacceptable level of noise transfer from the ground floor uses to the residential accommodation above shall be submitted to and approved in writing by the City Council as local planning authority. Where entertainment noise is proposed the LAeq (entertainment noise) shall be controlled to 10dB below the LA90 (without entertainment noise) in each octave band at the facade of the nearest noise sensitive location. The approved noise insulation scheme shall be completed before any of the approved uses commence.

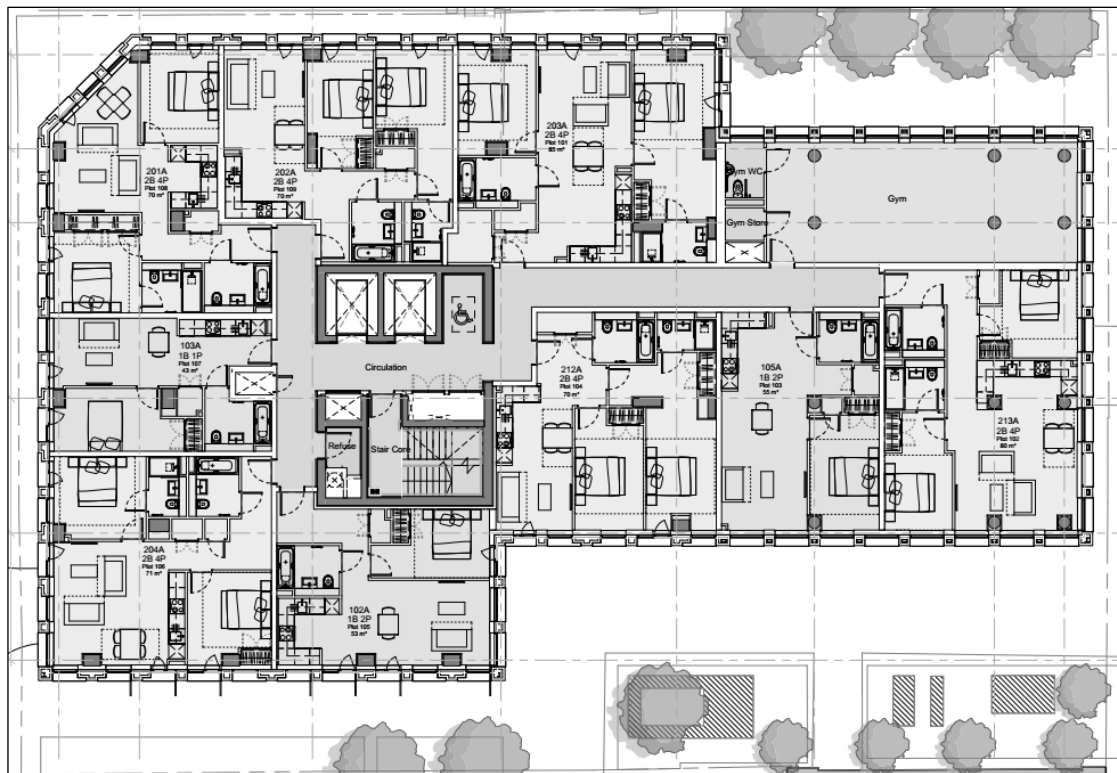
Prior to occupation a post completion report to verify that all of the recommended mitigation measures have been installed and effectively mitigate any potential adverse noise impacts in adjacent residential accommodation arising directly from the proposed development shall be submitted and agreed in writing by the City Council as local planning authority. Prior to occupation any non compliance shall be suitably mitigated in accordance with an agreed scheme."

2.0 Project Proposals

The building will comprise 2No. ground floor commercial spaces with residential apartments above (first floor and above).



Ground Floor (commercial space highlighted green)



First Floor



The building shall be formed with a concrete frame structure, with 250mm thick in-situ concrete floor slabs. At ground floor, internal/external walls shall be formed from blockwork.

There is a small residents only gym to be located at first floor. Given that this is for residents only it would not be considered appropriate to classify the space as a commercial unit. It would therefore be deemed beyond the scope of Condition 17 to assess from a planning perspective.

Notwithstanding, it is noted that no classes or organised group sessions will take place, and music, if played at all, is intended only to be played at a background level. There is therefore not expected to be significant noise egress to external receptors from the residents' gym activities, and although there is the potential for noise and vibration from activities to be perceived in adjacent apartments this is considered to be a building management issue and will be actively monitored by the building operators to ensure that operation of the gym space will be managed and modified should complaints arise.

The ground floor commercial units shall be constructed to a shell specification (no ceilings) with the intention for tenants to fit-out their respective unit as required/desired. Unit frontage shall be double glazed (laminated) in aluminium framing/curtain walling. The shell constructions are considered to be acoustically suitable for the following reasons.

1. The shell construction (no ceiling) will be capable of achieving the minimum airborne sound insulation requirement of Building Regulations' Approved Document E ($45 \text{ dB } D_{nT,w} + C_{tr}$) between ground floor units and first floor apartments.
2. The sound insulation offered by the shell construction (no ceiling) is expected to be sufficient for the majority of prospective tenants/uses, e.g. office, retail, café, most restaurants, etc..
3. The shell construction will be easily upgradable. Noisier tenant (e.g. bars) will be able to enhance sound insulation with the addition of plasterboard ceilings/linings. The commercial floor can be upgraded with floating floor systems by tenant's whose operations may risk impact excitation of the structure (e.g. gyms).

Prospective tenants shall be made responsible for controlling their noise/vibration output so as to not adversely impact on neighbouring commercial/residential units. This shall be secured by including a suitable form of words in either the commercial lease agreements or in tenants handbooks, in line with the below.

3.0 Draft Acoustic Wording for Tenants Handbooks

Noise & Vibration Transfer to Internal Areas

Tenants shall control noise and vibration transfer from all of their sources (including mechanical services, amplified speech/music and activities) to internal areas beyond their demise such that:

- a) *It does not cause a nuisance, disturbance or annoyance.*



- b) *It does not exceed any acoustic criteria specifically agreed between the Landlord and other Tenants.*
- c) *It does not exceed the following Noise Rating (NR) levels.*

Adjacent Area	Space/Use	Criteria for MEP Services L_{eq}	Criteria for Music & Activities L_1
Residential	Within Apartment	At least 5dB below the minimum L_{90} in each octave band across the audible frequency range.	
Commercial	Office	NR30	NR35
	Retail, Bar, Restaurant, Landlord Areas	NR35	NR40

- d) *It does not give rise to audible tones or rattles.*
- e) *Vibration transfer from M&E services to internal occupied areas shall not exceed $0.01m.s^{-2}$ peak based on the W_b weighting as defined within BS 6472-1: 2008 "Guide to Evaluation of Human Exposure to Vibration in Buildings".*

Criterion (a) is ultimately the overriding requirement. Provided (a) is complied with in full, some relaxation of (b) (c) (d) and (e) may be permissible, but only at the Landlord's discretion. Compliance with (b) (c) (d) and (e) would however, in most cases, be considered as evidence tending to demonstrate compliance with a).

4.0 Assessment

4.1 Criteria

In line with the above, commercial unit operational noise levels should be at least 5 dB below the minimum octave band L_{90} 'background' noise level in apartments. At design stage, the minimum L_{90} background noise levels are not known. However, we do know that apartments shall be designed so that internal noise levels satisfy the following limits of BS 8233.

Living Room: 35 dB $L_{Aeq,16hr}$ (07:00-23:00)

Bedroom: 30 dB $L_{Aeq,8hr}$ (23:00-07:00)

Apartments will be mechanically ventilated using systems that shall be specified to achieve Noise Rating NR Levels equivalent to the above dB levels (NR30 daytime & NR25 night-time). In reality, these systems tend to achieve these limits with a margin of a few dB. The mechanical services noise is also steady state, which produces very little difference in L_{eq} and L_{90} readings (1-2 dB typically).

With the above considerations, a reasonable estimate of minimum background noise levels in apartments would be not less than NR25 during the daytime and NR20 at night. By subtracting



a further 5 dB in line with the criteria, we attain the following operational noise limits for our calculations.

Operational Period	Commercial Unit Operational Noise Limit in Apartments (dB) at OCBF (Hz)							
	63	125	250	500	1k	2k	4k	8k
Day (07:00-23:00)	51	41*	31	24	20	17	14	13
Night (23:00-07:00)	47*	41*	26	19	15	12	9	7

* Limit of virtual inaudibility (ref. DEFRA)

4.2 Shell Slab Sound Insulation

The following table presents the expected apparent sound reduction performance of the proposed 250mm slab. This is based on our in-house database of sound insulation tests undertaken across bare concrete floor slabs (200-250mm thick) in concrete frame buildings with similar robust interface/flanking constructions.

Element	Apparent SRI Sound Reduction, R' (dB) at OCBF (Hz)							
	63	125	250	500	1k	2k	4k	8k
250mm Floor Slab	36	39	46	54	60	63	65	65

4.3 Commercial to Apartment Noise Transfer Calculations

The following Figures present our daytime and night-time noise transfer calculations to determine the maximum operational noise levels permissible in the commercial units based on the commercial shell constructions.

Daytime Commercial Unit Noise Limits (Shell)

Noise Transfer to L01 Apartments

Receive room dimensions: height: 2.5 m
(Bedroom) width: 3.5 m
length: 4.5 m

$$SPL2 = SPL1 + 10\log(S/A) - SRI$$

Interface dimensions: width: 3.5 m
(Floor) length: 4.5 m

Frequency	63	125	250	500	1K	2K	4K	8K
Receive Room Criteria	51	41	31	24	20	17	14	13
Receive Room RT	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Floor SRI	36	39	46	54	60	63	65	67
	dBA							
Limiting Source Room Lp	86	79	76	77	79	79	78	79
	86							

Night-time Commercial Unit Noise Limits (Shell)

Noise Transfer to L01 Apartments



Receive room dimensions:	height:	2.5	m	$SPL2 = SPL1 + 10\log(S/A) - SRI$
(Bedroom)	width:	3.5	m	
	length:	4.5	m	
Interface dimensions:	width:	3.5	m	
(Floor)	length:	4.5	m	

Frequency	63	125	250	500	1K	2K	4K	8K
Receive Room Criteria	47	41	26	19	15	12	9	7
Receive Room RT	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Floor SRI	36	39	46	54	60	63	65	67
								dBa
Limiting Source Room Lp	82	79	71	72	74	74	73	73
								81

4.4 Discussion

The commercial shell construction (no ceiling) is expected to provide sufficient sound insulation for the majority of tenants who operating in the daytime. To demonstrate we present below a comparison of the calculated daytime operational noise limits against the typical highest $L_{1,5min}$ noise levels Hann Tucker has measured within various occupied/operational shops, cafes and offices in the past.

Desc.	Internal Reverberant* $L_{1,5min}$ Sound Level (dB) at OCBF (Hz)							
	63	125	250	500	1k	2k	4k	8k
Calculated Limit	86	79	76	77	79	79	78	79
Miss Selfridge Clothes Store	60	74	66	65	69	67	70	56
Costa Coffee (busy)	71	73	72	74	76	73	71	70
Federal Café	71	71	74	75	73	70	69	66
Coop Supermarket	61	62	65	66	70	63	60	58
Office (Call Centre)	65	65	67	71	69	64	58	52

*spatial average (front of house)

Noisier tenants, e.g. late bars or commercial gyms, will be responsible for shell enhancements should they expect to generate noise levels that will breach the criteria outlined in Section 3.0. The criteria apply to airborne and structure-borne (impact) noise transfer. High activity/noise tenants will therefore need to think about isolated floors (gyms) and resilient fixings solutions for loudspeakers to mitigate impact noise transfer.

Noise flanking via the glazed frontage (and into apartments above via their windows) must also be considered. Lobbied doors would be sensible to control music noise spill when people are entering/exiting.



High noise tenants (music bars) should implement a noise management plan, confirming how they intended to prevent noise levels becoming excessive through the evening. The implementation of an electronic noise limiter on the PA system would be sensible. Staff and managers should be made aware of noise restrictions so they can continuously monitor activity and music noise levels, and implement noise reduction measures as required.

Anti-social behaviour must not be tolerated. Patrons should be asked to leave quietly in consideration of nearby residents. A sign on the door to this effect would be sensible too.

For and on behalf of

HANN TUCKER ASSOCIATES

Joe Sinker

