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PROJECT TECHNICAL MEMORANDUM

JOB TITLE : 68-70 Oldham Street,
61 Spear Street

REF : HT: 29397/PTM1/R1

DATE : 29 November 2022

FROM : Michael Hartley

ISSUED TO : Cumming Group

RE: 68-70 OLDHAM STREET, 61 SPEAR STREET, MANCHESTER NOISE TRANSFER ASSESSMENT

1.0 Introduction

As part of the planning submission for the scheme Manchester City Council (MCC) have requested that an assessment of noise transfer from the structurally connected entertainment venue at the front of the building (Oldham Street elevation) be carried out.

Hann Tucker Associates contacted Sue Jones of MCC to scope the assessment. The following approach was agreed by both parties.

- To undertake an airborne sound insulation test of the existing wall separating the two demises,
- To undertake a number of sample noise level measurements during a live music event at The Castle both in the Castle itself (source) and within the existing building at 68-70 Oldham Street (receiver).

Sue Jones attended site to witness the sound insulation testing of the existing separating wall.

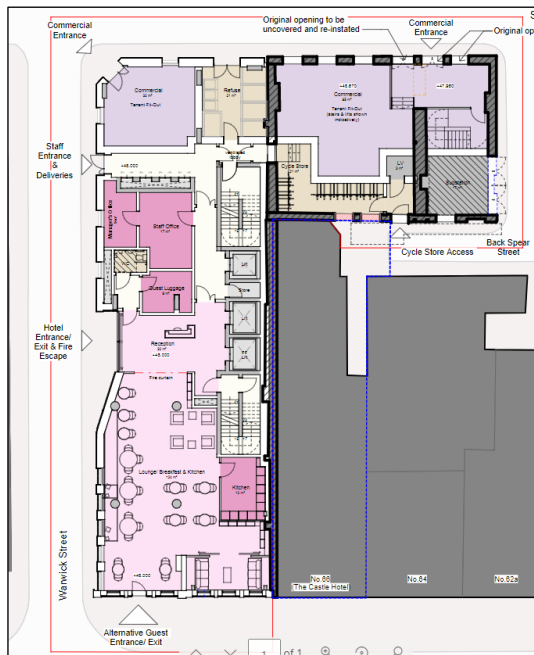
2.0 Proposed Development

The proposed building is to be a commercial aparthotel development. The development will have a shared wall separating the development and The Castle at ground level and first floor level.



Internally, the majority of the development that shares a common partition with The Castle separating partition will be a circulation space (stairs wells, lifts, etc). The ground floor of the development is to comprise a reception/Lounge & kitchen area. The first-floor level will have guestroom that shares the separating partition with The Castle.

A typical floor plan layout of the ground and first floor can be seen below.



Proposed Ground Floor Plan
(c/o SimpsonHaugh Architects)



Proposed First Floor Plan

3.0 The Castle Entertainment Noise Transfer via Wall

This memo aims to assess the transfer of noise from operational activities of The Castle to the proposed development via the shared party wall. Our assessment considers measured noise generated during a live music event within The Castle's event space and measurements within the bar and lounge areas, capturing general patron and jukebox noise.

3.1 Separating Wall Sound Insulation Test

3.1.1 Overview

Hann Tucker Associates attended site on Friday 18th November 2022 to undertake an airborne sound insulation test across the separating wall between The Castle and the proposed development. At the time of the test, The Castle was fully furnished and the adjacent development was mostly an open plan derelict space.



3.1.2 Instrumentation

The instrumentation used to carry out the measurements is presented in the table below:

Equipment	Model	Serial Number	Calibration Date	Certificate No
Precision Sound Analyser Meter	Brüel & Kjær Type 2250	3025397	03/10/2022	04048/2
Sound Level Calibrator	Brüel & Kjær Type 4231	2271905	30/09/2022	05505/1
Sound Source	Custom made, un-ported sealed cabinet type	N/A	N/A	N/A

The sound level meter was calibrated prior to and on completion of the measurement schedule. No significant deviation had occurred (no more than 0.3 dB).

3.2 Methodology

The sound insulation tests were undertaken by generating a broad band, random diffuse sound field within the source room. A spatial average of the resulting 1/3 octave band noise levels was obtained within the source room from measurements undertaken over a time period of a least 30 seconds. The measurement procedure was repeated in the receive room.

The sound level differences were determined by generating a broad band, random diffuse sound field within the source room. A spatial average of the resulting 1/3 octave band noise levels was obtained within the source room from measurements undertaken over a time period of a least 30 seconds. The measurement procedure was repeated in the receive room. A second speaker position was then selected in the source room and the measurement procedure was repeated.

The receive levels were corrected for background noise where necessary as follows:

Where the measured background noise level in each 1/3rd octave band was more than 6dB but less than 10dB below the receive level, the following formula was applied:

$$L = 10 \log \left(10^{\frac{L_{SB}}{10}} - 10^{\frac{L_B}{10}} \right) \text{ dB}$$

where

L is the adjusted signal level in decibels;

L_{SB} is the level of the signal and background noise levels combined, in decibels;

L_B is the background level in decibels.



Where the measured background noise level was less than 6dB below the receive level, a correction of 1.3dB was applied (corresponding to a level difference of 6dB) and the $\geq$ symbol was added to the results to show that the reported values are the limit of measurement.

The corrected receive levels are subtracted from the source levels to determine the level differences over the frequency range 50-10kHz from each source position. The level differences for each source position are arithmetically averaged at each frequency band to give the level difference, D.

3.3 Results

The on-site measured normalised sound reduction performance of the separating floor slab is presented in the table below.

Description	Measured Sound Level Difference D (dB) at Octave Band Centre Frequency (Hz)								D _w
	63	125	250	500	1k	2k	4k	8k	
TEST 1 – Ground of 68 Oldham Street to Performance Space of The Castle	33	44	48	54	58	54	55	46	56
TEST 2 – Performance Space of The Castle to Ground Floor of 68 Oldham Street	37	49	53	66	69	68	55	60	66
TEST 3 – Performance Space of The Castle to First Floor of 68 Oldham Street	38	52	58	67	72	61	43*	60	66
TEST 4 – 68 Oldham Street Ground to The Castle Snug	37	42	46	51	58	61	60	49	56
TEST 5 – The Castle First Floor Space to 68 First Floor	39	45	49	57	62	65	66	60	60

*The Measured Normalised Level Difference at 4kHz was unduly affected by background noise from fire alarm beeps in 68 Oldham Street.

3.4 Discussion

We understand the separating wall structure comprised of a solid brick construction of unknown layers and depth, with no visible penetrations for columns or beams.

Whilst the wall was under test it was noted that low frequency noise was audible within the receiving room, which was emanating from the wall uniformly. There was no notable weakness of the wall on any of the levels within the development.



3.5 Entertainment Noise

Hann Tucker Associates attended an event at The Castle on Friday 18th November 2022 between the hours of 21:00-23:00 to undertake noise level measurements within The Castle. During our measurements we captured noise events from various live music acts and at multiple positions throughout the ground floor space of The Castle, and general noise from patrons and jukeboxes within the ground floor and first floor seating areas.

We understand the live music events can occur anytime from opening and end at approximately 23:00hrs, the bar then remains open until closing at 01:00hrs during the week and 02:00hrs during the weekend.

The highest $L_{Aeq,T}$ and L_{Amax} noise levels measured within each of the spaces of The Castle are presented in the table below.

Location	Metric	Typical Highest Reverberant Noise Level (dB) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Live Music and Event Space	L_{Aeq}	106	113	105	104	101	96	95	90	106
Ground Floor Front of House Bar Area	L_{Aeq}	69	74	74	77	74	71	64	55	79
First Floor Seating Area	L_{Aeq}	76	80	82	82	80	76	69	57	85
Ground Floor Seating/Lounge Area	L_{Aeq}	76	84	79	81	80	77	71	64	84

It should be noted that multiple measurements of the live music event were undertaken. Of the measurement undertaken the worst-case period was the live music event, and as such is presented above and subsequently used within our assessment.

3.6 Proposed Assessment Criteria

Based on MCC guidance, music noise levels in the 63 Hz and 125 Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (in habitable rooms) 47 dB and 41 dB, respectively. In our experience, it is also appropriate to set limits for all other frequencies based on achieving NR 15 $L_{eq,5min}$. These limits would apply any time The Castle is operational, day or night.



3.7 Minimum Level Difference Required

We have assessed noise transfer based on source noise levels measured within The Castle as presented in Section 3.5, room dimensions from Simpson Haugh Architects drawings, and the music noise criteria as presented in Section 3.6.

The table below summarises the results of the assessment and sets out the octave band sound insulation performance required between the ground floor space and the residential areas above.

Description	Octave Band Centre Frequency (Hz) dB						
	63	125	250	500	1k	2k	4k
Measured Source Room Level (The Castle Event Space), L_{eq}	106	113	105	104	101	96	95
Proposed Receive Room Limits, $L_{eq,5min}$ (dB)	47	41	26	19	15	12	9
Required Level Difference, D, (dB)	59	72	79	85	86	84	86

3.8 Required Mitigation

The performances required to sufficiently mitigate music noise transfer to the proposed dwellings will be greater than the sound insulation performance of the existing wall construction. Therefore additional allowances will be required by the below illustrated amounts.

Description	Octave Band Centre Frequency (Hz) dB						
	63	125	250	500	1k	2k	4k
Required Level Difference, D, (dB)	59	72	79	85	86	84	86
Current Measured Level Difference, D, (dB)	38	52	58	67	72	61	43*
Required Increase in Level Difference, D, (dB)	21	20	21	18	14	23	43

*The Sound Reduction Index at 4kHz was unduly affected by background noise from fire alarm beeps in 68 Oldham Street.

As seen in the table above the required mitigation performance for low frequency (63Hz and 125Hz) is high and would likely require a substantial and detailed construction to be achieved. Example mitigation measured that could achieve the required performance include the following:

- Independent multiple layer plasterboard/blockwork walls built off a resilient floor, essentially forming an isolated construction within the existing building envelope (box-in-box arrangement);
- Walls will require a resilient head detail and a cavity of up to 500mm (spec. TBC during detailed design);



The design proposals are to retain the existing structure behind 70 Oldham Street frontage. As such, further investigation into the nature of the noise transfer should be carried out and the exact specification of the mitigation will need to be determined through detailed design and liaison with suitable acoustic isolation specialists.

The required mitigation identified is only required to bedrooms which abut the party wall. As this would not be necessary to achieve the criteria within the ground floor communal / operational spaces.

4.0 Conclusion

The minimum level difference requirements between the Castle Hotel and the development have been established based on on-site testing.

It should be noted that the implemented mitigation would require careful consideration and should be developed throughout the next design stage, with exact design details to be incorporated as required.

Example mitigation measures, that will need to be investigated further, have been recommended.

Yours sincerely

Michael Hartley
for HANN TUCKER ASSOCIATES