

Swan Street Manchester

Condition 15 Discharge Report

25173/RP-2

02 February 2024

For:
RG Group
4 Abbey Wood Road
Kings Hill
West Malling
Kent
ME19 4AB



Hann Tucker Associates

Consultants in Acoustics Noise & Vibration

Head Office: Duke House, 1-2 Duke Street, Woking, Surrey, GU21 5BA (t) +44 (0) 1483 770 595

Manchester Office: First Floor, 346 Deansgate, Manchester, M3 4LY (t) +44 (0) 161 832 7041

(w) hanntucker.co.uk (e) enquiries@hanntucker.co.uk



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Internal Noise Level Test Report 25173/RP-2

Document Control

Rev	Date	Comment	Prepared by	Checked by	Authorised by
0	01/02/2024	-			
			James Hardacre Consultant BEng (Hons), AMIOA	Jake Howarth Senior Associate BEng (Hons), MIOA	



1.0 Introduction

A new-build residential development has been constructed at Swan Street, Manchester. The development is subject to various conditions of planning and Condition 15 requires a post construction survey to confirm that internal noise levels within apartments are compliant with the requirements of Manchester City Council.

Hann Tucker Associates has therefore been commissioned to carry out internal noise measurements within a selection of apartments to assist in the discharge of Condition 15.

It should be noted that this Report relates to “Tower 2” only as the practical completion date for this tower is some time before the remaining areas of the scheme are available for testing. However, the tests were carried out on a number of facades which captures each façade specification provided across the development.

Our findings are presented herein.

2.0 Planning Condition 15

Planning Condition 15 states:

“15) The acoustic insulation of the residential accommodation hereby approved shall be carried out in accordance with the attenuation measures set out in the noise and vibration report prepared by Hann Tucker stamped as received by the City Council, as Local Planning Authority, on the 27 September 2018.

Prior to the first occupation of the residential element a post construction survey (including appropriate mitigation measures and timescales for implementation if necessary) shall be submitted for approval in writing by the City Council, as Local Planning Authority. The measures agreed thereafter shall be retained and maintained in situ.

Reason: To secure a reduction in noise from traffic or other sources in order to protect future residents from noise disturbance pursuant to policies SP1, H1 and DM1 of the Core Strategy (2007) and saved policy DC26 of the Unitary Development Plan for the City of Manchester (1995).”

As such, internal ambient noise levels must adhere to the criteria stipulated in BS 8233:2014, as shown in the table overleaf.



Activity	Location	Desirable Ambient Criteria	
		07:00 – 23:00	23:00 – 07:00
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

3.0 Commissioning Details

3.1 Overview

An initial survey was carried out between Friday 11 January 2024 and Monday 15 January 2024. The results of which indicated exceedances during the night. Upon further investigation the likely source of these exceedances was the entertainment venue “Ramona” and “Firehouse” directly neighbouring site on Mason Street.

As such, a further survey with additional attended night-time measurements to determine the extent of the adverse impact due to music noise from Ramona was carried out between 26 January 2024 and 29 January 2024.

At the time of the surveys the apartments were unfurnished.

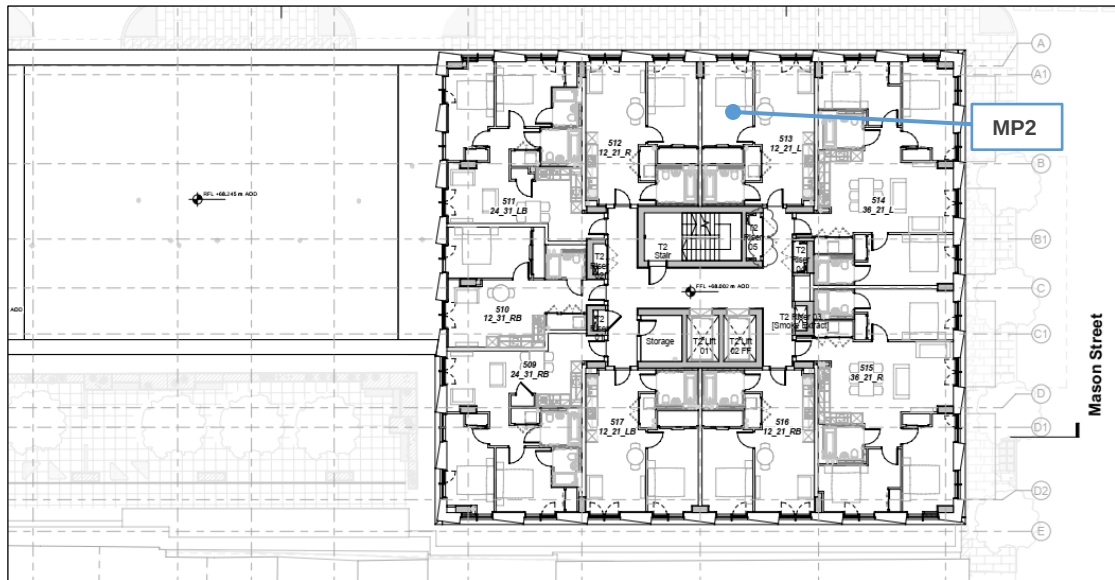
The results both unattended and the attended surveys are outlined in the following Sections.

3.2 Automated Measurement Locations

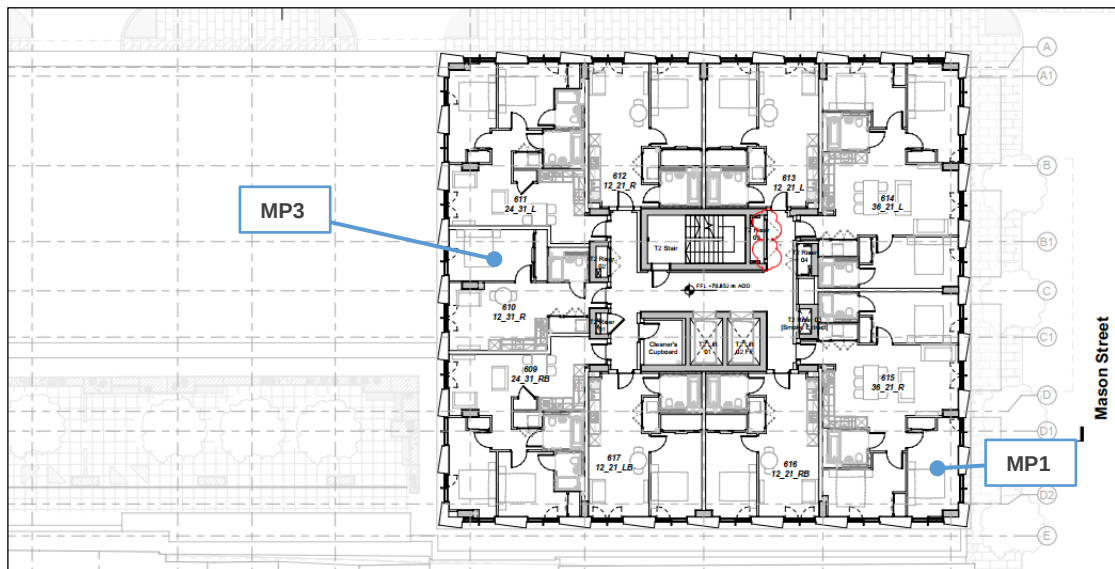
Automated sound level loggers were installed within 5No apartment bedrooms, as described below. These rooms were selected for the unattended surveys as they can be considered to be representative of highest and lowest façade specifications of the development as a whole (See Appendix A for details of the façade specifications).

Test Ref.	Apartment	Room	Facade Zone	Test Dates
MP1a	0615	Bedroom	Red	11/01/2024 – 15/01/2024
MP2	0513	Bedroom	Green	26/01/2024 – 29/01/2024
MP3	0610	Bedroom	Green	26/01/2024 – 29/01/2024
MP1b	0615	Bedroom	Red	26/01/2024 – 29/01/2024
MP4	0915	Bedroom	Red	26/01/2024 – 29/01/2024

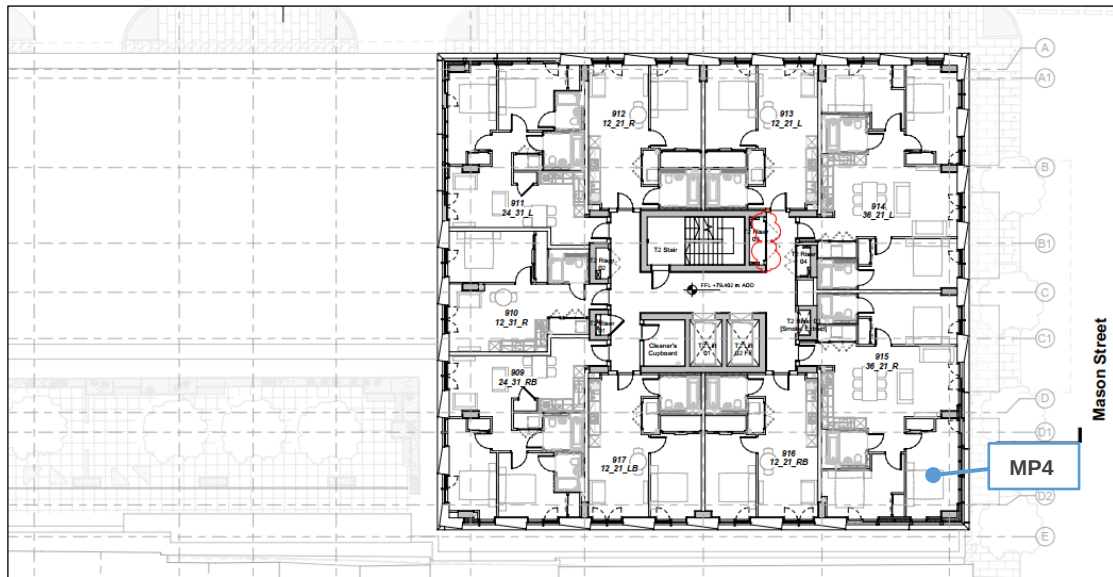
Each sound level meter was set up to continuously record L_{Aeq} and L_{Amax} noise levels over 15-minute and 2 minute periods. The measurement locations are marked on the following plans.



Plan Showing Level 5 Unattended Survey Positions



Plan Showing Level 6 Unattended Survey Positions



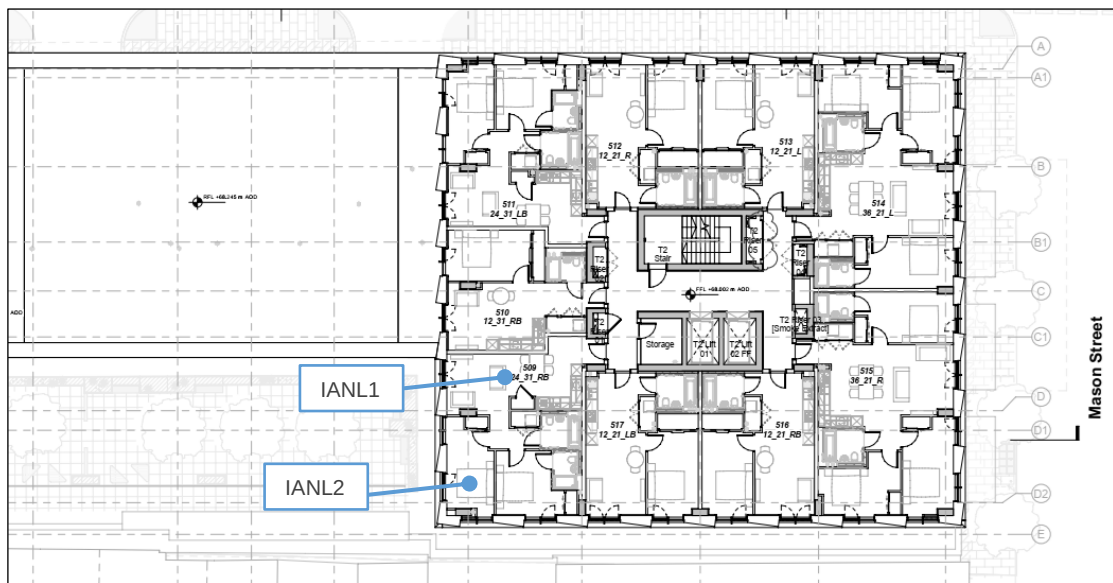
Plan Showing Level 9 Unattended Survey Positions

3.3 Attended Measurement Locations

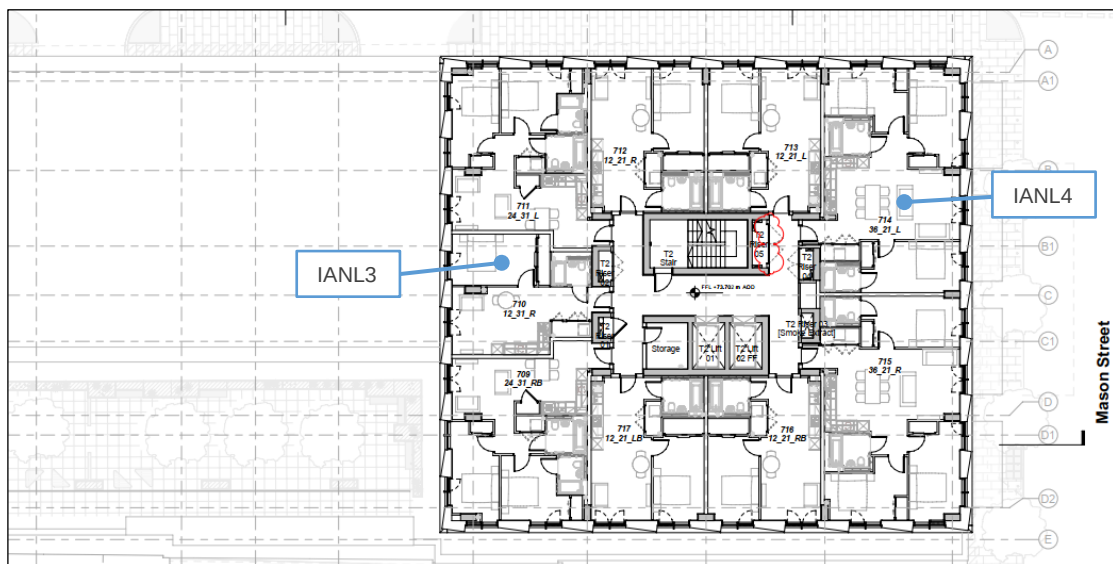
Internal ambient noise level measurements were taken in 7No different apartments across the development in the following locations. The noise levels were typically measured between 1 and 5 minute durations as this captured a reasonable time period that could be considered representative of the worst case period of the night.

The table below also shows the façade specification for each of the rooms tested. (See Appendix A for details of the façade specifications).

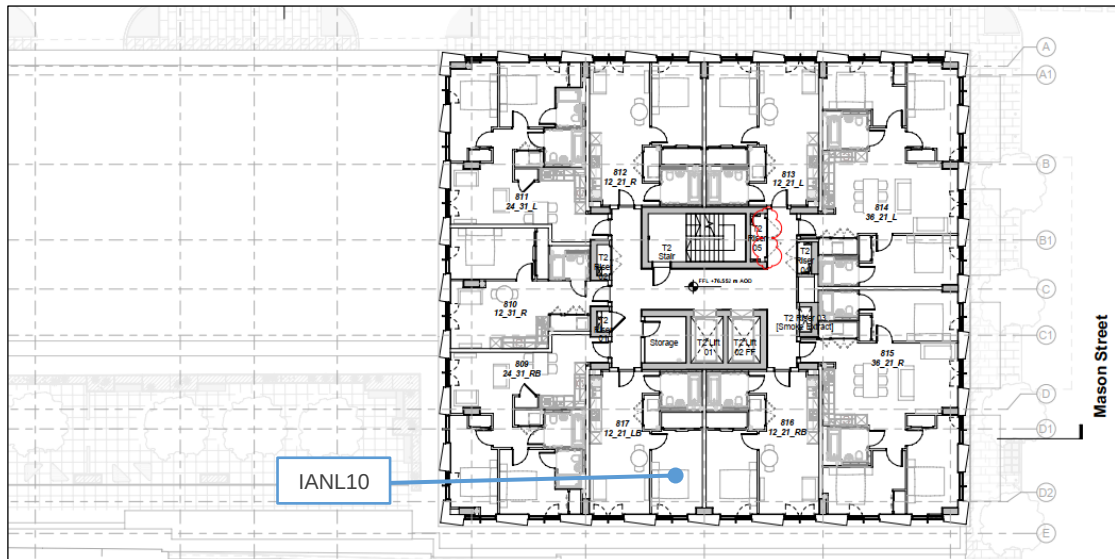
Test Ref.	Apt No.	Room Type	Facade Zone	Test Date	Test Time
IANL1	0509	Bedroom	Orange	26/01/2024	23:00
IANL2	0509	Living Room	Orange	26/01/2024	23:07
IANL3	0710	Bedroom	Green	26/01/2024	23:17
IANL4	0714	Living Room	Orange	26/01/2024	23:27
IANL5	1315	Bedroom	Orange	26/01/2024	23:40
IANL6	1310	Bedroom	Green	26/01/2024	23:48
IANL7	1111	Bedroom	Green	27/01/2024	00:01
IANL8	1111	Bedroom	Green	27/01/2024	00:03
IANL9	1111	Bedroom	Green	27/01/2024	00:06
IANL10	0817	Bedroom	Orange	27/01/2024	00:12



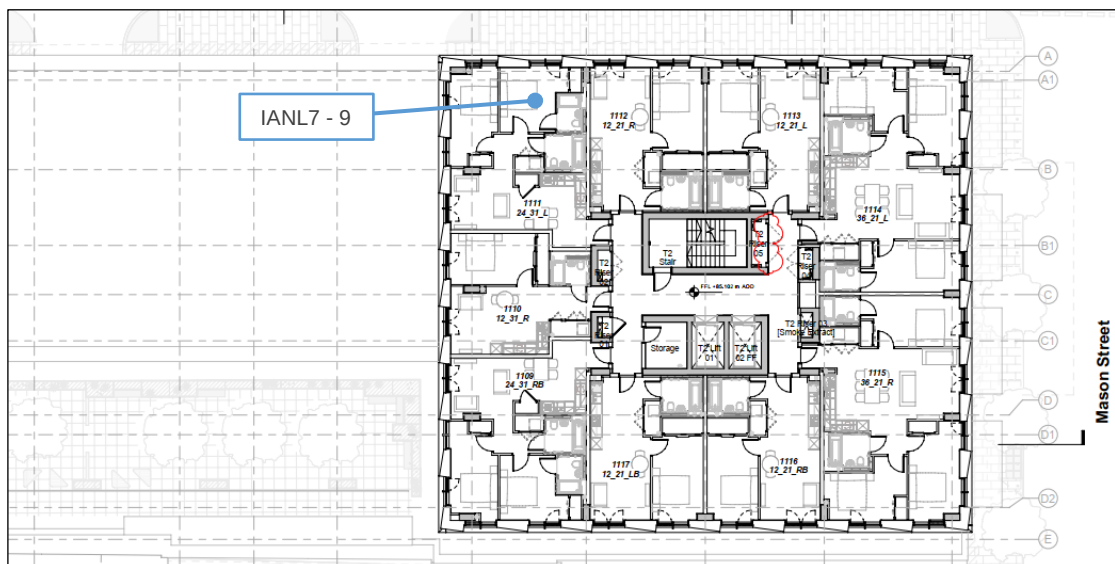
Plan Showing Level 5 Attended Survey Positions



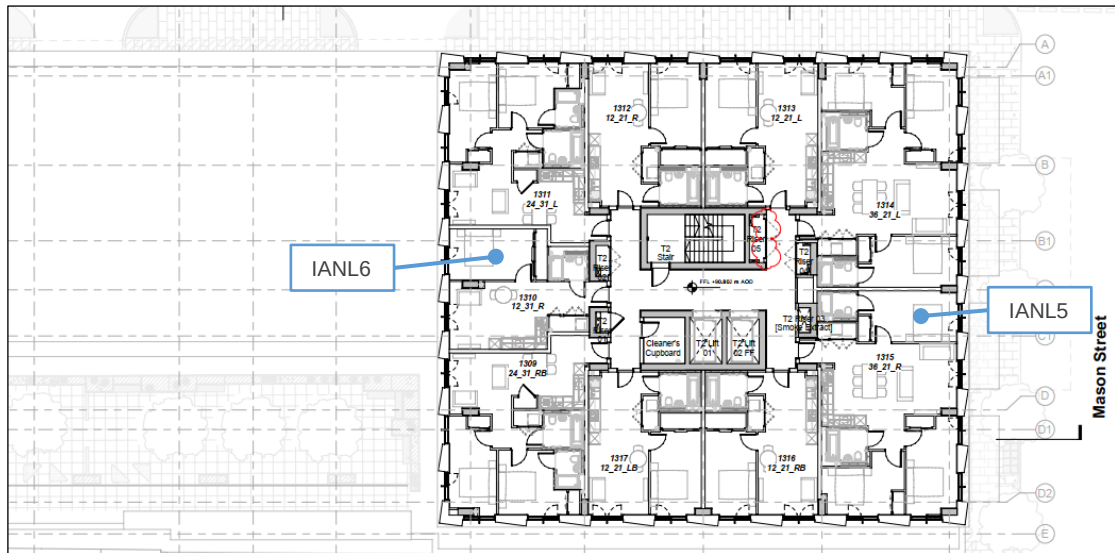
Plan Showing Level 7 Attended Survey Positions



Plan Showing Level 8 Attended Survey Positions



Plan Showing Level 11 Attended Survey Positions



Plan Showing Level 13 Attended Survey Positions

3.4 Equipment

The equipment used, as detailed below, was calibrated prior to and on completion of the survey. No significant calibration drift occurred (not more than 0.1 dB).

Location	Description	Manufacturer	Type	Serial Number	Calibration
MP1a	Type 1 Precision Sound Level Meter	Larson Davis	LxT	6490	Calibrated on 08/09/2023
MP1b	Type 1 Precision Sound Level Meter	Larson Davis	LxT	5104	Calibrated on 30/05/2023
MP2	Type 1 Precision Sound Level Meter	Larson Davis	LxT	6490	Calibrated on 08/09/2023
MP3	Type 1 Precision Sound Level Meter	Larson Davis	LxT	4569	Calibrated on 30/05/2023
MP4	Type 1 Precision Sound Level Meter	Larson Davis	LxT	4568	Calibrated on 30/05/2023
IANL1 - 10	Type 1 Precision Sound Level Meter	Larson Davis	LxT	5103	Calibrated on 30/05/2023
MP1 - 4, IANL1 - 10	Calibrator	Larson Davis	Cal 200	3083	Calibrated on 27/03/2023

3.5 Site Conditions

3.5.1 Automated Survey

The following pre-requisites were requests from site in order to obtain representative measurements results:-

- Test rooms to be locked off for the duration of the measurement (no access for trades).
- Windows to be closed.



- Mechanical ventilation systems (understood to be) balanced and operating at design duty.

The test rooms were largely finished but did not contain any furnishings.

3.5.2 Attended Survey

The following pre-requisites were requests from site in order to obtain representative measurements results:-

- Rooms were to be finished, unfurnished and unoccupied
- Windows to be closed.
- Mechanical ventilation systems (understood to be) balanced and operating design duty.
- Extraneous noises from site construction works were excluded as far as reasonably possible

All measurements were carried out during night-time hours (typically between 23:00-07:00 hrs), as to include music noise from Ramona.

4.0 Survey Results & Discussion

4.1 Unattended

The table below summarises the highest $L_{Aeq,16hr}$ (daytime), $L_{Aeq,8hr}$ (night-time) measurements and the 15th highest $L_{AFmax,2min}$ (night-time) noise levels at each measurement position. The Manchester City Council (MCC) noise level limit is also presented to judge compliance.

Test Ref	Measurement Location	Parameter	Measured Noise Level (dB)	MCC Limit (dB)	Compliance?
MP1a	0615 Bedroom	Daytime $L_{Aeq,16hr}$	39	35	✗
		Night-time $L_{Aeq,8hr}$	36	30	✗
		Night-time L_{Amax}	51	45	✗
MP1b	0615 Bedroom	Daytime $L_{Aeq,16hr}$	37	35	✗
		Night-time $L_{Aeq,8hr}$	34	30	✗
		Night-time L_{Amax}	49	45	✗
MP2	0513 Bedroom	Daytime $L_{Aeq,16hr}$	36	35	✗
		Night-time $L_{Aeq,8hr}$	37	30	✗
		Night-time L_{Amax}	47	45	✗
MP3	0610 Bedroom	Daytime $L_{Aeq,16hr}$	29	35	✓



Test Ref	Measurement Location	Parameter	Measured Noise Level (dB)	MCC Limit (dB)	Compliance?
MP4	0915 Bedroom	Night-time $L_{Aeq, 8\text{hour}}$	27	30	✓
		Night-time L_{Amax}	39	45	✓
		Daytime $L_{Aeq, 16\text{hour}}$	34	35	✓
		Night-time $L_{Aeq, 8\text{hour}}$	32	30	✗
		Night-time L_{Amax}	46	45	✗

As music noise has been noted around site, the following table outlines the typical $L_{eq,15\text{mins}}$ in the 63 and 125 Hz octave bands during the times Ramona & Firehouse was in operation. While no criteria has been stipulated regarding music noise in Condition 15 the typical Manchester City Council (MCC) internal noise limits are also present for comparison.

Test Ref	Measurement Location	Parameter	Typical Measured Noise Level (dB)	Typical MCC Criteria (dB)	Difference (dB)
MP1a	0615 Bedroom	63Hz $L_{Aeq, 15\text{mins}}$	56	47	+9
		125Hz $L_{Aeq, 15\text{mins}}$	49	41	+8
MP1b	0615 Bedroom	63Hz $L_{Aeq, 15\text{mins}}$	56	47	+9
		125Hz $L_{Aeq, 15\text{mins}}$	50	41	+9
MP2	0513 Bedroom	63Hz $L_{Aeq, 15\text{mins}}$	50	47	+3
		125Hz $L_{Aeq, 15\text{mins}}$	43	41	+2
MP3	0610 Bedroom	63Hz $L_{Aeq, 15\text{mins}}$	40	47	-7
		125Hz $L_{Aeq, 15\text{mins}}$	36	41	-5
MP4	0915 Bedroom	63Hz $L_{Aeq, 15\text{mins}}$	52	47	+5
		125Hz $L_{Aeq, 15\text{mins}}$	48	41	+7

4.2 Attended Measurements

The table below summarises the $L_{Aeq,T}$ (night-time) measurements at each measurement position. The Manchester City Council (MCC) noise level limit is also presented to judge compliance.

Test Ref.	Measurement Location	Time (mins)	Measured L_{eq} (dB)	MCC Criterion $L_{Aeq,16\text{hr}}$ (dB)	Compliance
IANL1	0509 Living Room	5	34	35	✓
IANL2*	0509 Bedroom	2.5	34	30	✗
IANL3	0710 Bedroom	5	30	30	✓
IANL4*	0714 Living Room	5	36	35	✗
IANL5*	1315 Bedroom	1	36	30	✗



Test Ref.	Measurement Location	Time (mins)	Measured L_{eq} (dB)	MCC Criterion $L_{Aeq,16hr}$ (dB)	Compliance
IANL6	1310 Bedroom	5	31	30	✗
IANL7	1111 Bedroom	1	32	30	✗
IANL8	1111 Bedroom	1	29	30	✓
IANL9	1111 Bedroom	1	33	30	✗
IANL10*	0817 Bedroom	3	35	30	✗

*Music Noise was noted as the dominant source in these apartments

As music noise has been noted around site, the following table outlines the typical $L_{eq,2mins}$ in the 63 and 125 Hz octave bands during the times Ramona was in operation. While no criteria has been stipulated regarding music noise in Condition 15 the typical Manchester City Council (MCC) internal noise limits are also present for comparison.

Test Ref.	Measurement Location	Parameter	Measured L_{eq} (dB)	Typical MCC Criterion L_{Aeq} (dB)	Difference (dB)
IANL1	0509 Bedroom	63Hz L_{Aeq}	53	47	+6
		125Hz L_{Aeq}	37	41	-4
IANL2	0509 Living Room	63Hz L_{Aeq}	47	47	0
		125Hz L_{Aeq}	43	41	+2
IANL3	0710 Bedroom	63Hz L_{Aeq}	46	47	-1
		125Hz L_{Aeq}	39	41	-2
IANL4	0714 Living Room	63Hz L_{Aeq}	54	47	+7
		125Hz L_{Aeq}	47	41	+6
IANL5	1315 Bedroom	63Hz L_{Aeq}	52	47	+5
		125Hz L_{Aeq}	46	41	+5
IANL6	1310 Bedroom	63Hz L_{Aeq}	45	47	+2
		125Hz L_{Aeq}	40	41	-1
IANL7	1111 Bedroom	63Hz L_{Aeq}	42	47	-5
		125Hz L_{Aeq}	43	41	+2
IANL8	1111 Bedroom	63Hz L_{Aeq}	41	47	-6
		125Hz L_{Aeq}	40	41	-1
IANL9	1111 Bedroom	63Hz L_{Aeq}	41	47	-6
		125Hz L_{Aeq}	43	41	+2
IANL10	0817 Bedroom	63Hz L_{Aeq}	56	47	+9
		125Hz L_{Aeq}	43	41	+2



5.0 Discussion

On the basis of the results presented above it is clear that there are issues resulting in the internal noise levels being typically above the criteria set out by Manchester City Council. The most significant and common of these issues is the music noise from Ramona & Firehouse as this is notably audible within all the dwellings during our time on site.

The following table outlines our on site observations from the attended survey on the night of Friday 26 January 2024.

Location	Test Ref.	Comments
0615 Bedroom	MP1b	Music from Ramona clearly audible. Faint air movement also audible, wind conditions were calm so likely to be MVHR units. Road Traffic Noise inaudible over the music
0513 Bedroom	MP2	Music from Ramona/Firehouse clearly audible and dominant, particularly the bass. Building service noise also audible.
0610 Bedroom	MP3	Music from Ramona faintly audible, low frequency still audible but is faint. Road Traffic Noise on Great Ancoats Street audible but not excessive. Building service noise also audible.
0915 Bedroom	MP4	Music from Ramona/Firehouse dominant, particularly the low frequency. Faint air movement audible, likely MVHR units but difficult to know for certain over the music. Road Traffic Noise not audible over music.
0509 Living Room	IANL1	Building Service noise was dominant, however, levels noted to be compliant with BS8233:2014. Music noise from Ramona/Firehouse not audible in the room.
0509 Bedroom	IANL2	Music noise from Ramona/Firehouse clearly audible in this room and dominant, no significant contribution from building services noted. Internal noise level likely to be compliant without external music noise present.
0710 Bedroom	IANL3	Music noise from Ramona/Firehouse faintly audible but not dominant. Road Traffic Noise and building services noise also audible, but overall compliant.
0714 Living Room	IANL4	Music noise from Ramona/Firehouse dominant. Building services noise and road traffic noise also audible but not excessively. Internal noise levels likely compliant with contribution from external music noise.
1315 Bedroom	IANL5	Music noise from Ramona/Firehouse dominant in low and mid frequency ranges. Building services noise also audible but not dominant.
1310 Bedroom	IANL6	Music noise from Ramona/Firehouse faintly audible at low frequency
1111 Bedroom	IANL7	Music noise from Ramona/Firehouse audible but not dominant. Building services noise from the water heater and MVHR units audible. This measurement was repeated three times with everything on, everything off and just the MVHR on. MVHR noise was dominant when on.
	IANL8	
	IANL9	
0817 Bedroom	IANL10	Music and patron noise from Ramona/Firehouse very audible and dominant. Road traffic noise also audible but not excessively. Building services noise not noted in this room.



5.1 Ramona/Firehouse

5.1.1 Music/Entertainment Noise

We understand that as part of the planning application (133064/FO/2022) for the Ramona/Firehouse site octave band entertainment noise limits at 1m from the nearest noise sensitive premises have been set for daytime, evening and night periods by Hoare Lea Acoustics. These are outlined in the following table.

Description	Time of Day	Sound Pressure Level (dB L _{eq}) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1000	2000	4000	8000	
Maximum Entertainment Noise Limits at 1m from Nearest Noise Sensitive Premises	Daytime (07:00 – 19:00)	46	40	35	33	33	27	18	9	37
	Evening (19:00 – 23:00)	44	38	34	32	31	25	15	6	35
	Night (23:00 – 07:00)	38	33	29	26	25	18	9	5	29

Based on observations on site, it is clear that the above levels are being exceeded by Ramona/Firehouse. By way of justification, the table below shows the octave band noise levels measured for position IANL 4 in the Living Room of Apartment 0714 and compares these levels against the external night-time noise limits presented in the Hoare Lea Report.

Description	Period	Sound Pressure Level (dB L _{eq}) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1000	2000	4000	8000	
Measured Internal Ambient Noise Level (IANL 4)	Night	54	47	38	31	31	22	18	20	36
Difference to Relevant Criteria	-	+16	+14	+9	+5	+6	+4	+9	+15	+7

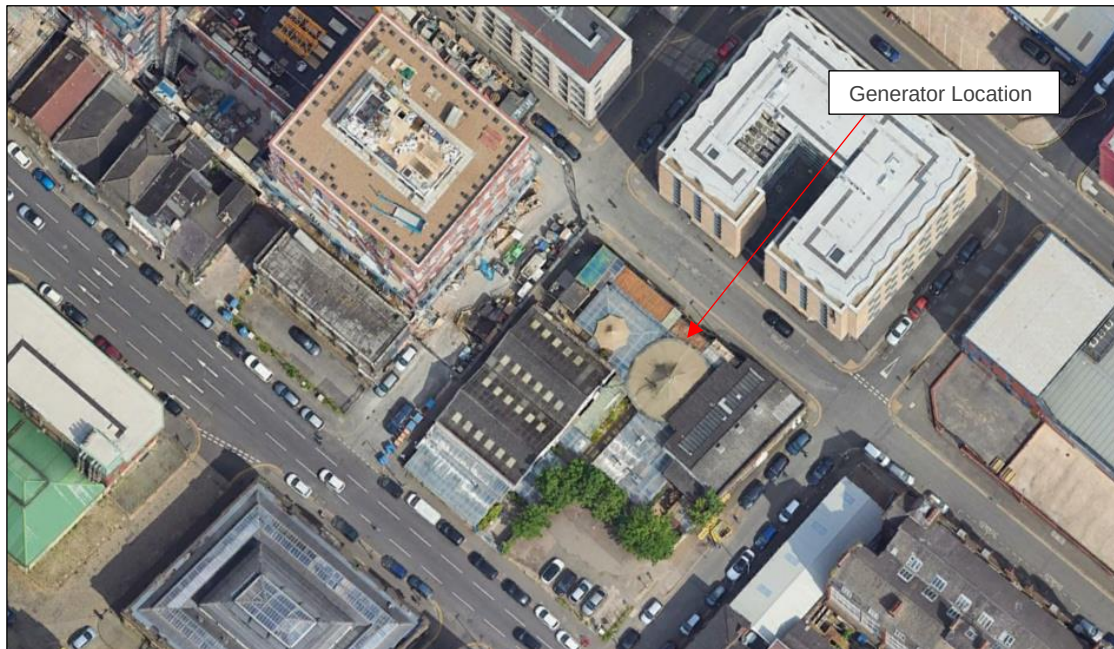
On the basis of the above table, it is clear that the operation of Ramona/Firehouse is not in compliance with the limits set out in the Hoare Lea Report as the internal noise levels measured exceed the external noise limits for the site.

As such, for the purposes of this assessment the time periods which were clearly impacted by music noise have been excluded from our assessment. However, the issue of the music noise needs to be addressed as it is very likely that complaints would be received as soon as the building is occupied. The council should investigate the music/entertainment noise produced by Ramona/Firehouse and ensure the operators are operating within their consent.



5.1.2 Generator Noise

While on site, plant noise from the operation of Ramona/Firehouse was having an impact on the internal noise levels measured in rooms overlooking the site. It is understood that the plant noise is being produced by an external generator in the location highlighted below.



Mark-up Showing Location of External Generator at Ramona/Firehouse

Again, it is clear that the operation of Ramona/Firehouse is resulting in the limits set out by Hoare Lea to be exceeded. As such, for the purposes of this assessment the time periods which were clearly impacted by plant noise have been excluded from our assessment. However, the issue needs to be addressed as it is very likely that complaints would be received as soon as the building is occupied. The council should investigate the music/entertainment noise produced by Ramona/Firehouse and ensure the operators are operating within their consent.

5.2 Electric Heater Operation

While on site it was also noted that the electric radiators were occasionally “clicking”. While we were able to avoid this for the attended portion of our survey, the unattended measurements taken at MP2 are held above the criteria due to this.

It should also be noted that when interrogating the 2 minute measured L_{Aeq} data, it can be seen that there are regular intervals in the range of 27 to 29 dB (Night) and 30 to 34 dB (Day) during the survey. As such, it stands to reason that both the daytime and night-time noise criteria would be achieved in the absence of the radiator clicking (see Section 6.3).



5.3 Corrections for Unfurnished Rooms

All of the spaces measured on site were unfurnished with hard floor finishes. Sound absorption provided by soft furnishings such as sofas, beds, rugs, etc would result in the reverberation time being shorter once the apartments occupied than is currently provided in their unfurnished condition. As such, the measured noise levels would likely reduce once the apartments are unfurnished and taking the measured noise levels without consideration of this may imply that the facade/building services are not sufficient when they would be once the apartment is occupied.

As such, whilst on site, reverberation time measurements were taken in various unfurnished spaces. Typical reverberation times measured in similar sized, furnished rooms are shown below:

Description	Room Type	Reverberation Time T20, (s) at each Octave Band Centre Frequency (Hz)					
		125	250	500	1000	2000	4000
Flat 0911 Unfurnished	LKD	1.2	1.2	1.3	1.3	1.3	1.2
	Bed	1.0	1.4	1.4	1.3	1.2	1.2

It would be typical to measure the reverberation time in an example show flat. However, for these scheme this was not possible. As such, the table below shows the measured reverberation times in a furnished apartment with similar finishes (ie hard floors)

Description	Room Type	Reverberation Time T20, (s) at each Octave Band Centre Frequency (Hz)					
		125	250	500	1000	2000	4000
Typical Furnished Flat	LKD	0.8	0.9	0.8	1.1	0.9	0.9
	Bed	0.6	0.5	0.6	0.7	0.6	0.6

Through comparison of the reverberation times recorded in each space, a correction factor can be determined per octave interval. These values are shown in the table below.

Room Type	Correction Factor (dB) at each Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
LKD	1.6	1.1	2.0	0.8	1.6	1.3
Bed	2.3	4.3	3.7	2.6	3.1	3.1

Based on the above, it would therefore be reasonable to apply with above corrections to the noise levels measured in unfurnished rooms.

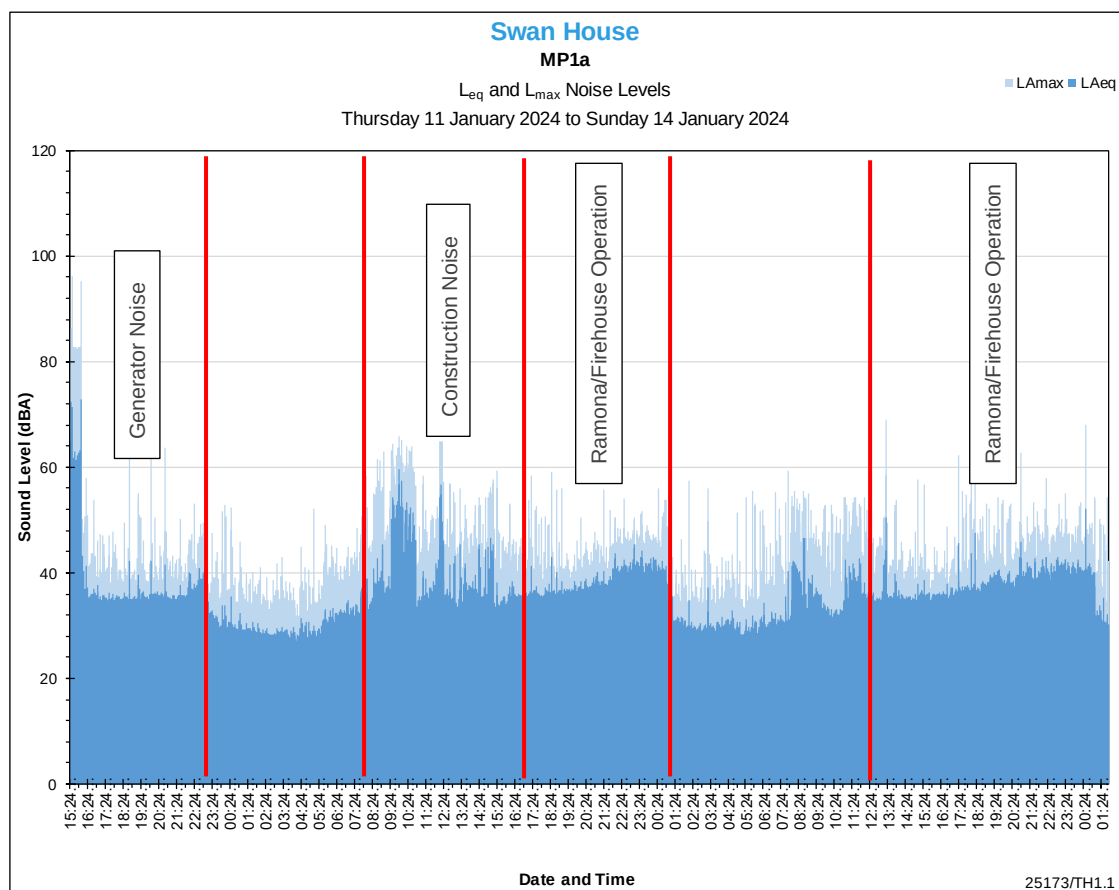


6.0 Re-Assessment of Internal Noise Levels

On the basis of the discussion and analysis carried out in Sections 5.1, 5.2 and 5.3 it is necessary to analyse the unattended survey results in more depth. The following Sections outline these results in the absence of music noise and radiator clicking, and room corrections applied as necessary.

6.1 Position MP1a

The graph below outlines the 2 minute L_{Aeq} and L_{Amax} data was collected during the survey. Select time periods affected by different sources are also highlighted on the graph below for clarity.



From the above graph it can be seen that there is a notable drop in both the L_{Aeq} and L_{Amax} levels after Ramona/Firehouse closes on all nights, however the drop off in noise is more noticeable on Friday and Saturday nights.



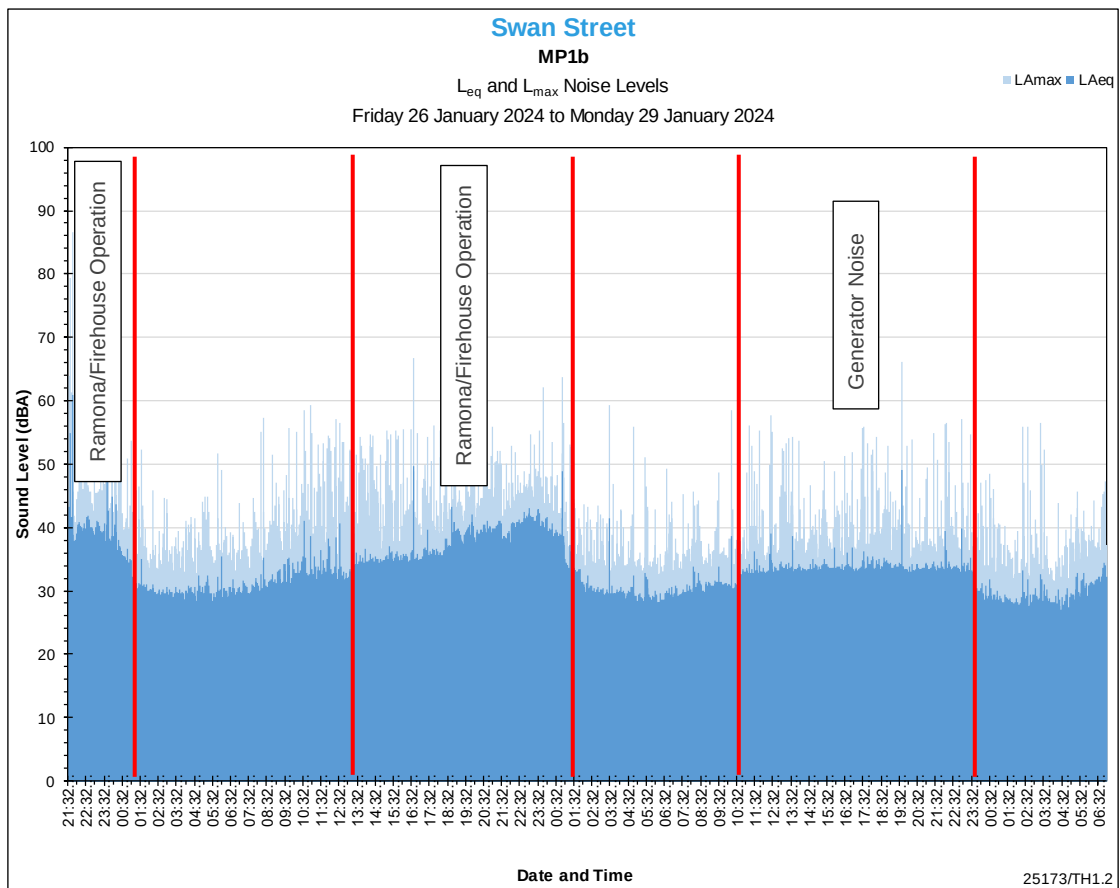
Through careful analysis of the 2 minute data and removal of any intervals adversely affected by the sources discussed above, the internal noise levels during the survey period can be calculated to as follows.

Test Ref	Measurement Location	Parameter	Average Measured Weekend Noise Level (dB)	MCC Limit (dB)	Compliance?
MP1a	0615 Bedroom	Daytime L_{Aeq}	33	35	✓
		Night-time L_{Aeq}	30	30	✓
		Night-time L_{Amax}	45	45	✓

On the basis of the above, it can be seen that with suitable corrections applied and only considering data unaffected by Ramona the measured internal noise levels are compliant with the criteria set out by Manchester City Council.

6.2 Position MP1b

The graph below outlines the 2 minute L_{Aeq} and L_{Amax} data was collected during the survey. Select time periods affected by different sources are also highlighted on the graph overleaf for clarity.



From the above graph it can be seen that there is a notable drop in both the L_{Aeq} and L_{Amax} levels after Ramona/Forehouse closes on Friday and Saturday nights.

Through careful analysis of the 2 minute data and removal of any intervals adversely affected by the sources discussed above, the internal noise levels during the survey period can be calculated to as follows.

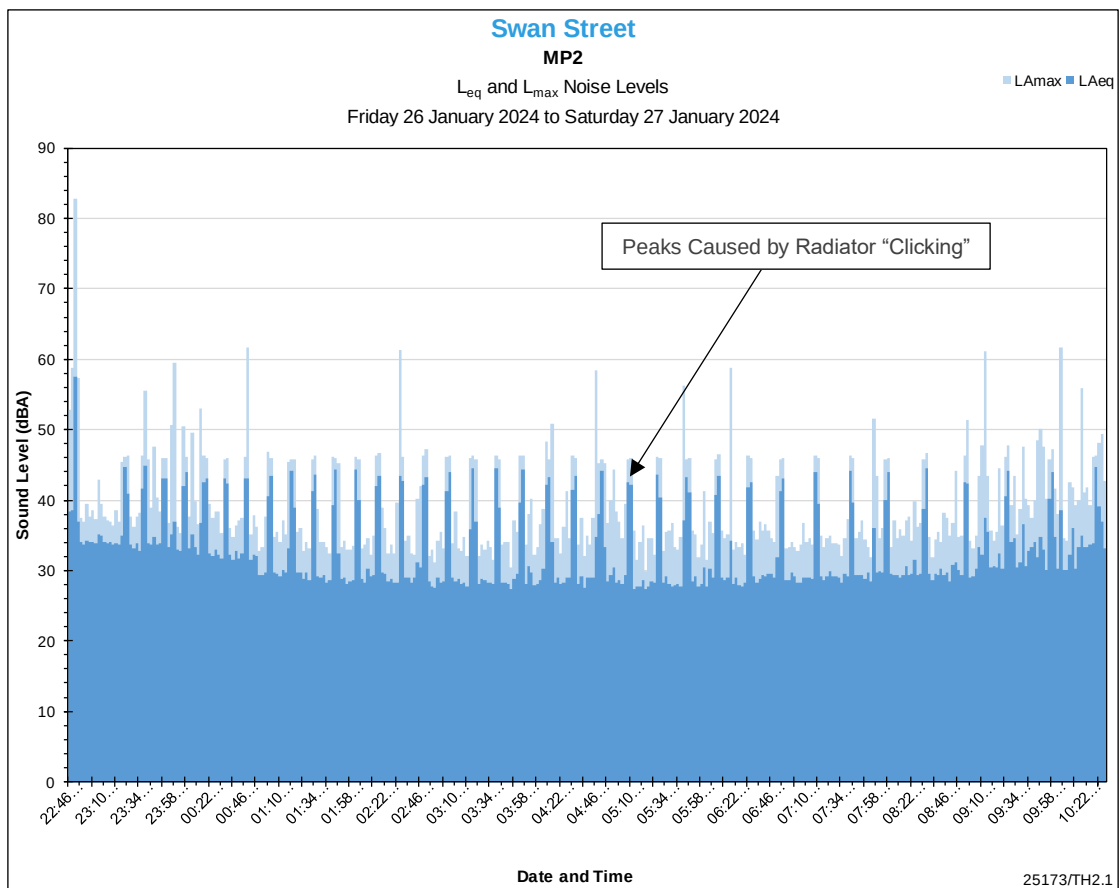
Test Ref	Measurement Location	Parameter	Average Measured Weekend Noise Level (dB)	MCC Limit (dB)	Compliance?
MP1b	0615 Bedroom	Daytime L _{Aeq} , 16hour	29	35	✓
		Night-time L _{Aeq} , 8hour	28	30	✓
		Night-time L _{Amax}	44	45	✓

On the basis of the above, it can be seen that with suitable corrections applied and only considering data unaffected by Ramona/Firehouse the measured internal noise levels are compliant with the criteria set out by Manchester City Council.



6.3 Position MP2

The graph below outlines the 2 minute L_{Aeq} and L_{Amax} data was collected during the survey. Select time periods affected by different sources are also highlighted on the graph below for clarity.



From the above graph it can be seen that there is a notable drop in both the L_{Aeq} and L_{Amax} levels after Ramona closes on Friday night. It can also be noted that there are regular maximum events in excess of the 45dBA criterion during both the daytime and night-time periods, on site observations indicate that this is likely to be due to the radiators "clicking".

Through careful analysis of the 2 minute data and removal of any intervals adversely affected by the sources discussed above, the internal noise levels during the survey period can be calculated to as follows.

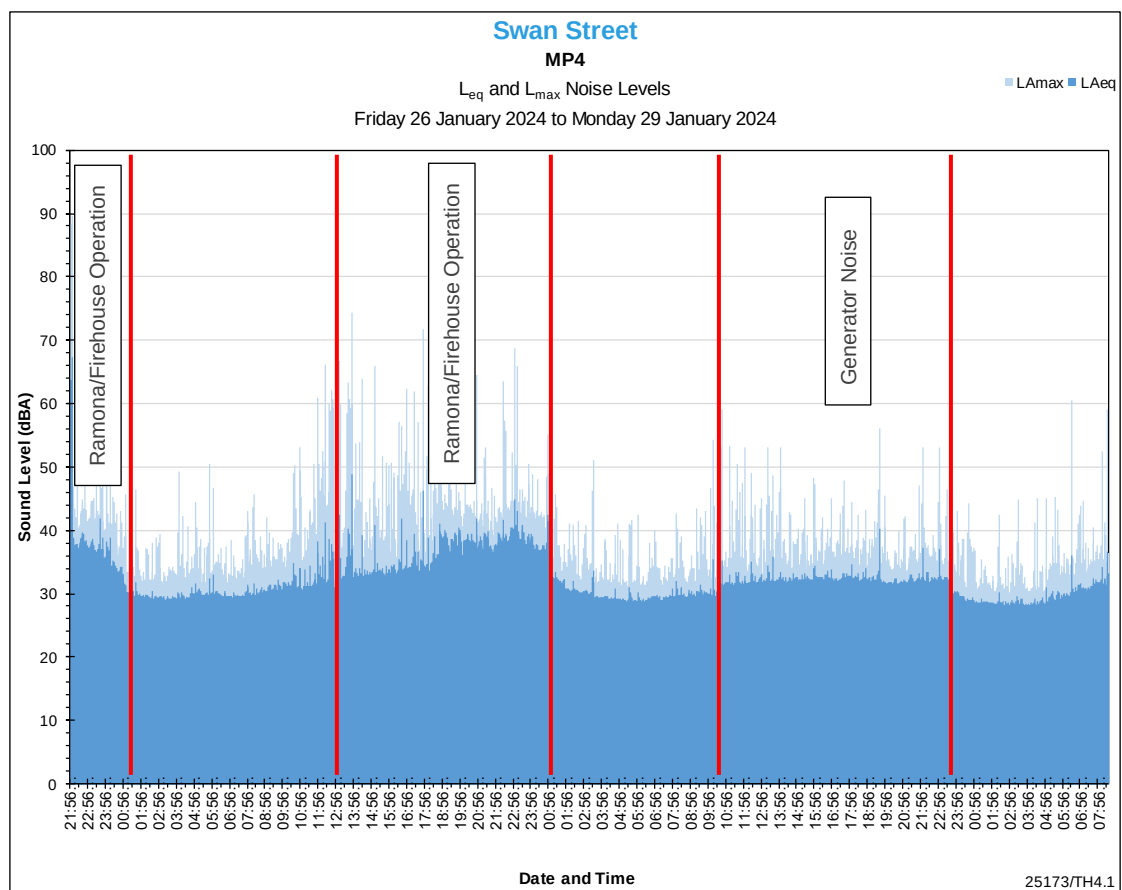


Test Ref	Measurement Location	Parameter	Average Measured Weekend Noise Level (dB)	MCC Limit (dB)	Compliance?
MP2	0513 Bedroom	Daytime $L_{Aeq, 16\text{hour}}$	34	35	✓
		Night-time $L_{Aeq, 8\text{hour}}$	30	30	✓
		Night-time L_{Amax}	45	45	✓

On the basis of the above, it can be seen that with suitable corrections applied and only considering data unaffected by Ramona/Firehouse the measured internal noise levels are compliant with the criteria set out by Manchester City Council.

6.4 Position MP4

The graph below outlines the 2 minute L_{Aeq} and L_{Amax} data was collected during the survey. Select time periods affected by different sources are also highlighted on the graph below for clarity.





From the above graph it can be seen that there is a notable drop in both the L_{Aeq} and L_{Amax} levels after Ramona closes on both Friday and Saturday nights.

Through careful analysis of the 2 minute data and removal of any intervals adversely affected by the sources discussed above, the internal noise levels during the survey period can be calculated to as follows.

Test Ref	Measurement Location	Parameter	Average Measured Weekend Noise Level (dB)	MCC Limit (dB)	Compliance?
MP4	0915 Bedroom	Daytime $L_{Aeq, 16hr}$	31	35	✓
		Night-time $L_{Aeq, 8hr}$	29	30	✓
		Night-time L_{Amax}	41	45	✓

On the basis of the above, it can be seen that with suitable corrections applied and only considering data unaffected by Ramona/Firehouse the measured internal noise levels are compliant with the criteria set out by Manchester City Council.

6.5 Attended Positions

As outlined in the table in Section 5.0 on 3No. of the attended internal ambient noise level measurements were unaffected by music noise from the operation of Ramona/Firehouse and still did not meet the criteria set out by Manchester City Council.

These 3No. measurements were taken in finished but unfurnished rooms within the development. As such, the measured level is likely overvalued due to an exaggerated reverberation time. On this basis it is possible to correct the measured values to account for future furnishings as set out in Section 5.3. The following table outlines these corrected values.

Test Ref.	Measurement Location	Corrected L_{Aeq} (dB)	MCC Criterion $L_{Aeq, 16hr}$ (dB)	Compliance
IANL6	1310 Bedroom	28	30	✓
IANL7	1111 Bedroom	29	30	✓
IANL9	1111 Bedroom	30	30	✓



7.0 Conclusion

In conclusion, it stands to reason that the installed façade system is suitable to control external noise intrusion on all façades of “Tower 2” of the Swan Street development. As the façade types used in Tower 2 are also the same as in Tower 1, the same could be inferred for Tower 1.

The measurements of internal noise have been impacted by the operation of Ramona/Firehouse exceeding the operational noise limits set out in the respective planning application and, to a lesser extent, a number of the installed radiators were noted to be clicking throughout the attended survey and during other times on site.

However, the measured noise levels have been interrogated and the above extraneous noise sources removed. With these noise sources removed, the measured results show that the requirements of Condition 15 should be achieved within the development.

However, the issue with the operation of Ramona/Firehouse is significant and Manchester City Council should investigate this further as it is likely that noise being generated from the site does not comply with the required limits.



Appendix B

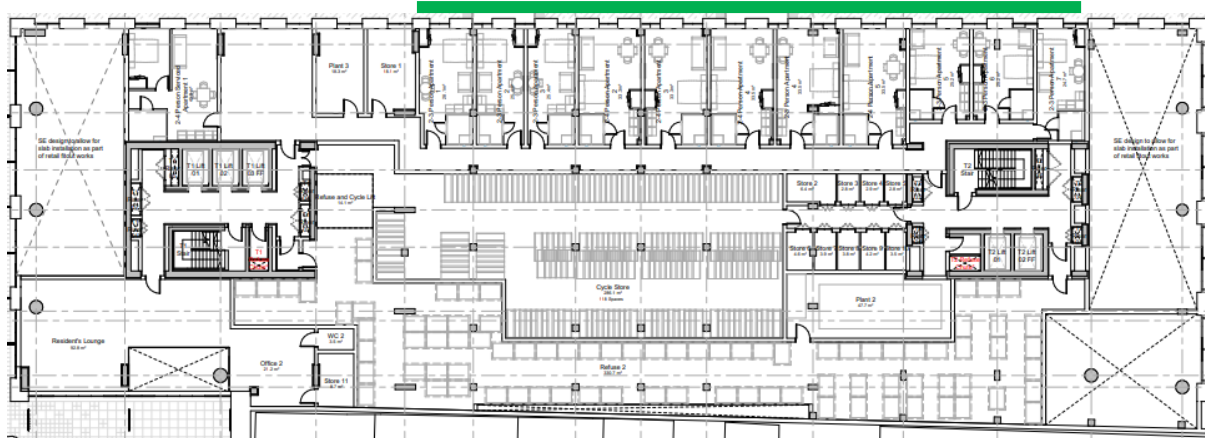
Façade Specifications

The following table presents the minimum octave band sound reduction performance requirements for framed window/curtain walling to systems to apartments.

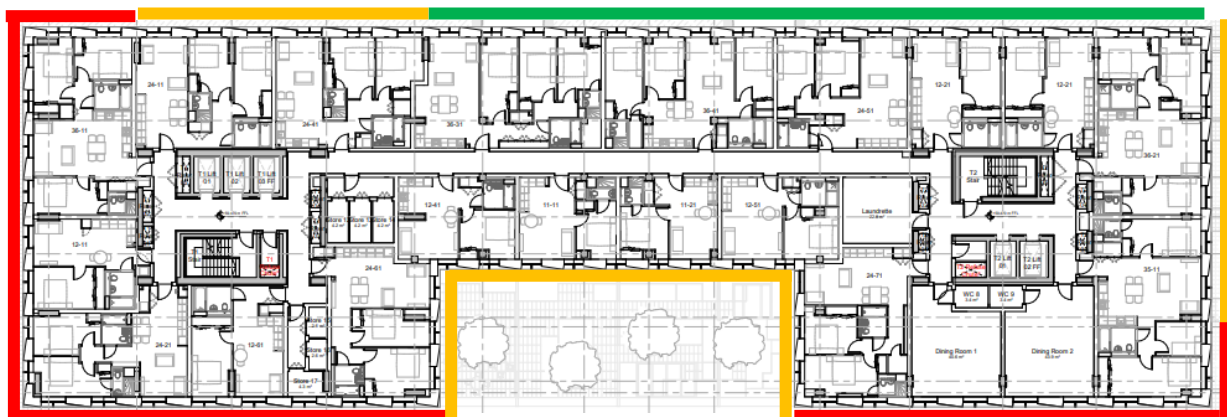
Colour Zone	Minimum Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
GREEN	22	23	27	33	37	40	40
ORANGE	23	25	31	36	40	43	43
RED	26	28	34	40	43	46	46

*Ref. sketch zone plans

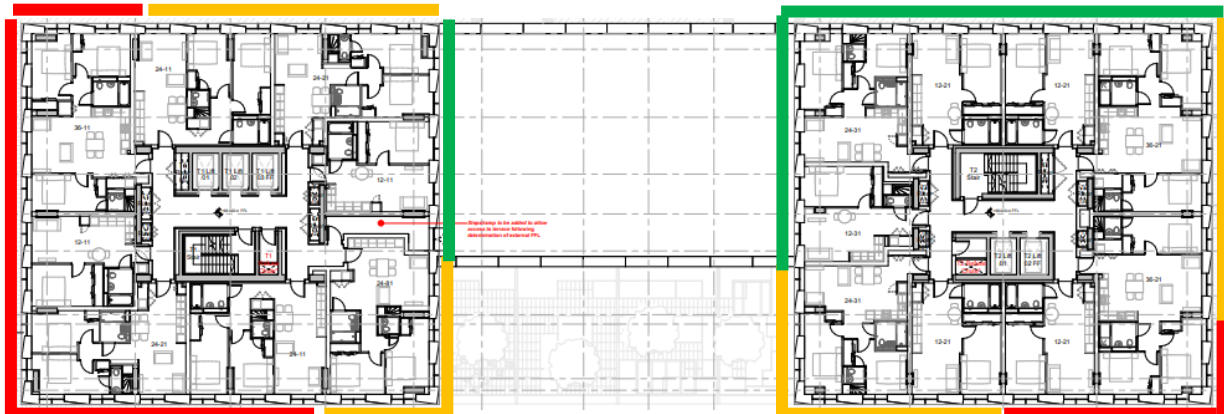
The location of each façade zone are shown on the plans below.



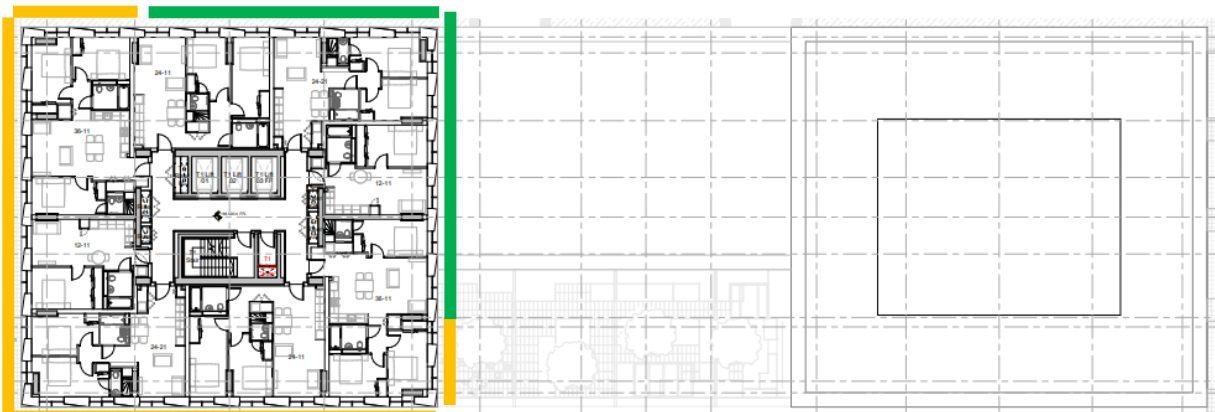
Level 00(Mez)



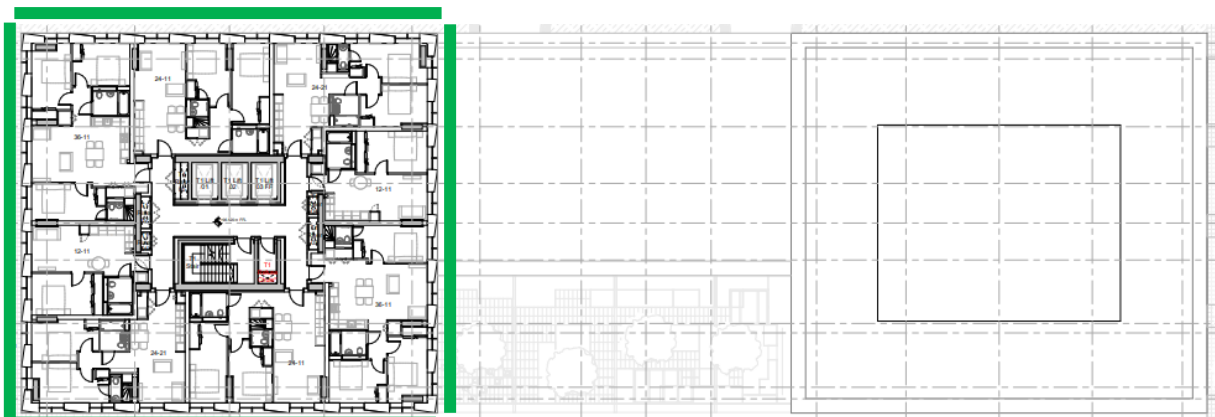
Level 01 - 04



Level 05-13



Level 14-24



Level 25-32

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