023771-R16-C

23 September 2026

MCFC North Stand Expansion

Planning Condition 37 discharge report

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Version	Date	Comments	Author	Reviewer
A	5 Aug 26		TS	MR
B	18 Sep 26	Updated following additional Commercial building break out measurements and assessment	JMG	JA
C	23 Sep 26	Minor updates, clarifications following partial discharge of Planning Condition 37b.	JMG	JA

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Summary

Sandy Brown has been appointed by John Sisk & Son Ltd to carry out acoustic verification measurements to demonstrate compliance with Planning Condition 37 under 136763/FO/2023. The planning condition relates to entertainment noise breakout from areas within the hotel and commercial buildings that form part of the North Stand expansion at Etihad Stadium, Manchester.

Part A of Planning Condition 37 has been covered separately in Sandy Brown technical memo 023771-M080-B *Entertainment noise breakout assessment – Planning Condition 37*, dated 7 May 2026. Part B of Planning Condition 37 (Condition 37b) was partially discharged for the Hotel Building (Section 2) under application OTH-2026-001328. This report has been prepared as an addendum to address the Commercial Building (Section 3) and, together with the previous submission, to support the full discharge of Condition 37b.

The details and assessment related to the Hotel Building in Sandy Brown 023771-R16-A *Planning conditions 37 discharge report,* dated 5 August 2026 remain unchanged from the approved application and are included in this assessment for completeness.

The Planning Condition received from Manchester City Council (MCC) requires verification measurements be carried out to demonstrate that entertainment noise break out from the development (excluding the North Stand areas) is controlled to be no higher than 5 dB below the background noise level in octave bands outside the nearby noise sensitive receptors.

This report details the measurement methodology, observations relating to the site conditions, amplified sound systems, and presents an assessment of entertainment noise breakout.

The following attended sample noise measurements have been carried out:

- 22 July 2026: Hotel Level 1 gym and all day dining and bar spaces.
- 30 July 2026: Sound insulation tests of the hotel ground floor F&B unit facades
- 7 September 2026: Sound insulation tests of the commercial building Level 3 museum, Level 2 and ground floor retail unit facades.

3D acoustic modelling has been carried out based on the amplified sound limits to ensure that entertainment noise break out for the hotel is controlled to be compliant with Planning Condition 37.

The operation of the gym, all day dining and bar area remain unchanged from the approved application. The proposed operation of the retail and museum spaces within the commercial building will be determined as part of the fit-out works, which falls outside the scope of this assessment. The amplified sound limits for the commercial building will need to be adhered to.

Based on the verification measurement results and the internal limits for amplified sound systems being adhered to, the cumulative levels of amplified sound breakout comply with the requirements of Planning Condition 37b.

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1 Introduction

Sandy Brown has been appointed by John Sisk & Son Ltd to carry out acoustic verification measurements to demonstrate compliance with Planning Condition 37 under 136763/FO/2023. The planning condition relates to entertainment noise breakout from areas within the hotel and commercial buildings that form part of the North Stand expansion at Etihad Stadium, Manchester.

Part A of Planning Condition 37 has been covered separately in Sandy Brown technical memo 023771-M080-B *Entertainment noise breakout assessment – Planning Condition 37*, dated 7 May 2026. Condition 37b was partially discharged for the Hotel Building (Section 2) under OTH-2026-001328. The details and assessment for the Hotel Building remain unchanged and are not reassessed in this report.

This addendum addresses the Commercial Building (Section 3) and provides the verification information required to support the full discharge of Condition 37b.

As part of this, the following attended sample noise measurements have been carried out:

- 22 July 2026: Hotel Level 1 gym and all day dining and bar spaces.
- 30 July 2026: Sound insulation tests of the hotel ground floor F&B unit facades
- 7 September 2026: Sound insulation tests of the commercial building Level 3 museum, Level 2 and ground floor retail unit facades.

The measurement results have been used to assess the impact of entertainment noise break out at the nearby noise sensitive premises.

This report presents the survey methodology, results, limits for the amplified sound systems and an assessment of break out to the nearby noise sensitive premises.

2 Site description

The site location in relation to its surroundings is shown in Figure 1, with the noise sensitive receptors identified as part of *Chapter 11 of the Environmental Statement: Volume 1* from the original planning application (Planning ref 136763/FO/2023). The site is bounded by Alan Turing Way (A6010) to the east, Ashton New Road (A662) to the south and the Metrolink tramline to the north and east.



Figure 1 Aerial view of site (courtesy of Google Earth Pro)

The hotel and commercial building facades considered in this assessment are indicated in red and pink, respectively, in Figure 2. The nearby premises listed below are also shown in Figure 2.

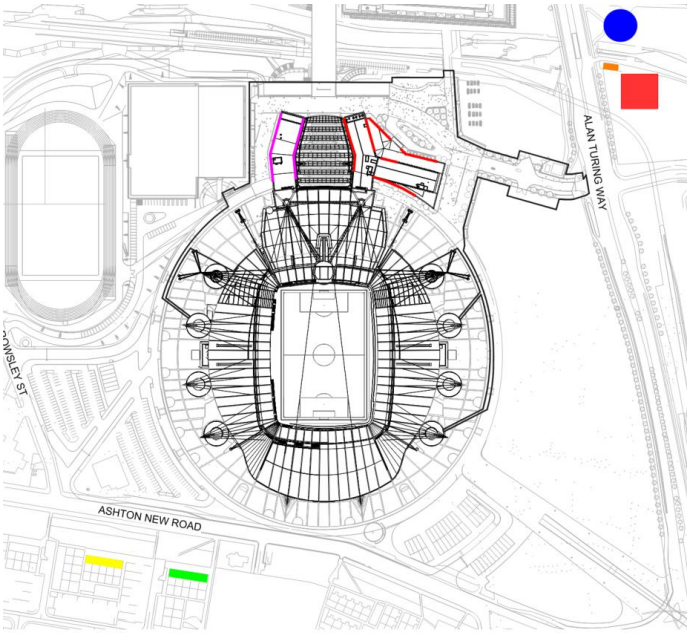


Figure 2 Excerpt of drawing NSE-POP-ZZ-ZZ-DR-DR-A-000090 C02 showing the site plan

The nearest noise sensitive residential premises (NSPs) have been identified as part of the original Environmental Statement, dated April 2023, and are summarised below:

- Residential premises located at 6 Cromarty Walk, approximately 380 m southwest of the commercial and hotel buildings, highlighted in yellow.
- Residential premises located at 12 Biscay Close, approximately 380 m south of the commercial and hotel buildings, highlighted in green.
- Residential premises located at 2b The Waterfront (The Cube), Gibbon Street, approximately 185 m east of the commercial and hotel buildings, highlighted in red.
- Residential premises located at 2 Stuart Street (The Drum), approximately 190 m east of the commercial and hotel buildings, highlighted in blue.

An additional noise sensitive receptor has also been identified and is included due to its proximity to the North Stand expansion:

- Residential premises located along Alan Turing Way, approximately 270 m east of the commercial and hotel buildings, highlighted in orange.

3 Planning Condition 37

Planning Condition 37 (Planning ref 136763/FO/2023) states the following in regard to entertainment noise breakout:

> *(a) Notwithstanding Noise response (ref. 053810-0820-1-PN-02-P0) received by the City Council, as Local Planning Authority, on the 27 June 2023 and Chapter and Appendices 11 of the Environmental Statement received by the City Council, as Local Planning Authority, on the 18 April 2023, prior to the first use of commercial units, workspaces, hotel, gymnasium (and any other ancillary commercial spaces excluding the North Stand) in each phase of the development hereby approved as shown on Plan Ref: ZZ-ZZ-DR-J000083 RevP01, received by the City Council on 15 July 2025, a scheme of acoustic insulation for those spaces shall be submitted for approval in writing by the City Council, as Local Planning Authority.*
> *Where entertainment noise is proposed the LAeq (entertainment noise) shall be controlled to 5dB below the LA90 (without entertainment noise) in each octave band at the facade of the nearest noise sensitive location, and internal noise levels at structurally adjoined residential properties in the 63HZ and 125Hz octave frequency bands shall be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (Leq,5min), respectively.*
>
> *(b) Prior to the first use of those spaces within a relevant phase of the development, a verification report will be required to validate that the work undertaken conforms to the recommendations and requirements approved as part of part (a) of this planning condition. The verification report shall include post completion testing to confirm the noise criteria has been met. In instances of non-conformity, these shall be detailed along with mitigation measures required to ensure compliance with the noise criteria. A verification report and measures shall*

be agreed until such a time as the development complies with part (a) of this planning condition.
Any mitigation measures shall be implemented in accordance with a timescale to be agreed with the City Council, as Local Planning Authority. Any measures shall thereafter retained and maintained in situ.

4 Entertainment noise egress limits

Limits for entertainment noise egress have previously been provided in the Vanguardia ES noise and vibration chapter and these are reproduced below for reference. It is unclear whether the levels presented in Table 1 are facade or free-field noise levels. For the purpose of this assessment these have been assumed to be facade levels, which represents a worst-case scenario.

Table 1 Maximum entertainment noise egress levels

Location	Maximum sound pressure level due to entertainment noise, L_{Aeq} (dB)	
	Day (07:00-23:00)	Night (23:00-07:00)
6 Cromarty Walk	47	44
12 Biscay Close	47	44
The Cube	52	37
The Drum	52	37

A supplemental environmental noise survey has since been undertaken, as detailed in Sandy Brown report 023771-R09-D *Noise impact assessment*. It is noted that the limits given Table 1 are given as broadband levels and have been converted to octave band sound pressure levels as per the requirements of Planning Condition 37.

The cumulative noise level resulting from entertainment noise at 1 m from the worst affected windows of the nearest noise sensitive premises (outside the MCFC development) should not exceed the limits set out in Table 2. This is based on entertainment noise being controlled to be 5 dB below the background sound levels at the receptors in octave bands.

Table 2 Spectral entertainment noise egress limits at 1 m from the nearest noise sensitive premises

Item	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{eq,5min}$ (dB) Octave band centre frequency (Hz)								Total L_{Aeq} (dB)
	63	125	250	500	1k	2k	4k	8k	
Day (07:00-23:00)	52	46	44	43	45	40	32	24	48
Night (23:00-07:00)	41	35	33	32	34	29	21	13	37

Music noise levels in the 63 Hz and 125 Hz octave centre frequency bands to be controlled to ensure $L_{eq,5min}$ 47 dB and 41 dB respectively are not exceeded in habitable rooms. These limits are expected to be achieved based on the external limits set out above.

5 Proposed operations

The following spaces proposed to the hotel and commercial building require limits for any amplified sound systems that may be proposed:

- Hotel F&B units (ground floor)
- Hotel gym (Level 1)
- Hotel all day dining/bar area (Level 1).
- Retail spaces within commercial building (ground floor to Level 2)
- Museum within commercial building (Level 3 to Level 4).

Office floors and hotel rooms have not been included in this assessment, as it is understood that amplified sound systems are not proposed in these spaces.

It is understood that the gym will be operational 24/7. The all day dining and bar area is proposed to operate between 06:00-01:00 with background music only. The amplified sound systems for these areas will be centrally controlled by the hotel staff.

The operational proposals for amplified sound in the commercial building are to be determined by others as part of the fit-out works, which falls outside the scope of this assessment.

6 Internal entertainment noise limits

A desktop assessment has been carried out to set appropriate internal noise limits for any amplified sound systems that may be proposed to the areas set out in Section 5. These are detailed in 023771-M080-B *Entertainment noise breakout assessment*, dated 7 May 2026 and are presented below for reference.

The limits are based on the expected reverberation times within the spaces once fitted out and amplified sound systems in each space operating simultaneously.

Two scenarios have been assessed:

- Scenario 1: Spaces with external doors carefully managed to ensure that these are not held open. It has been assumed that doors would not be open for more than 10% of the time.
- Scenario 2: External door held open (100% of the time).

It should be noted that this assessment only considers entertainment noise breakout to nearby noise sensitive receptors (outside the MCFC development) to satisfy the condition.

In practice, entertainment noise levels would be lower to mitigate noise disturbance within the development itself.

This report presents the verification measurements for the hotel and commercial building. The limits applicable to each building are set out in Section 6.

6.1 Day

The proposed internal entertainment noise limits during the day are set out in Table 3.

Table 3 Entertainment noise limits within proposed spaces - Day

Item	Maximum sound pressure level due to amplified sound systems during the day (07:00-23:00), $L_{eq,5min}$ (dB) Octave band centre frequency (Hz)								Total L_{Aeq} (dB)
	63	125	250	500	1k	2k	4k	8k	
Scenario 1: Doors open 10% of the time									
Hotel F&B units 1-4	92	87	86	86	86	81	76	67	90
Hotel gym	95	90	89	89	89	84	79	74	93
Hotel all day dining/bar area.	90	85	85	85	85	80	75	67	88
Museum within commercial building	85	85	80	80	80	80	80	80	87
Retail spaces within commercial building	86	81	80	80	80	75	70	64	84
Scenario 2: Doors open 100 % of the time									
Hotel F&B units 1-4	78	73	73	73	73	68	63	55	76
Hotel gym	90	90	90	90	90	90	90	90	97
Hotel all day dining/bar area.	80	75	75	75	75	67	63	55	78
Museum within commercial building	85	85	80	80	80	80	80	80	87

Item	Maximum sound pressure level due to amplified sound systems during the day (07:00-23:00), $L_{eq,5min}$ (dB) Octave band centre frequency (Hz)								Total L_{Aeq} (dB)
	63	125	250	500	1k	2k	4k	8k	
Retail spaces within commercial building	81	71	70	70	70	70	58	50	75

6.2 Night

The proposed internal entertainment noise limits at night are set out in Table 4.

Table 4 Entertainment noise limits within proposed spaces - Night

Item	Maximum sound pressure level due to amplified sound systems during night (23:00- 07:00), $L_{eq,5min}$ (dB) Octave band centre frequency (Hz)								Total L_{Aeq} (dB)
	63	125	250	500	1k	2k	4k	8k	
Scenario 1: Doors open 10% of the time									
Hotel F&B units 1-4	85	80	79	79	79	74	69	60	83
Hotel gym	88	83	82	82	82	77	72	67	86
Hotel all day dining/bar area.	83	78	78	78	78	73	68	60	81
Museum within commercial building	78	78	73	73	73	73	73	73	80
Retail spaces within commercial building	79	74	73	73	73	68	63	57	77

Item	Maximum sound pressure level due to amplified sound systems during night (23:00- 07:00), $L_{eq,5min}$ (dB) Octave band centre frequency (Hz)								Total L_{Aeq} (dB)
	63	125	250	500	1k	2k	4k	8k	
Scenario 2: Doors open 100 % of the time									
Hotel F&B units 1-4	71	66	66	66	66	61	56	48	69
Hotel gym	83	83	83	83	83	83	83	83	90
Hotel all day dining/bar area.	73	68	68	68	68	60	56	48	71
Museum within commercial building	78	78	73	73	73	73	73	73	80
Retail spaces within commercial building	74	64	63	63	63	63	51	43	68

7 Measurement methodology

7.1 Hotel gym and all day dining/bar area

In the gym and all day dining/bar area, the amplified sound systems had been installed and commissioned.

Between 2 and 4 internal measurements were carried out in each of these spaces with a representative from the AV team in attendance to calibrate the sound system in line with the internal noise limits set out in Table 3 and Table 4. For the purpose of the measurements, typical music tracks were selected by the AV representative and played back in a loop for the duration of the measurements. Internal measurements were carried out over 1-minute periods.

External measurements were carried out over 5-minute periods on the Level 1 terrace at measurement positions either 1 m or 10 m from the hotel facade. The sound level meter was mounted on a tripod approximately 1.2 m above the floor level. The dominant sound sources were noted at each measurement position. Additional external background noise level measurements were carried out at certain positions without any amplified sound systems in operation.

7.2 Hotel F&B units

At this stage, the hotel F&B units are being completed to shell and core standards only. As per the agreed methodology set out in Sandy Brown technical memo 023771-M068-C *Comments on Planning Condition 32 and 37 discharge methodology*, dated 10 September 2025, post completion verification testing using acoustic test signal (pink noise) was carried out. Sound insulation measurements of the facades of the F&B units have been carried out with all external doors closed. Further details are provided below.

For each sound insulation test, at least 2 internal source positions, 2 external receiver locations and 1 background measurement position were used. Measurements were undertaken over 30-second periods.

7.3 Measurements at NSPs

External measurements were also undertaken in proximity to the worst-affected noise sensitive premises in two scenarios:

- All day dining and the gym operating in the day 100% open condition
- All day dining and the gym operating in the day 10% open condition.

Measurements were carried out over three 5-minute periods in two locations for both scenarios listed above. The sound level meter was mounted on a tripod approximately 1.2 m above the floor level. The dominant sound sources were noted at each measurement position. The measurement results are considered to be free-field.

7.4 Commercial building

At this stage, the commercial building is being completed to shell and core only. As per the agreed methodology set out in Sandy Brown technical memo *023771-M068-C*, post completion verification testing using acoustic test signal (pink noise) was carried out.

Sound insulation measurements were undertaken for the facades of the Level 3 museum, Level 2 retail and ground-floor retail spaces. The measurements were undertaken with the external doors closed, as they could not be opened during the measurements, except for the Level 2 measurements, where testing was carried out with the doors both open and closed.

The measurement locations were as follows:

- Level 3 museum: measurements were undertaken at 2 m from the west facade
- Level 2 retail: measurements were undertaken from the terrace, at 2 m from the facade, with the doors both open and closed.
- Ground floor retail: measurements were undertaken at 2 m from the west, north and east facades, with the doors closed.

Further details are provided below.

For each sound insulation test, at least 2 internal source positions, 2 external receiver locations and 1 background measurement position were used. Measurements were undertaken over 1-minute periods.

7.5 Measurement locations

7.5.1 Hotel gym and all day dining/bar

The internal and external measurement locations for the gym and all day dining/bar areas are shown in Figure 3 with arrows indicating the direction of entertainment noise breakout.

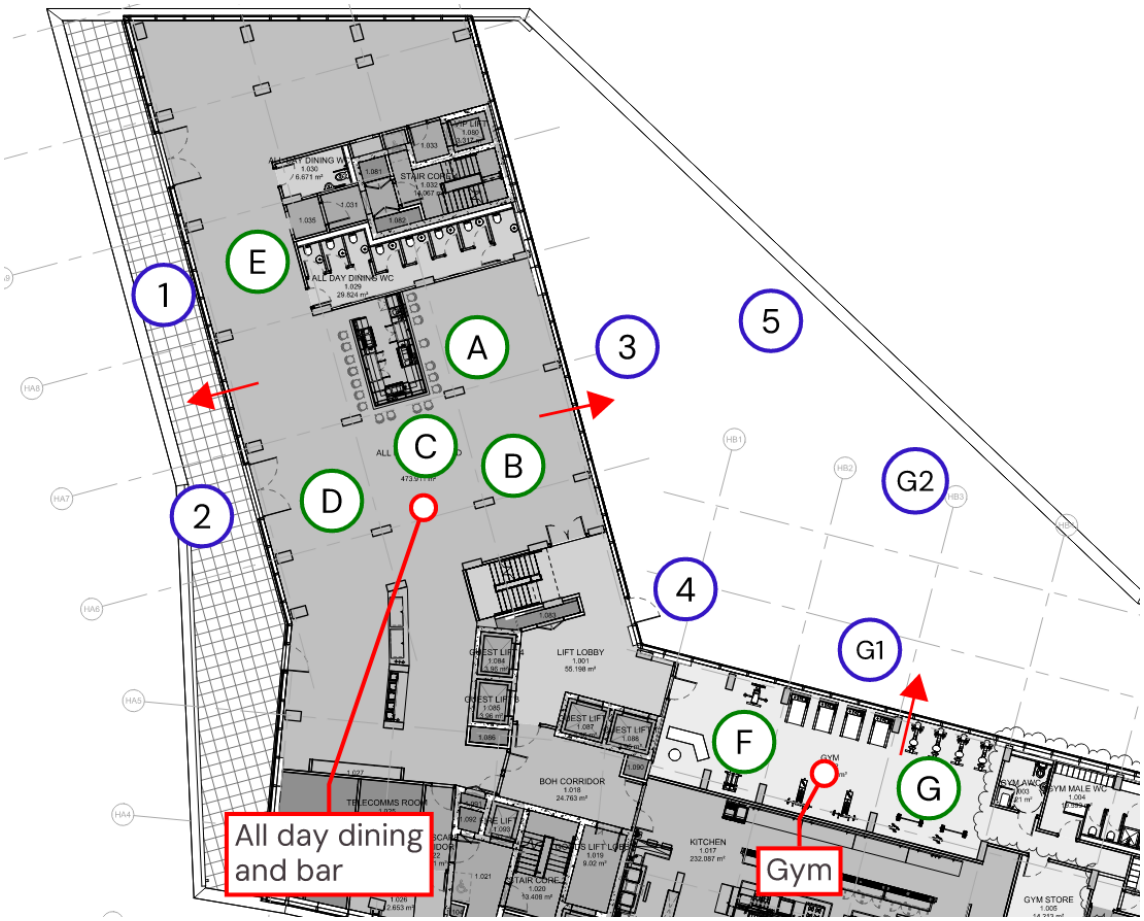


Figure 3 Gym and all day dining/bar measurement locations

7.5.2 Hotel F&B units

The facade sound insulation measurement locations for the F&B units are shown in Figure 4.

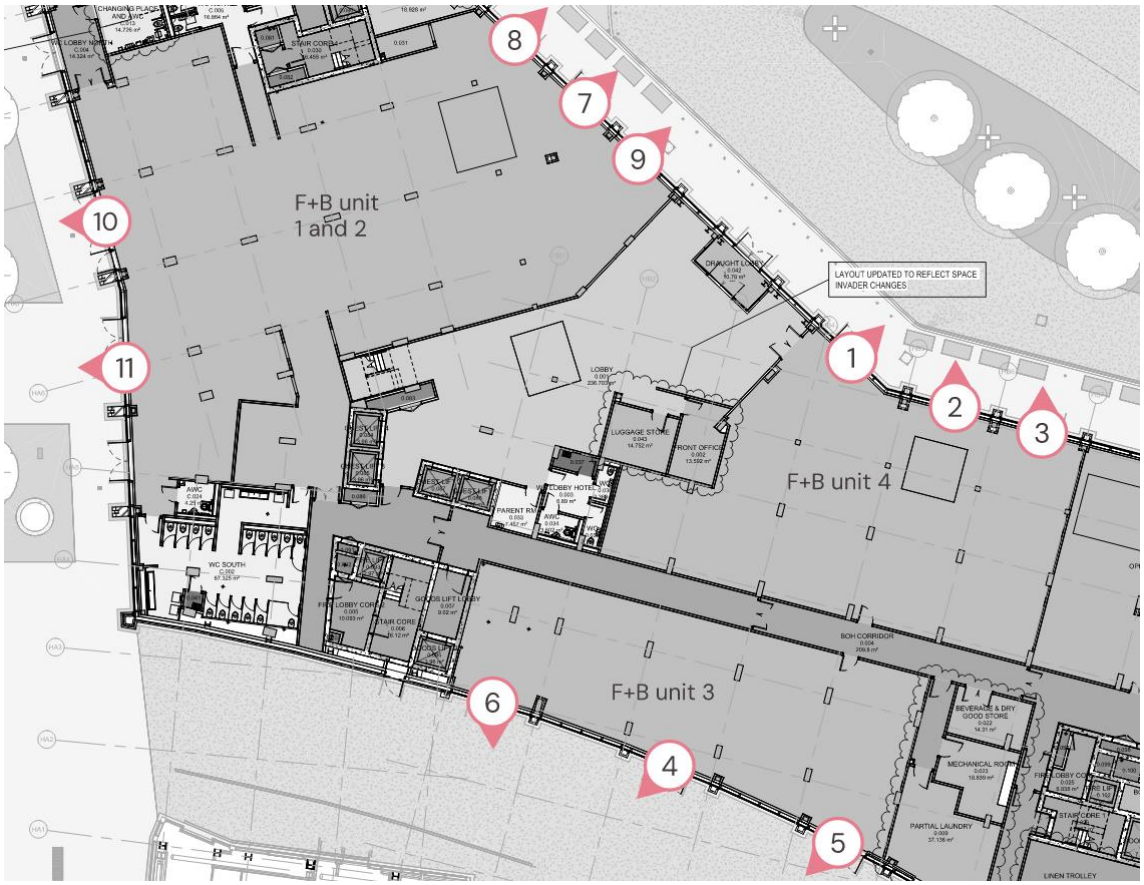


Figure 4 F&B unit facade sound insulation measurement locations

7.5.3 Measurements at NSPs

The measurement locations at the nearest noise sensitive premises are shown in Figure 5. The approximate outline of the hotel building is shown in red.



Figure 5 Measurement locations at nearest noise sensitive premises (courtesy of Google Earth Pro)

7.5.4 Commercial building

The facade sound insulation measurement locations for Level 3 museum, Level 2 Retail and Ground retail are shown in Figure 6 to Figure 8 respectively.

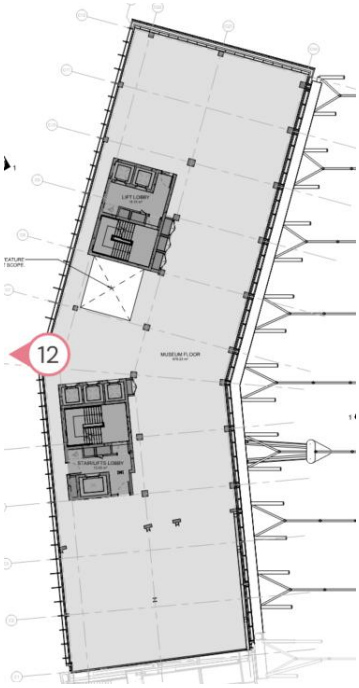


Figure 6 Level 3 museum facade sound insulation measurement location



Figure 7 Level 2 retail unit facade sound insulation measurement locations



Figure 8 Ground facade sound insulation measurement locations

8 Measurement results

8.1 Hotel gym and all day dining internal measurement results

The internal measurement results are summarised in Table 5. Where measurements have not been carried out for a particular scenario, the 3D acoustic model has been calibrated using the relative difference between proposed limits for different scenarios. This is discussed in Section 8.4.

Table 5 Measured internal noise levels

	Measured sound pressure level, L_{eq} (dB) Octave-band centre frequency (Hz)							
Position	63	125	250	500	1000	2000	4000	8000
Day – Scenario 1: Doors open 10% of the time								
A	75	84	79	76	74	67	57	43
B	77	85	85	81	78	68	62	52
C	79	86	84	85	84	79	70	57
D	78	83	81	78	74	69	59	47
E	79	86	81	80	76	68	61	52
F	83	89	81	84	85	77	76	74
G	85	90	82	80	80	73	75	75
Day – Scenario 2: Doors open 100% of the time								
A	69	74	74	75	73	68	60	47
B	69	76	70	69	63	55	50	41
C	68	75	76	71	71	66	58	42
D	68	74	71	75	72	69	61	45
E	61	66	75	69	66	63	55	48
Night – Scenario 1: Doors open 10% of the time								
A	72	80	77	75	73	68	61	45
B	69	77	74	76	74	69	61	43
C	71	75	71	69	65	57	50	41
D	72	76	75	73	70	65	59	47
E	70	77	74	75	74	70	63	47
F	78	84	76	75	77	73	71	68
G	78	84	77	77	78	72	72	68

	Measured sound pressure level, L_{eq} (dB) Octave-band centre frequency (Hz)							
Position	63	125	250	500	1000	2000	4000	8000
Night – Scenario 2: Doors open 100% of the time								
A	63	70	66	63	59	52	46	36
B	62	68	69	68	64	58	51	38
C	61	67	64	67	65	63	55	37
D	62	66	63	61	59	52	42	28
E	62	67	63	60	55	49	42	33

8.2 Hotel gym and all day dining external measurements

8.2.1 Measurement results

The external measurement results are summarised in Table 6. Where measurements have not been carried out for a particular scenario, the 3D acoustic model has been calibrated using the relative difference between proposed limits for different scenarios. This is discussed in Section 8.4.

Table 6 Measured external noise levels

	Measured sound pressure level, L_{eq} (dB) Octave-band centre frequency (Hz)							
Position	63	125	250	500	1000	2000	4000	8000
Day – Scenario 1: Doors open 10% of the time								
1	61	61	53	48	45	40	33	24
2	64	68	62	62	58	49	43	34
3	56	56	45	42	45	38	30	22
4	57	55	53	45	45	38	28	20
5	54	55	43	40	43	37	29	21
G1	56	58	47	44	44	36	28	21
G2	59	55	41	38	41	35	27	21
Day – Scenario 1: Doors open 100% of the time								
1	58	56	50	47	46	40	33	22
2	63	67	65	65	62	57	50	35

	Measured sound pressure level, L_{eq} (dB) Octave-band centre frequency (Hz)							
Position	63	125	250	500	1000	2000	4000	8000
Night – Scenario 1: Doors open 10% of the time								
1	57	53	48	47	46	44	34	25
2	58	60	56	57	53	45	37	27
3	52	51	47	41	45	39	30	23
4	52	50	48	43	46	39	29	21
5	53	48	43	41	45	40	37	26
G1	55	54	46	42	45	40	31	22
G2	57	52	45	40	44	38	28	18
Night – Scenario 1: Doors open 100% of the time								
1	55	54	49	45	43	38	31	22
2	58	62	57	56	53	44	38	29

External background measurement results without any amplified sound systems in operation are presented in Table 7.

Table 7 Measured external background noise level

	Measured sound pressure level, L_{eq} (dB) Octave-band centre frequency (Hz)							
Position	63	125	250	500	1000	2000	4000	8000
1	56	49	46	42	44	40	30	20
1	55	49	46	47	43	38	32	24
5	56	51	45	41	45	38	29	20
G2	52	49	44	38	42	36	27	20

8.2.2 Discussion

It can be seen from the measurement results presented in Table 6 and Table 7, that the external noise levels were comparable to the measured background noise level without the amplified sound system in operation.

Subjectively, the breakout noise was just audible at positions 1 m from the facade (1, 2, 3, 4 and G1). Breakout noise was only just audible at positions 10 m from the facade (5, G2).

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8.3 Hotel F&B unit facade sound insulation measurement results

A summary of the F&B unit facade sound insulation measurement results with all external doors closed is provided in Table 8, referring to the measurement positions indicated in Figure 4.

Table 8 Facade sound insulation measurement results (Hotel)

	Measured sound insulation, *D* (dB) Octave-band centre frequency (Hz)						
Measurement position	63	125	250	500	1000	2000	4000
F&B unit 4							
1	25	27	31	31	29	33	32
2	24	29	33	37	36	36	37
3	27	32	35	38	38	39	40
F&B unit 3							
4	22	27	32	34	31	32	34
5	23	30	37	40	40	41	43
6	21	26	30	31	29	30	30
F&B unit 1/2							
7	19	25	31	32	31	32	32
8	23	30	33	34	32	32	34
9	26	25	31	30	31	31	31
10	20	24	29	28	27	26	30
11	21	25	32	33	33	33	34

8.4 Measurement results at NSPs

A summary of the measurements undertaken at the nearest noise-sensitive premises is presented in Table 9, referring to the measurement locations shown in Figure 5.

Table 9 Measured external noise level at nearby noise sensitive premises (Hotel)

	Measured sound pressure level, L_{eq} (dB) Octave-band centre frequency (Hz)							
Measurement position	63	125	250	500	1000	2000	4000	8000
All day dining and the gym operating in the day 100% open condition								
1	69	64	62	60	67	63	56	47
	68	65	61	59	65	58	50	53
	70	66	64	63	67	68	69	63
2	67	60	57	57	60	53	44	51
	62	56	56	55	58	52	43	36
	64	57	55	55	59	52	43	34
All day dining and the gym operating in the day 10% open condition								
1	67	61	60	59	64	58	47	40
	69	66	61	60	64	59	48	40
	68	63	62	60	64	59	49	43
2	61	55	54	53	57	51	43	34
	60	55	53	52	56	50	41	35
	63	59	55	54	57	50	42	34

The dominant noise sources during these measurements included road traffic noise on Alan Turing Way, infrequent tram passes and running water noise in the Ashton canal. Amplified noise breakout from the hotel was not audible in either location or scenario.

8.5 Commercial building

A summary of the commercial building facade sound insulation measurement results with all external doors closed and open is provided in Table 10, referring to the measurement positions indicated in Figure 6 to Figure 8.

Table 10 Facade sound insulation measurement results

	Measured sound insulation, *D* (dB) Octave-band centre frequency (Hz)						
Measurement position	63	125	250	500	1000	2000	4000
Doors closed							
Level 3							
12	22	39	42	47	49	53	57
Level 2							
13	23	30	32	34	29	29	30
14	21	30	37	38	35	35	39
15	23	27	32	32	31	28	32
Ground							
16	34	39	47	47	43	44	46
17	23	23	31	30	28	27	26
18	25	30	39	41	40	41	46
19	19	24	31	33	33	34	36
20	17	21	26	28	26	27	31
21	20	24	28	31	32	35	36
Doors open 100% condition							
Level 2							
13	11	17	13	11	12	11	12
14	17	22	24	24	23	23	25
15	14	15	11	11	12	13	13

9 3D acoustic modelling and assessment

A 3D environmental noise model was created using CadnaA by Datakustik to provide further verification that amplified sound breakout is reasonably controlled.

The software carries out calculation using a ray tracing technique. This takes into account the effects of topography, reflections, screening and distance attenuation for noise sources to predict noise levels in three dimensions.

Calculations are carried out in accordance with ISO 9613 (2024) Attenuation of sound during propagation outdoors. A screenshot from this model is provided in Figure 9.

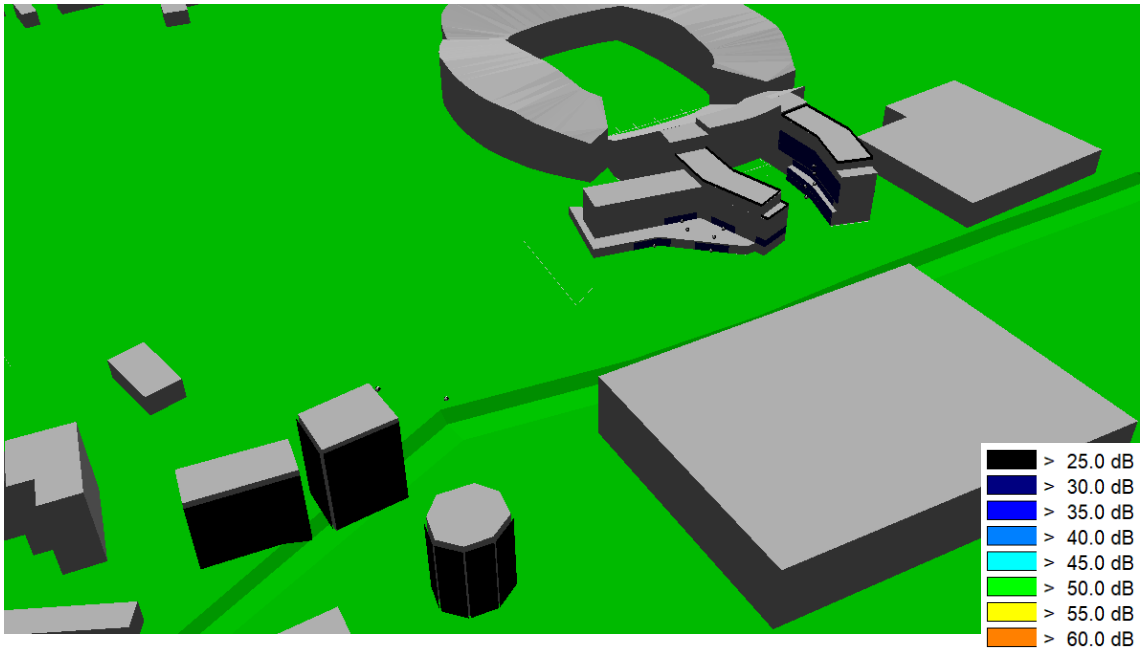


Figure 9 3D environmental noise model (day 10% open operation) - L_{Aeq} (dB)

The acoustic modelling is based on the measured amplified sound breakout levels and facade sound insulation measurement results set out in Section 8 for each of the following scenarios:

- Day – External doors open 10% of the time
- Day – External doors open 100% of the time
- Night – External doors open 10% of the time
- Night – External doors open 100% of the time.

Where measurements of the specific scenario have not been carried out, calculations have been made to predict the noise breakout level based on the measurement results for other scenarios and the difference between proposed limits.

The predicted cumulative noise levels at 1 m from the facade of the worst-affected premises (The Drum) due to the entertainment noise sources are presented in Table 11 and include the contributions from the Hotel and Commercial building to support the full discharge of Condition 37b

Table 11 Predicted cumulative noise breakout levels at 1 m from the facade of the worst-affected NSP

Scenario	Predicted external noise level, L_{eq} (dB) Octave-band centre frequency (Hz) 63	125	250	500	1000	2000	4000	8000	Total L_{Aeq} (dB)
Day									
Scenario 1 – 10% open	32	32	21	18	20	11	-	-	23
Scenario 2 – 100% open	32	32	22	20	21	13	2	-	24
Night									
Scenario 1 – 10% open	28	27	22	16	20	13	6	-	23
Scenario 2 – 100% open	28	27	22	17	20	13	6	-	23

These levels are significantly below the limits presented in Table 2.

10 Conclusion

Sandy Brown has been appointed by John Sisk & Son Ltd to carry out acoustic verification measurements to demonstrate compliance with Planning Condition 37 under 136763/FO/2023. The planning condition relates to entertainment noise breakout from areas within the hotel and commercial buildings that form part of the North Stand expansion at Etihad Stadium, Manchester.

Part A of Planning Condition 37 has been covered separately in Sandy Brown technical memo *023771-M080-B Entertainment noise breakout assessment – Planning Condition 37*, dated 7 May 2026. The approved details and assessment for the Hotel Building remain unchanged.

This addendum report relates to the discharge of Part B of Planning Condition 37 for the Commercial Building (Section 3).

Amplified sound noise breakout associated with the commercial building areas has been measured to satisfy the requirements of Planning Condition 37. On the basis that the internal amplified sound limits set out in this report are adhered to, the commercial building complies with the requirements of Planning Condition 37b, together with the previously approved Hotel building assessment, and the planning condition can be fully discharged.

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Appendix A

Survey details

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Equipment

The noise measurements were taken using B&K 2250 and Rion NL-52 sound level meters.

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	2250/3011964	Brüel & Kjær	14 April 27	UCRT25/1609 UCRT25/1610
Microphone	4189/3100176	Brüel & Kjær	14 April 27	UCRT25/1609 UCRT25/1610
Pre-amp	ZC0032/26376	Brüel & Kjær	14 April 27	UCRT25/1609 UCRT25/1610
Calibrator	4231/3019123	Brüel & Kjær	14 April 27	UCRT25/1603
Sound level meter	NL-52/00932326	Rion	8 May 28	TCRT26/2310
Microphone	UC-59/09251	Rion	8 May 28	TCRT26/2310
Pre-amp	NH-25/32354	Rion	8 May 28	TCRT26/2310
Calibrator	NC-74/34536129	Rion	8 May 28	TCRT26/2309

Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meters used in this survey are available upon request.

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg, L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS 7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

Weather conditions

During the external noise measurements on 22, 30 July 2026 and 7 September 2026, the weather was generally overcast, with some light rain occurring. This is not thought to have impacted the measurement results. The measured winds on 22 and 30 July were below 2 m/s. On 7 September, the measured wind speed was in the region of 1 m/s to 2 m/s, however, there were occasional wind gusts up to 5 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

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