

Memorandum

From:

Simon Everett

Date

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To

Mark Lambkin, Bill Olsen, Craig Slater, Joe Clark

cc

Robert Turner, Michael Pimlott

Subject

Adair Street Hotel: Planning Condition 12 and 13 – Acoustic Validation Memorandum

The purpose of this Memorandum is to detail Cundall's in-situ validation measurements at the Adair Street Hotel (hereafter referred to as 'the Development') in relation to the discharge of planning conditions 12 and 13 as stipulated by Manchester City Council¹ (MCC).

Planning condition 12

Planning condition 12 relates to noise impacts from items of fixed external plant associated with the Development. The condition is as follows.

12) Prior to occupation of the development a scheme for the acoustic insulation of any externally mounted ancillary equipment associated with the hotel shall be submitted and approved in writing by the City Council as Local Planning Authority to ensure that it achieves a background noise level of 5dB below the existing background (La90) at the nearest noise sensitive location shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the equipment. The approved scheme shall be completed before the premises is occupied and a verification report submitted for approval by the City Council as local planning authority and any non compliance with the above noise standards suitably mitigated in accordance with an agreed scheme prior to occupation. The approved scheme shall remain operational thereafter.

Reason - To secure a reduction in noise in order to protect future occupiers and adjacent residents from noise nuisance, pursuant to policies SP1, H1 and DM1 of the Core Strategy and saved UDP Policy DC26.

Source level noise measurements for all items of external rooftop plant were undertaken by Simon Everett (MIOA) on 13 April 2022. It was confirmed that items of plant were operating at typical maximum design duty while measurements were being undertaken.

A summary of the measured octave-band sound pressure level adjacent to each rooftop plant item is given below.

Plant Item	Octave band sound pressure level (dB) L _p							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Panasonic U-16MF3E8 x 1	66	61	57	53	51	48	43	36
Panasonic U-16MF3E8 x 5	67	58	59	53	50	47	42	34
Panasonic U-16MF3E8 x 5	68	59	51	48	45	44	41	33
Panasonic U-16MF3E8 x 5	63	59	50	45	46	46	44	37

¹ Approved Decision notice ref: 122599/FO/2019

Plant Item	Octave band sound pressure level (dB) L_p							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Mitsubishi PUZ-HWM140VHA X 3	57	58	48	46	47	46	43	37
Mitsubishi PUZ-HWM140VHA X 3	61	58	49	46	46	46	45	40
Toshiba VRF MMY AP 2814	65	63	57	53	50	48	44	34
AHU01 / AHU02 Intake	65	64	50	45	44	41	38	33
Kitchen Extract	62	59	55	49	48	45	41	31
General Extract	63	60	51	43	41	37	33	27
Kitchen AHU Casing	62	69	51	45	43	40	36	28
General AHU Casing	62	63	52	45	44	41	37	30

Due to the proximity of plant items across the roof, in many instances the values above were directly influenced by noise contributions from other nearby plant items. The measurements therefore only represent the general ambient noise climate at the microphone location, rather than a specific sound rating attributable solely to that plant item.

As such, a worst-case assessment has been undertaken whereby the highest measured level in each octave band has been used as the sound power level per m^2 for the entirety of the roof plant area, as summarised below.

Octave band sound power level dB per square meter							
63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
68	69	59	53	51	48	45	40

In order to determine plant noise propagation to the nearest effected residential properties, a model has been produced using SoundPLAN 8.2 acoustic modelling software. This model is capable of accurately determining sound propagation by taking into account variations in topography, barrier attenuation provided by existing landscaping and buildings, and distance attenuation.

Using the information detailed above, the noise propagation to the nearest noise-sensitive receptor (Ibis Budget Hotel located to the north of the site) has been calculated and a summary of the assessment is presented below.

It has been assumed that all plant could potentially operate 24 hours a day and therefore only the worst-case night-time periods (23:00 – 07:00h) has been assessed (as compliance during daytime hours with higher background levels would be achieved by default).

Noise-sensitive receptor	Representative night-time background sound level	Worst case calculated cumulative specific sound level, L_{Aeq} dB	Acoustic feature correction*, dB	Calculated rating level at noise-sensitive receptors, $L_{A,r,Tr}$ dB	Assessment outcome
Ibis Budget Hotel	45	36	+3*	39	Rating level is 6 dB below existing background sound level

**Characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment*

As can be seen from the results detailed above, the worst-case level of sound impact due to new building services plant associated with the development is predicted to be at least 6 dB below the existing representative background noise level.

This is considered to satisfy Condition 12 of the MCC noise policy requirement for the plant noise rating level limit to be at least 5 dB below the representative background level.

Planning condition 13

Planning condition 13 describes the need to acoustically insulate the bar/restaurant and gym noise from other elements of the hotel and gives limits for entertainment noise at nearby noise-sensitive receptors. The condition is as follows.

13) Before any above ground level works commence a scheme for acoustically insulating and mechanically ventilating (a) the hotel, (b) the bar / restaurant and (c) the Gym, against noise from adjacent roads and any noise transfer from the bar/ restaurant use/ gym use to the hotel rooms 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 each 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.

Reason - To secure a reduction in noise in order to protect future residents from noise nuisance, pursuant to policies SP1 and DM1 of the Core Strategy and saved UDP Policy DC26.

Requirement 13(a): Acoustic insulation to hotel bedrooms

A programme of internal ambient noise levels (IANL) measurements has been undertaken across the scheme. Measurements were undertaken in bedrooms considered to be most exposed to existing road traffic sources, and mechanical ventilation heat recovery (MVHR) units serving bedrooms were confirmed to be operating at their correct design duty at the time of testing.

Shortened measurements of no less than 5 minutes were undertaken on all floor levels to assess daytime levels, and full 8 hour night-time measurements were undertaken at 3 positions.

A summary of IANL results is represented below:

Room	Measurement period	Required internal ambient noise level (dBA)	Measured internal ambient noise level (dBA)	Pass
Room 401	Daytime	35	35	✓
Room 403	Daytime	35	35	✓
Room 102	Daytime	35	35	✓
Room 302	Night-time	30	24	✓
Room 814	Daytime	35	30	✓

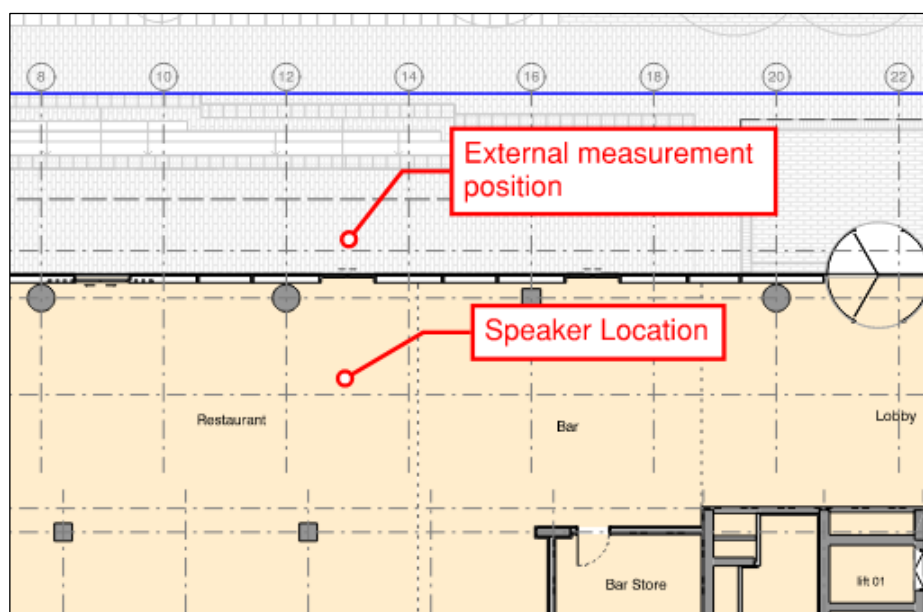
Room	Measurement period	Required internal ambient noise level (dBA)	Measured internal ambient noise level (dBA)	Pass
Room 1204	Daytime	35	26	✓
Room 1010	Daytime	35	32	✓
Room 917	Daytime	35	30	✓
Room 720	Daytime	35	30	✓
Room 1105	Night-time	30	31	✓
Room 619	Daytime	35	29	✓
Room 501	Daytime	35	34	✓
Room 521	Daytime	35	28	✓
Room 201	Night-time	30	25	✓

As can be seen from the above, all measurements are compliant with BS 8233 guidance criteria.

Requirement 13(b): Acoustic insulation to bar/restaurant

In-situ sound insulation tests were undertaken by Simon Everett (MIOA) to establish noise transfer from the bar/restaurant to guest rooms above, and noise break out from the bar/restaurant through the external façade to nearby noise sensitive receptors.

At the time testing, the loudspeaker installation to the restaurant/bar had not yet been completed. To establish noise break-out via the façade, measurements were taken of the level difference from the bar/restaurant area to outside the ground floor façade. The loudspeaker was set up approximately 3 m away from an external door, and the external measurements were undertaken 1 m from this door set. This is considered a reasonable worst-case scenario for noise break-out as external doorsets represent the weakest acoustic element of the external façade. The speaker position and external measurement position is highlighted in detail below.



The measured level difference from the Bar/Restaurant to the external measurement position was as follows.

Level Difference D (dB)							
63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
9	16	23	24	27	30	31	37

Section 7.2 of the Cundall Environmental Noise Assessment Report (1023173-RPT-AS-001 dated 5 November 2019) previously identified the appropriate entertainment noise limits to be achieved at the nearest noise-sensitive receptor (NSR). In accordance with MCC Noise Policy Guidance, these limits are 10 dB below the existing background sound climate at the NSR.

	Unweighted sound pressure level – L ₉₀ (dB)							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Noise limits for entertainment noise when measured 1m from nearest NSR	50	45	40	36	35	30	19	8

The nearest NSR (Ibis Budget Hotel), is located 60 m to the north east of the external measurement position labelled above. Based on distance attenuation and the level of sound insulation provided by the external bar/restaurant façade, the following table identifies appropriate upper entertainment noise limits within the Bar / Restaurant which will ensure compliance with the entertainment noise limits at NSRs.

	Unweighted sound pressure level – L ₉₀ (dB)							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Noise limits for future entertainment noise (10 dB below measured levels)	50	45	40	36	35	30	19	8
Façade level difference reduction	9	16	23	24	27	30	31	37
Distance attenuation (60 m)	18	18	18	18	18	18	18	18
Noise limits within Bar/Restaurant	77	79	81	78	80	78	68	63

These octave band limits are the equivalent to broadband music levels of **84 dB L_{Aeq}**. This acceptable for the proposed operational use of the space and a sound limiter system will be installed within the Bar/Restaurant sound system signal chain to ensure that internal music levels do not exceed these values.

To establish the noise transfer to hotel bedrooms directly above, the speaker was placed in the Bar/Restaurant area directly below Bedroom 105. Measurements show that the level difference between the Bar/Restaurant area and Bedroom 105 is as follows.

Level difference D (dB)							
63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
44	52	62	70	75	78	78	74

As noted in Section 7.1.1 of the Cundall Environmental Noise Assessment Report (1023173-RPT-AS-001 dated 5 November 2019), entertainment noise contributions from the bar/restaurant must not exceed the following internal noise limits within guest bedrooms.

Unweighted sound pressure level - L_{eq} (dB)							
63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
47	41	31	24	20	17	14	13

With reference to the above limits, the following table presents an assessment of predicted entertainment noise impacts within the worst-case affected bedrooms (Bed 105) based on the measured in-situ level difference of the dividing floor slab and the previously defined maximum entertainment noise levels within the Bar/Restaurant.

	Unweighted sound pressure level – L_{90} (dB)							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Maximum noise level within Bar / Restaurant (<i>with noise limiter installed</i>)	77	79	81	78	80	78	68	63
Sound insulation of dividing floor	44	52	62	70	75	78	78	74
Noise limits for guest bedrooms	47	41	31	24	20	17	14	13
Predicted noise levels in guest bedrooms	33	27	19	8	5	0	-10	-11
Assessment outcome	Predicted noise levels below proposed noise limits in all octave bands							

It can be seen from the above that the level of sound insulation afforded by the dividing floor slab will see that noise transfer to structurally connected bedrooms is suitably controlled and compliant with the proposed upper noise limits.

Requirement 13(c): Acoustic insulation to Gym

There are no guest bedrooms located underneath the Gym and careful space planning has ensured that no guest bedrooms are positioned directly adjacent to the Gym on the same floor level. A full high-specification resilient floor layer has been provided throughout the entirety of the gym space.

All above measures will see that vibration and re-radiated noise impacts associated with normal gym usage should be imperceptible in guest bedrooms.

In addition, the sound insulation of dividing floor throughout the Development has typically achieved an in-situ performance of $> 55 D_{nT,w} + C_{tr}$. This very high level of sound insulation performance for the dividing floor will comfortably facilitate proposed background music within the Gym without adverse impacts to guest bedroom above.

Summary

Condition 12

In-situ source level measurements have been undertaken for all roof top external plant items. Based on these measured sound pressure values, it has been determined through 3D noise modelling calculations that the resultant rating level at the nearest noise-sensitive receptor is at least 6 dB below the representative background sound level. This is compliant with the requirements of Condition 12 attached and is an indication of low noise impact.

Condition 13

The sound insulation a schedule of pre-completion testing at the development has determined the following

- **Sound insulation scheme to bedrooms:** IANL values are compliant with BS 8233 guidance values
- **Sound insulating scheme to restaurant/bar:** Appropriate upper noise limits for the noise limiter system have been defined to ensure entertainment noise break-out is controlled to 10 dB the existing background sound level at nearby noise-sensitive receptors. Resultant noise levels in bedrooms directly above the restaurant/bar will be compliant with MCC noise policy for structurally connected receptors.
- **Sound insulate scheme to gym:** Space planning and the provision of resilient floor treatments will suitably control vibration/re-radiate noise impacts to nearby guest bedrooms. Dividing floors have achieved a very high level of sound insulation which will facilitate proposed background music within the Gym without adverse impacts to guest bedroom above.

Yours faithfully

For and on behalf of

Cundall Johnston & Partners LLP



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