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AP House, Manchester

Terrace PA noise egress assessment

This memo provides an assessment of the predicted amplified noise egress due to PA system proposed to the outdoor terrace area at AP House, Manchester. This is to support the removal of current restrictions on any noise on the terrace area, as per Planning Condition 7.

Sound power limits for each speaker location in octave bands are provided to ensure that resultant entertainment noise levels are at least 5 dB below typical background levels at the nearest noise sensitive receptor. This has initially been set in relation to office premises during the day, with the nearest residential premises significantly further distant as well as screened from the terrace area.

Summary

- Offices are not formally identified by the Manchester City Council (MCC) as noise sensitive receptors, however neither should they be considered entirely non-sensitive. As such, for the purposes of assessing noise egress and protecting nearby residential receptors from the new PA system, the entertainment noise criteria to noise sensitive receptors has been applied to overlooking offices at 37 King Street as a worst-case scenario. However, it is advised that it is queried with the planning officer whether a relaxation can be permitted in this instance (5 dB has been proposed).
- The current proposed PA system is likely to require line array speakers placed in planters close to the noise sensitive receptor. It is recommended that the quantity of line array speakers is reduced to nine and is localised to the outdoor terrace seating area furthest from the worst-affected receptor
- Adjustments are recommended to the proposed PA system within the terrace area of AP House, 35 King Street needs to meet the following requirements in order to meet MCC entertainment noise guidelines. These, along with any relaxation in entertainment noise limits to offices, should be agreed upon with MCC:
 - Have electronic limiters installed to ensure the loudspeaker sound pressure limits at 1 m given in Table 3 are not exceeded

- Be installed using the same geometry as used in the 3D acoustic model to ensure the existing overlooking office at 37 King Street does not experience an increase in noise and disturbance
 - Be turned off in any situation where the terrace is unoccupied or not in use
 - Not be used outside of daytime operational hours (07:00-23:00) to ensure there are no adverse effects to nearby residential premises such as 58-66 King St or St Ann's Square Apartments.
- The assessment and design proposals demonstrate that noise emissions from a suitably installed PA system will be significantly below the MCC entertainment noise limits and not cause any harm to the amenity of neighbouring noise sensitive residential premises.

Basis

This memo is based on the following information:

- K-Array Anakonda loudspeaker array directivity file received via email on 6 March 2025
- Sandy Brown report 024609-R01-B *Noise planning report* dated 19 June 2024.

Criteria

Manchester City Council Noise and Planning Technical Guidance 2022

Manchester City Council (MCC) states the following in regard to entertainment noise for a new entertainment venue that is structurally detached from other building, assuming that the residential properties in question have their windows open:

‘Entertainment noise ($L_{Aeq,5min}$) should be controlled to 5dB below the typical background noise level (L_{A90}) in each octave band at the nearest noise sensitive location’.

MCC guidance also states that the following may be applicable for a new entertainment venue:

- A suitable noise limiting device may be necessary to install
- Music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{Aeq}) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB ($L_{Aeq,5min}$), respectively.

Offices are not formally identified by the MCC as noise sensitive receptors, however neither should they be considered entirely non-sensitive. As such, for the purposes of assessing noise egress from the new PA system, the entertainment noise criteria to noise sensitive receptors has been applied. However, it is advised that it is queried with the planning officer whether a relaxation can be permitted in this instance.

It should be noted that since entertainment noise criteria is applied at 37 King Street offices, it is expected that nearby residential receptors are to be significantly less affected from noise on proposed terrace area.

Based on the above criteria and measurement results detailed in Sandy Brown report 024609-R01-B *Noise planning report*, the cumulative noise level from the operation of all entertainment noise should not exceed the limits set out in Table 2.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. In this case these limits would apply at the 4th floor offices of 37 King Street, which overlooks the terrace.

There shall be no amplified noise during nighttime (23:00-07:00).

Table 1 Entertainment noise limits at 1 m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)
Day (07:00-23:00)	43

Planning Condition 7 decision notice

The planning officer at Manchester City Council previously stated in their decision notices received via email on 26 June 2024:

“There shall not be any speakers, music or amplification of any kind in the external terrace area at any time. Reason - In interests of residential amenity in order to reduce noise and general disturbance in accordance with saved policy DC26 of the Unitary Development Plan for the City of Manchester and policies SP1 and DM1 of the Core Strategy.”

It should be noted that the decision statement notice takes into account only residential amenity. Since the worst affected noise sensitive receptor during the operational hours of the terrace are 37 King St offices, it is understood that an agreement may be reached upon receipt of noise mitigation measures to reduce risk of any adverse effects of entertainment noise from the terrace of 35 King Street.

Proposals

It is understood that a PA system consisting of 12 K-array Anakonda flexible line array speakers are proposed to planters throughout the perimeter of the terrace area, highlighted in green in Figure 1 with the approximate location of the nearest noise sensitive receptor (37 King St offices) is highlighted in red.

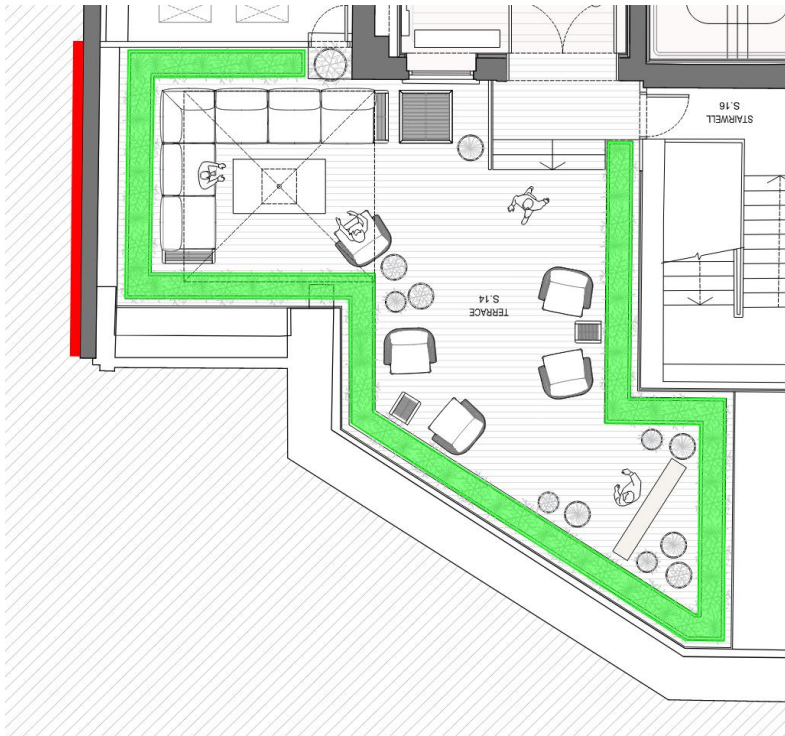


Figure 1 Proposed PA system loudspeaker locations

It is understood that the proposed line array loudspeakers consist of eight 1 inch drivers per unit, which significantly limits the low frequency response of the proposals. Despite this, it is recommended that no line arrays are placed close to the noise sensitive receptor to assist in minimizing risk of disturbance

Despite the arrays being flexible, it has been assumed that the line array shall lie flat on the planters, with the drivers themselves pointed directly upwards.

Client's operational proposal

The Client's terrace operational management plan of 16 December 2024 includes the following statements relevant to the noise assessment:

"Our future AP House Manchester will have a terrace of 69sqm dedicated to clients' hospitality, offering a luxury hospitality beverage and light snacks service to our clients during their visit if the weather allows it. "

“The maximum capacity is 25 PAX at one time, including seating and standing-up staff and clients. However, on a normal day and majority of the time, we forecast that around 10-12 PAX should be on the terrace at one time. “

“Finally, we expect to run a maximum of 10 intimate events at the AP House per year, inviting 20-50 PAX max for special occasions or celebrations. The terrace will be used only to serve food and beverages if the weather allows it; we don’t expect to have DJ booths or performance”. In terms of the effects on traffic, the scale of the events proposed will not result in any significant increases in traffic in the local area, and in any event King Street is pedestrianised.”

Assessment

3D acoustic modelling

A 3D acoustic model of the assessed terrace has been created using Odeon. This software can be used to predict the acoustics of a variety of spaces using a ray tracing method that considers reflections of surfaces, the directivity pattern of the specific speakers and existing background noise levels. A screenshot of the 3D acoustic model is provided in Figure 2.

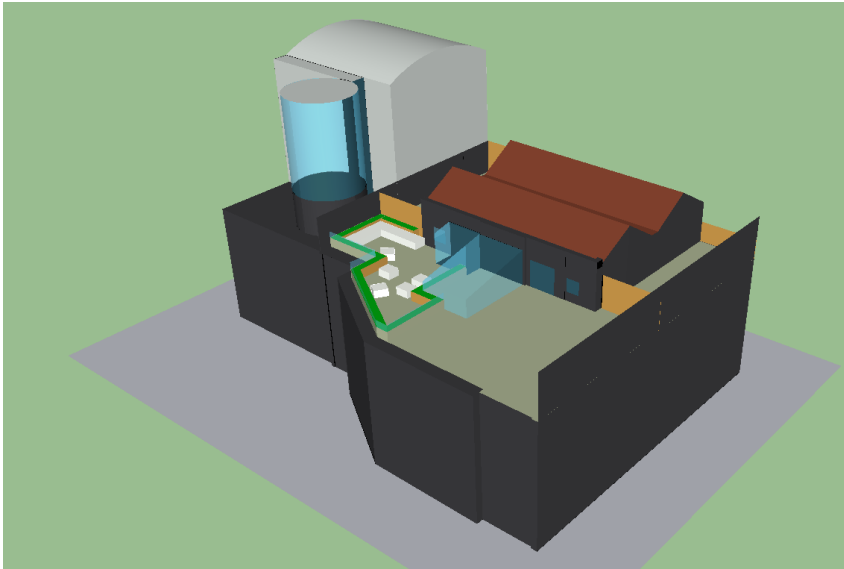


Figure 2 Screenshot of 3D acoustic model

Current proposals

The proposed PA loudspeaker system locations were replicated in Odeon. The receiver positions at the worst affected noise sensitive receptor located 1 m away from the facade is highlighted in red is shown in Figure 3.



Figure 3 Proposed loudspeaker position and direction used in Odeon 3D model

It is recommended that the quantity of line array speakers is reduced from 12 to 9 such that speakers can be localised around the terrace seating area furthest from the receptor. The recommended PA system layout is shown in Figure 4.

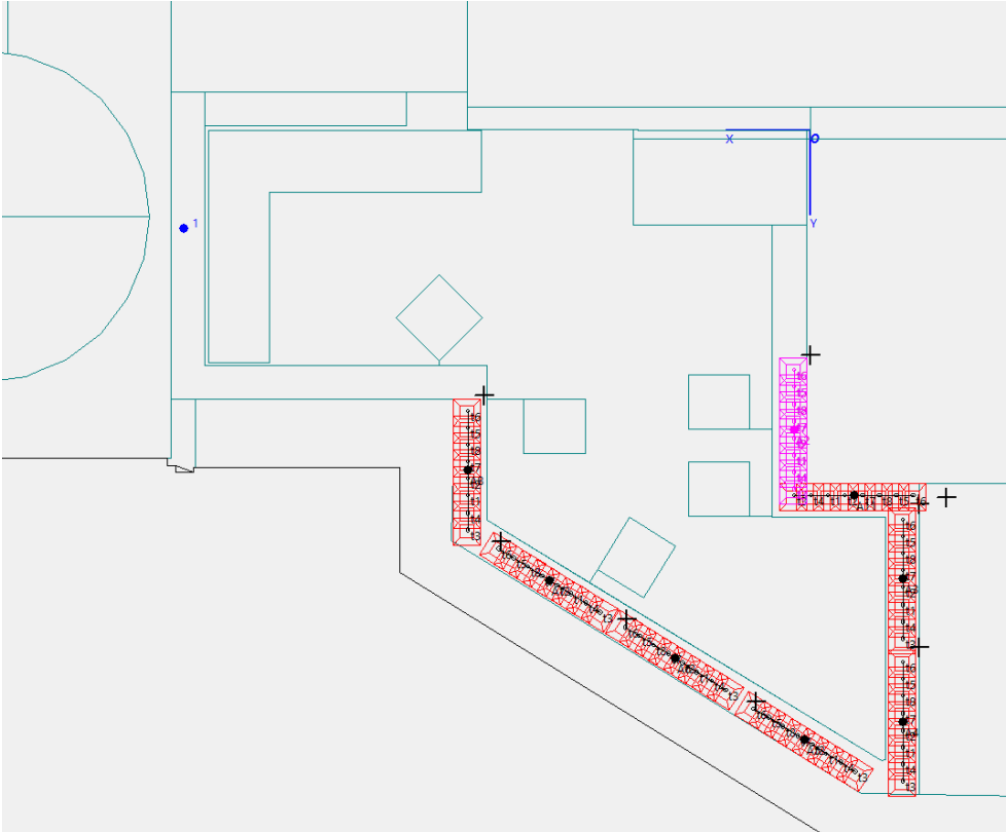


Figure 4 Alternative PA system layout

A representative background noise level during the daytime (07:00–23:00) into the model to replicate existing noise levels at the site and are given in octave bands in Table 2.

Table 2 Octave band representative background sound level used in model

	Octave band centre frequency, Hz								
	Background sound level, L_{90} (dB)								
	63	125	250	500	1k	2k	4k	8k	L_{90} , dB(A)
Daytime (07:00-23:00) representative background level	45	44	43	41	39	32	23	13	48

The proposed PA system is predicted to require octave band limits that are well below conversation noise levels with normal vocal effort and is likely to be borderline inaudible over the existing background levels.

The 3D acoustic model takes into account the directivity pattern and frequency response of the K-Array Anakonda. It should be noted that due to the small geometry of the individual

loudspeaker drivers, the low frequency response of the line arrays are significantly limited. Each individual loudspeaker is limited to the sound pressure level at 1 m provided in Table 3.

Table 3 PA system octave band sound pressure level limits

	Octave band centre frequency, Hz								L_{Aeq} , dB(A)
	Sound pressure level at 1 m, L_{Aeq} (dB)								
	63	125	250	500	1k	2k	4k	8k	
Loudspeaker sound pressure level	-	18	44	49	53	52	53	47	58

The predicted A-weighted sound pressure level at the nearest noise sensitive receptor is predicted to be 43 dB at 1 m from the facade of the nearest noise sensitive receptor.

It is predicted that low frequency noise egress to 37 King Street is to result in internal levels well below the internal low frequency limits of 47 dB at 63 Hz and 41 dB at 125 Hz to be achieved in line with MCC guidance.

Potential for relaxation in limits

The nearest residential noise sensitive receptors have been identified as 58-66 King Street, 25 m distant and screened by AP House itself, and the St Ann's Square apartments, approximately 50 m distant and partially screened by a glazed balustrade.

The additional distance and screening is anticipated to result in at least 17 dB further attenuation (if not substantially more).

In our professional opinion, it would be reasonable to request a 5 dB relaxation in the entertainment noise limits such that noise from the PA would not exceed the existing typical background noise level. If this is acceptable to MCC, the values presented in Table 2 can be increased, such that the A-weighted sound pressure level limit would be L_{Aeq} 62 dB. This is similar to normal voice level.

Discussion

As currently proposed, there is a risk that line array sources placed close to the 37 King Street offices may cause potential disturbance. Therefore, it is recommended that the layout of the line array system is adjusted such that 9 loudspeakers are selected to surround the seating area furthest from the receptor. This is of benefit to the terrace itself, since the localised sound pressure level at for patrons in the seating area is likely to be more audible, while nearer the receptor, the sound pressure level should not exceed the MCC entertainment noise criteria.

MCC entertainment noise criteria are predicted to be achieved at 37 King Street with the alternative PA system layout with the loudspeakers being electronically limited to the sound pressure level values summarised in Table 3. It should be ensured that the PA system is installed using the same geometry as used in the 3D acoustic model. As an additional

mitigation measure it should be ensured that in any situation where the terrace is unoccupied, any entertainment noise on the terrace should be turned off.

As offices are not formally identified as noise sensitive receptors by MCC, and neighbouring residential premises are significantly further away from the proposed PA system terrace, it would be reasonable to negotiate a relaxation on the criteria. Additional attenuation due to distance and screening to the nearest noise sensitive residential premises is expected to be at least 17 dB (if not substantially more). Therefore, it is considered that a 5 dB relaxation in the loudspeaker limits are appropriate within the context of the MCC technical guidance.

The assessment and design proposals demonstrate that noise emissions from a suitably installed PA system will be significantly below the MCC entertainment noise limits and not cause any harm to the amenity of neighbouring noise sensitive residential premises.