SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Victoria Point, Manchester

Block 1 plant noise egress and overheating assessment

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Summary

Sandy Brown has been commissioned to provide acoustic advice in relation to the proposed development at Victoria Point, Manchester.

The planning noise report for the full scheme is set out in 023790-R03-B *Planning noise report*, dated 2 May 2024.

An environmental noise survey has been carried out at the site. The noise survey was carried out between 29 September 2023 and 4 October 2023.

Representative background sound levels measured during the survey were $L_{A90,15min}$ 46 dB during the day and between $L_{A90,15min}$ 38 dB and $L_{A90,15min}$ 42 dB at night.

Based on the requirements of Manchester City Council (MCC) and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed $L_{Aeq,15min}$ 44 dB during the day and $L_{Aeq,15min}$ 40 dB during the night. These have been corrected relative to the measured free-field background sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1).

If plant items contain tonal or attention catching features, a penalty based on the type and impact of those features will be applied, and the limits will be more stringent than those set.

With the proposed mitigation, the predicted external noise level at the nearest noise sensitive premises from Block 1 meets the criteria.

Moving the external plant items, when compared to the original planning application, is predicted to have no impact on the facade sound insulation performance requirements to control noise ingress or on the overheating strategy for Block 1.

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1 Introduction

Sandy Brown has been commissioned to provide acoustic advice in relation to the proposed development at Victoria Point, Manchester.

The planning noise report for the full scheme is set out in 023790-R03-B *Planning noise report*, dated 2 May 2024.

This report provides an updated assessment of plant noise egress and commentary on overheating, which supersedes any commentary made relating to Block 1 in 023790-R03-B.

2 Plant noise egress

2.1 Plant noise egress limits

External noise limits for normally operating and emergency/life-safety building services items are presented in the following section. The limits apply at nearby residential premises to the east of the proposed plant area. The limits were established following the environmental noise survey, set out in 023790-R03-B *Planning noise report*, dated 2 May 2024.

As presented in 023790-R03-B, the cumulative noise level from the operation of all new plant should not exceed the limits set out in Table 1 and Table 2. For the purposes of this memo, only the nearest noise sensitive premises to Block 1 are presented.

The limits apply at 1m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. These have been corrected relative to the measured free-field background sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1).

Table 1 Normally operating plant noise limits at 1 m from the nearest sensitive premises

	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)	
Receptor	Day (07:00 – 23:00)	Night (23:00 - 07:00)
Residential premises close to the east (Brandish Close, Keswick Close)	44	40

Table 2 Emergency plant noise limits at 1 m from the nearest noise sensitive premises

	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)	
Receptor	Day (07:00-23:00)	Night (23:00-07:00)
Residential premises close to the east (Brandish Close, Keswick Close)	59	55

2.2 Proposals

2.2.1 Plant item locations

Based on the latest information received from Bell Phillips, it is understood that the 2 No. CND-01 ASHPs associated with Block 1 are to be located in the plant enclosure shown in Figure 1. It has been assumed that the units will be mounted on big foot systems, giving an overall height of 2 m. A generator is also proposed to be located within the enclosure.

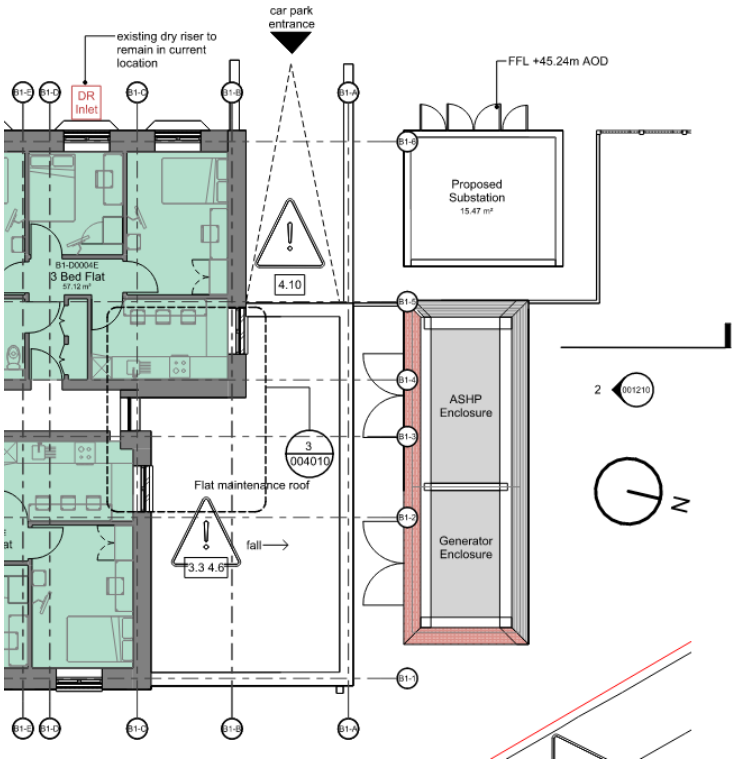


Figure 1 Proposed ASHP and generator enclosure in relation to Block 1

2.2.2 Operational hours

It has been assumed that both ASHPs will be continuously operational during the day. It is understood that only one of the Block 1 ASHPs will be required to be operational at night. The assessment has been carried out on this basis.

It is understood that regular testing of the generators will be completed on a monthly basis.

2.2.3 Noise data

The received noise level data for the ASHP units is presented in Table 3.

Table 3 Plant item noise level data for CND-01 (Mitsubishi CAHV-R450YA-HPB)

	Sound power level, L_w (dB) Octave-band centre frequency (Hz)							
Unit	63	125	250	500	1000	2000	4000	8000
CND-01	78	79	80	73	68	65	65	60

For the purposes of this assessment, a typical generator spectrum has been adjusted to match the stated single figure sound pressure level of L_{Aeq} 75 dB at 1 m, presented in Table 4.

Table 4 Assumed generator spectrum

	Sound pressure level at 1 m, L_{eq} (dB) Octave-band centre frequency (Hz)							
Unit	63	125	250	500	1000	2000	4000	8000
Generator spectrum corrected to 75 dB at 1 m	84	80	72	66	59	66	69	69

2.2.4 Screening

It is understood that solid screening can be considered to the south and east of the plant compound. The top of the compound is required to be open and the north and west sides are to be louvred to allow sufficient airflow to the units. There is also to be a solid screen between the generator and ASHP enclosures.

All screening will have an overall height of 3 m with a cantilever towards the equipment around the perimeter of the enclosure.

2.2.5 Attenuation

Attenuation applied directly to the ASHPs has been considered. Following previous assessment works, it has been confirmed by Atelier Ten that an ASHP acoustic kit by Ambient Acoustics Ltd

is to be applied to the units. The insertion losses for the attenuator kits are presented in Table 5.

Table 5 Insertion losses for Ambient Acoustics ASHP attenuation kit

Ref	Insertion losses, D_i (dB), Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
ASHP attenuation kit	3	4	6	7	10	10	8	7

2.3 Assessment

This assessment has been carried out to predict plant noise egress at the nearby noise sensitive premises for normally operating plant and to predict whether the noise egress levels will allow for the opening of windows for ventilation and overheating at the Block 1 north facade. Calculations are bases on all plant items running simultaneously except one of the Block 1 ASHPs at night. It has been assumed that the proposed plant items and mitigation measures for Blocks 2-6 are as per the assessment in 023790-R03-B.

A 3D environmental noise model has been produced using computational acoustic modelling package CadnaA.

The software carries out calculations using a ray tracing technique, and considers 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.*

2.3.1 Predicted noise levels at noise sensitive premises from normally operating plant

The predicted worst case noise level at 1 m from the facade of the nearby noise sensitive premises to the east (Brandish Close, Keswick Close) with attenuation directly applied to the units:

- L_{Aeq} 41 dB during the day
- L_{Aeq} 38 dB at night.

The results meet the day and night-time criteria, set out in Table 1, at the residential premises to the east.

2.3.2 Predicted noise levels at noise sensitive premises from emergency plant items

The predicted worst case noise level at 1 m from the facade of the nearby noise sensitive premises to the east (Brandish Close, Keswick Close) is L_{Aeq} 54 dB. This meets the emergency plant noise limits set out in Table 2 during the day and at night.

2.3.3 Predicted noise levels at the Block 1 north facade from normally operating plant

The predicted noise level, at 1 m from the facade of the worst affected window of Block 1 is L_{Aeq} 46 dB during the day and L_{Aeq} 43 dB at night. These noise levels are not predicted to cause an increase to the ambient noise level at Block 1.

3 Acoustics, ventilation and overheating

3.1 Assessment criteria

3.1.1 Approved Document O – Overheating

Approved Document O 2021 Edition (to the Building Regulations 2010) states the following in relation to noise ingress during overheating periods:

> *'In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (23:00-07:00 hours).*
>
> *Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.*
>
> *a. $L_{Aeq,T}$ 40 dB average over 8 hours (between 23:00-07:00)*
> *b. L_{AFmax} 55 dB more than 10 times a night (between 23:00-07:00).'*

The above applies to residential dwellings, institutional residential accommodation, and other types of residential accommodation, such as student accommodation.

3.1.2 Acoustics, ventilation and overheating

MCC *Planning and Noise Technical Guidance* includes discussion on the Association of Noise Consultants *Acoustics Ventilation and Overheating, Residential Design Guide* (AVO Guide) relation to ventilation and overheating. The AVO guide is also referenced within ADO2021.

The guidance for suitable internal noise levels in order that noise ingress can be suitably controlled for an overheating condition are provided in AVO Guide. These are adapted and summarised in Table 6, though are not supposed to be taken as limits, rather guidelines to be assessed while also considering the adverse effect of any overheating (duration and severity).

The lowest observed adverse effect level (LOAEL) and the significant observed adverse effect level (SOAEL) for increased noise levels associated with controlling overheating are specific to each project as these depend on the magnitude of the increased internal noise levels and the duration for which they occur.

Table 6 Guidance for Level 2 assessment of noise from transport sources relating to overheating condition

Effect level	Internal noise level from transport sources		
	Day (07:00 – 23:00)	Night (23:00 – 07:00)	
LOAEL (noise can be heard, but does not cause any change in behaviour)	L_{Aeq} ≤ 35 dB	L_{Aeq} ≤ 30 dB	L_{AFmax} 45 dB not normally exceeded
SOAEL upper limit for longer overheating durations	L_{Aeq} > 35 dB and L_{Aeq} ≤ 40 dB	L_{Aeq} > 30 dB and L_{Aeq} ≤ 35 dB	-
SOAEL upper limit for shorter overheating durations	L_{Aeq} > 40 dB and L_{Aeq} ≤ 50 dB	L_{Aeq} > 35 dB and L_{Aeq} ≤ 42 dB	-
Exceeds SOAEL (noise causes a material change in behaviour)	L_{Aeq} > 50 dB	L_{Aeq} > 42 dB	L_{AFmax} 65 dB normally exceeded

The AVO Guide illustrates that there is a link between adverse effects, increasing internal ambient noise levels and the duration of exposure to noise for an overheating condition. These are indicated in Figure 2.

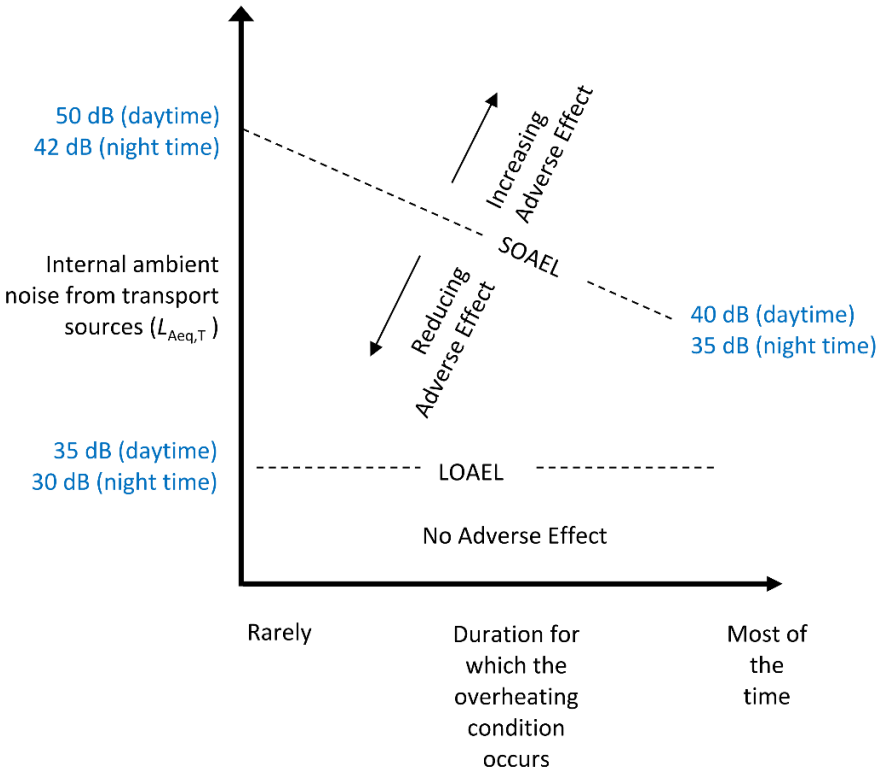


Figure 2 Internal ambient noise levels and increasing adverse effects for an overheating condition

When internal noise levels are above Significant Observed Adverse Effect Level (SOAEL), it is likely that there will be a high potential for an adverse outcome. These adverse outcomes will include:

- Material change in behaviour and/or attitude, eg avoiding certain activities during periods of intrusion
- Where there is no alternative ventilation, having to keep windows closed most of the time because of the noise
- Potential for sleep disturbance and difficulty in getting back to sleep
- Quality of life diminished.

As illustrated, the potential for adverse risk increases with the duration of exposure to noise, ie, a shorter exposure will result in a lower risk of adverse outcomes.

3.2 Approved Document O 2021 (during the night)

The predicted noise level at 1 m from the facade of Block 1 due to the proposed ASHPs in the worst affected location is L_{Aeq} 43 dB at night. As such, there is predicted to be no negative

impact on the overheating strategy at night for Block 1 and the recommendations set out in Section 9.1 of 023790-R03-B can be followed.

3.3 Acoustics, ventilation and overheating assessment (during the day)

The predicted external free-field noise level at the worst affected location of Block 1 due to the proposed ASHPs is L_{Aeq} 43 dB. This falls into the 'negligible' risk category. As such, there is predicted to be no negative impact on the overheating strategy during the day at Block 1.

4 Conclusion

Sandy Brown has been commissioned to provide acoustic advice in relation to the proposed development at Victoria Point, Manchester.

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An environmental noise survey has been carried out at the site. The noise survey was carried out between 29 September 2023 and 4 October 2023.

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Based on the requirements of Manchester City Council (MCC) and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed $L_{Aeq,15min}$ 44 dB during the day and $L_{Aeq,15min}$ 40 dB during the night.

With the proposed mitigation, the predicted external noise level at the nearest noise sensitive premises from Block 1 meets the criteria.

Moving the external plant items, when compared to the original planning application, is predicted to have no impact on the facade sound insulation performance requirements to control noise ingress or on the overheating strategy for Block 1.