

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

18487-R04-A

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Globe & Simpson

*Planning condition 17 discharge report – plant noise
egress assessment*

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Summary

Sandy Brown have been commissioned by Lendlease Ltd to carry out an assessment of noise egress from rooftop plant to surrounding sensitive receptors in accordance with Planning Condition 17 associated with the development at Globe & Simpson in Manchester.

Based on report 18487-R03-B by Sandy Brown and on the requirements of the Manchester City Council (MCC), the relevant plant noise limits at the worst affected existing noise sensitive premises must not exceed 5 dB below these representative background sound levels, as set out in this report. These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, a penalty is to be applied.

Based on the data provided for the rooftop plant, further mitigation measures are required to control plant noise egress to meet with the relevant criteria. These are set out in this report.

Provided these mitigation measures are incorporated, the proposed plant is expected to meet the noise egress criteria, including controlling the potential perceptibility of tones, and as such and the planning condition should be discharged.

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1 Introduction

Sandy Brown have been commissioned by Lendlease Ltd to carry out an assessment of noise egress from rooftop plant to surrounding sensitive receptors in accordance with Planning Condition 17 associated with the development at Globe & Simpson in Manchester.

This report sets out the basis for this assessment, predicted noise levels at the facades of the nearby noise sensitive receptors, and presents mitigation measures to comply with the criteria.

2 Planning Condition 17

Planning condition 17 states the following:

‘Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with the scheme designed so as to achieve a noise level of 5 dB below the existing background (L_{A90}) in each octave band at the nearest noise sensitive location’

3 Basis of review

The review has been based on the following documents:

- Sandy Brown report 18487-R03-B Stage 4 acoustic design report.
- Architectural and MEP drawing packages received July 2021
- Plant noise data received July 2021.

4 Site description

4.1 The site and its surroundings

Globe & Simpson is located within zone 2 of St John’s Place within the St John’s Masterplan, located on the former site of Granada Studios, along New Quay Street.

The proposed development includes a new Shell & Core 9-storey building with 8 floors of speculative offices, a reception/retail space at ground floor, a co-working/breakout area at mezzanine level, a basement car park and rooftop amenity terrace. A rooftop plant area is proposed.

The site location in relation to its surroundings is shown in Figure 1.



Figure 1 Site map (courtesy of Google Earth Pro)

The nearest noise sensitive receivers are the surrounding offices as part of St John's Place, and on New Quay Street. The nearest residential receptors are the Marriott Hotel on Water Street, and on Liverpool Road and Lower Byrom Street. Due to the additional distance and screening attenuation, on the basis that daytime criteria are met at the nearest commercial receptors, the night-time criteria will be met at the residential receptors further away. As such, only daytime sensitivity is to be considered.

5 External noise limits

In line with the current MCC guidelines, and in line with the plant noise egress planning conditions for other schemes within St Johns, it is proposed that limits be applied as broadband values instead of octave bands. As this is not strictly in line with the wording of planning condition 17, MCC will need to confirm this approach is acceptable.

5.1 Manchester City Council – typical requirements

Manchester City Council (MCC) provides guidance in relation to plant noise emissions in *Planning and Noise Technical Guidance* document dated December 2015 states the following in relation to plant noise egress:

‘Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5 dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.’

Appropriate corrections will need to be made for any attention catching features in line with BS 4142: 2014.

5.2 Cumulative limits for St John’s Masterplan

The cumulative noise level resulting from the operation of all new plant at 1 m from the windows of the nearby noise sensitive premises outside the development should not exceed the limits are set out in Table 1.

These limits are set to be 5 dB below the background noise levels measured during the environmental noise survey set out in Sandy Brown Acoustic Planning report 15210-R03-K dated 23 October 2018.

Table 1 Plant noise limits at 1 m from the nearest noise sensitive premises (outside the development)

Location of NSP	Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, L_{Aeq} (dB)
Marriott Hotel	07:00-23:00	42
	23:00-07:00	41
Liverpool Road	07:00-23:00	44
	23:00-07:00	38
Lower Byrom St	07:00-23:00	41
	23:00-07:00	37
Quay St	07:00-23:00	49
	23:00-07:00	41

5.3 Outside noise sensitive facades within St Johns

The cumulative noise level resulting from the operation of all new plant at 1 m from the windows of noise sensitive facades within the St Johns shall not exceed the limits are set out in Table 2.

Table 2 Plant noise limits at 1 m from the noise sensitive facades within the development

Maximum sound pressure level at 1 m from noise sensitive facades within the development, L_{Aeq} (dB)	
Time of day	
07:00-23:00	49
23:00-07:00	41

It is anticipated that if these local limits are met, the cumulative masterplan limits given in Section 5.2 will also be met due to increased distance attenuation and screening.

5.4 Split between St Johns Place zones

The limits are cumulative plant noise emissions associated with all plant serving the St John's Place development. There are understood to be two 'zones' proposed as part of the St John's Place development, reduced from the previous four zones proposed.

In order to ensure that these limits are met and in order to accommodate other items of external plant (including future tenant plant), it is necessary to design individual items of plant such that the atmospheric noise emissions associated with their combined operation are in line with these criteria. An even split of tenant and base-build noise egress is presented in Table 3. Thus, the same limits apply for the combined tenant plant/base-build plant for each of the two zones.

Table 3 Proposed plant limits outside noise sensitive facades within St Johns (base-build/tenant split)

	Time of day	Maximum sound pressure level at 1 m from noise sensitive premises within St Johns, L_{Aeq} (dB)
Base-building	07:00-23:00	46
	23:00-07:00	38
Tenant plant	07:00-23:00	46
	23:00-07:00	38

5.5 Emergency plant

Richard Knightley at MCC has requested that emergency plant (eg, smoke ventilation, generator, sprinkler pumps) should be designed to achieve noise levels no greater than 10 dB above the existing background noise level (L_{A90}) at the nearest noise sensitive location.

This requires emergency plant noise egress to meet the following limits based on the environmental noise survey results set out in Sandy Brown Acoustic Planning report 15210-R03-K dated 23 October 2018.

6 Plant information

6.1 Layouts

The rooftop plant layout is set out in Figure 2 below. Normally operating plant is to run as needed at any point throughout the day, while the generator will operate at any time during an emergency. Only the generator and smoke extract will operate during emergency conditions.

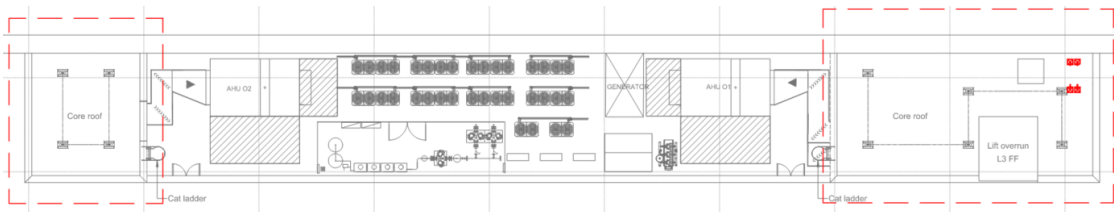


Figure 2 Rooftop plant layout

6.2 Plant noise levels

The received acoustic data is summarised in Table 4. The chillers are understood to be classed as tenant items but are being provided as part of the base-build.

Table 4 Acoustic data for rooftop plant

Item of plant	Sound power levels, L_{WA} (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
<i>AHS AHU 01 Airflex 112</i>								
Supply fan inlet	81	93	82	78	76	74	70	69
Extract fan outlet	84	92	81	84	81	77	74	69
<i>AHS AHU 02 Airflex 106</i>								
Supply fan inlet	78	90	85	80	78	75	73	69
Extract fan outlet	84	92	83	84	81	79	77	71
<i>Carrier chiller</i>	88	83	84	88	83	80	72	68
<i>EF 01 Extract fan</i>	80	80	88	98	94	89	84	78
<i>EF 02 Extract fan</i>	68	72	74	66	61	59	59	55

The noise data received for the other items of plant is per below:

- Boiler – L_{Aeq} 53 dB
- Booster pumps x 3 units - 80 dB (assumed sound power level per unit)
- Life safety generator – L_{Aeq} 76 dB at 1 m
- Smoke extract fans
 - L_{Aeq} 67 dB at 1 m for 50N unit
 - L_{Aeq} 72 dB at 1 m for 100N unit.

Table 5 Proposed atmosphere-side attenuation measures

Plant item	In-duct attenuator insertion loss (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
AHU 01 and 02 Intake	8	14	20	27	36	23	19	12
AHU 01 and 02 Exhaust	8	14	20	27	36	23	19	12
EF 01 Exhaust	2	6	11	21	28	23	17	10
EF 02 Exhaust	1	2	6	15	20	15	14	10

7 Assessment

7.1 Noise levels at receptors

Noise levels at receptors have been calculated in a 3D acoustic model, taking into account attenuation with distance, reflections from buildings, and screening where applicable.

As part of the proposals, solid screening has been included to the full height of the plant area.

Predicted normally operating plant noise egress levels at 1 m from the facade of the nearest noise sensitive receivers are presented in Figure 3. These exceed the cumulative base-build and tenant broadband daytime limits by up to 9 dBA at the nearest noise sensitive receivers during the day.

Emergency plant noise levels meet the relevant criteria during the daytime.

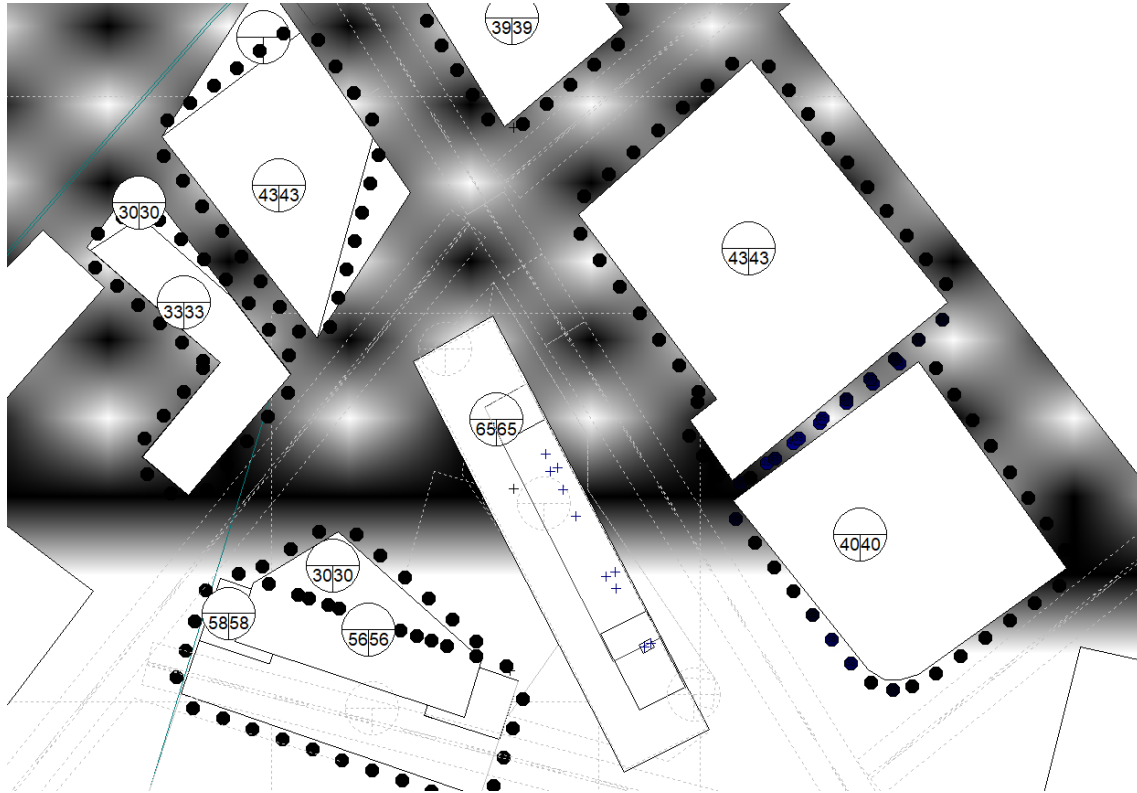


Figure 3 Rooftop plant noise egress levels – normal plant operations

7.2 Mitigation measures

Noise egress associated with the chillers and EF dominate the predicted levels.

In order to meet the proposed broadband plant noise egress criteria, the following attenuation measures would be required.

This mitigation requirements for the chiller is based on this dominating the 'tenant' plant noise egress limits as it is understood that this is a tenant plant item that is being provided as part of the base-build. Any future tenant plant such as condensers etc would need to have noise egress levels at least 10 dBA below the stated tenant limits.

From the noise data provided, and as the post-mitigation noise egress levels are 5 dBA below the minimum background noise levels at the receptor, there is unlikely to be perceptible tonality or other attention catching characteristics.

7.2.1 Chiller acoustic package

It is understood that an acoustic package is available for the proposed chillers. The assessment indicates that the package will need to provide an overall reduction of 12 dBA.

7.2.2 Toilet extract fan acoustic package

The proposed atmosphere-side attenuator to EF01 is to be increased, by the amounts presented below.

Table 6 EF01 additional attenuator minimum insertion losses

	Octave-band centre frequency (Hz)						
	63	125	250	500	1000	2000	4000
EF01 additional attenuator insertion loss required, dB	2	4	2	2	2	2	2

7.3 Attention catching characteristics

The following applies where plant noise is assessed in accordance with BS 4142:2014+A1:2019.

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), penalty corrections should be applied based on the type and impact of the features.

If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible.

Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor:

- 0 dB where the impulse is not perceptible
- 3 dB where the impulse is just perceptible
- 6 dB where the impulse is clearly perceptible
- 9 dB where the impulse is highly perceptible.

For noise which is equally both impulsive and tonal, then both features can be accounted for by linearly summing the corrections for both characteristics.

If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.

If a subjective assessment of tonality is not appropriate, an objective assessment can be made by analysis of time-averaged, third-octave band sound pressure levels. A noise source is deemed to be tonal if the level in a third-octave band exceeds the level in adjacent third-octave bands by the level differences given below:

- 15 dB in the low frequency third-octave bands (25 Hz to 125 Hz)

- 8 dB in the mid frequency third-octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency third-octave bands (500 Hz to 10000 Hz).

If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.

8 Conclusion

The proposed rooftop ventilation plant has been assessed at the nearest noise sensitive premises.

Mitigation measures are required to meet the plant noise egress limits in line with MCC Planning Condition 17.

Provided these measures are adopted, the plant noise egress limits are expected to be met.

Any future tenant plant such as condensers for servers etc would need to have noise egress levels 10 dB below the stated limits to ensure there is no increase in overall plant levels.

Appendix A

BS4142:2014-A1 2019 Attention catching features

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), the plant should be designed to achieve a limit below those set out above, based on the type and impact of the features.

If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible

Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor:

- 0 dB where the impulse is not perceptible
- 3 dB where the impulse is just perceptible
- 6 dB where the impulse is clearly perceptible
- 9 dB where the impulse is highly perceptible

For noise which is equally both impulsive and tonal, then both features can be taken into account by linearly summing the corrections for both characteristics.

If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.

If a subjective assessment is not appropriate then an objective assessment can be made. A noise source is deemed to be tonal if the time averaged sound pressure level in a one-third octave band exceeds the level in adjacent one-third octave bands by the level differences given below:

- 15 dB in the low frequency one-third octave bands (25 Hz to 125 Hz)
- 8 dB in the mid frequency one-third octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency one-third octave bands (500 Hz to 10000 Hz)

If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.