

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Manchester Goods Yard, St Johns

Plant noise egress assessment report

London, Manchester, Edinburgh, Birmingham, Belfast

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Version	Date	Comments	Author	Reviewer
A	25 Mar 21		Kane Mitchell	James Atha
B	19 May 21	Updates to Section 6	Kane Mitchell	James Atha
C	2 Jul 21	Updated following comments from Deloitte	Kane Mitchell	James Atha

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Summary

Sandy Brown has been appointed by Lendlease Construction (Europe) Limited to undertake an assessment of plant noise egress in relation to the proposed Manchester Goods Yard development at St Johns in Manchester in order to discharge planning condition 21 imposed by Manchester City Council.

This report sets out the plant noise egress criteria, the proposed plant items, an assessment of noise egress, and reviews the attenuation requirements to comply with the plant noise egress criteria.

In summary:

- Plant items are only proposed to operate during the daytime (07:00-23:00) and are to be switched off during the night-time (23:00-07:00)
- The chillers are to be provided with an acoustic shroud to reduce their noise emissions
- The in-duct attenuators proposed to the air handling units is expected to control noise egress from atmospheric terminations
- A solid screen is proposed to be provided along the edge of the roof and behind the plant deck.

By implementing the attenuation and mitigating measures above, it is predicted that the daytime (07:00-23:00) plant noise egress criteria will be complied with. As the plant will not operate during the night-time (23:00-07:00), the night-time plant noise egress criteria will also be achieved. As such, planning condition 21 should be discharged.

An assessment of noise egress from the rooftop emergency generator has been undertaken. It is predicted that the emergency generator will comply with the daytime (07:00-23:00) and night-time (23:00-07:00) emergency plant noise egress criteria.

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1 Introduction

Sandy Brown has been appointed by Lendlease Construction (Europe) Limited to undertake an assessment of plant noise egress in relation to the proposed Manchester Goods Yard development at St Johns in Manchester.

This report sets out the plant noise egress criteria, the proposed plant items, an assessment of noise egress, and reviews the attenuation requirements to comply with the plant noise egress criteria.

2 Site description

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

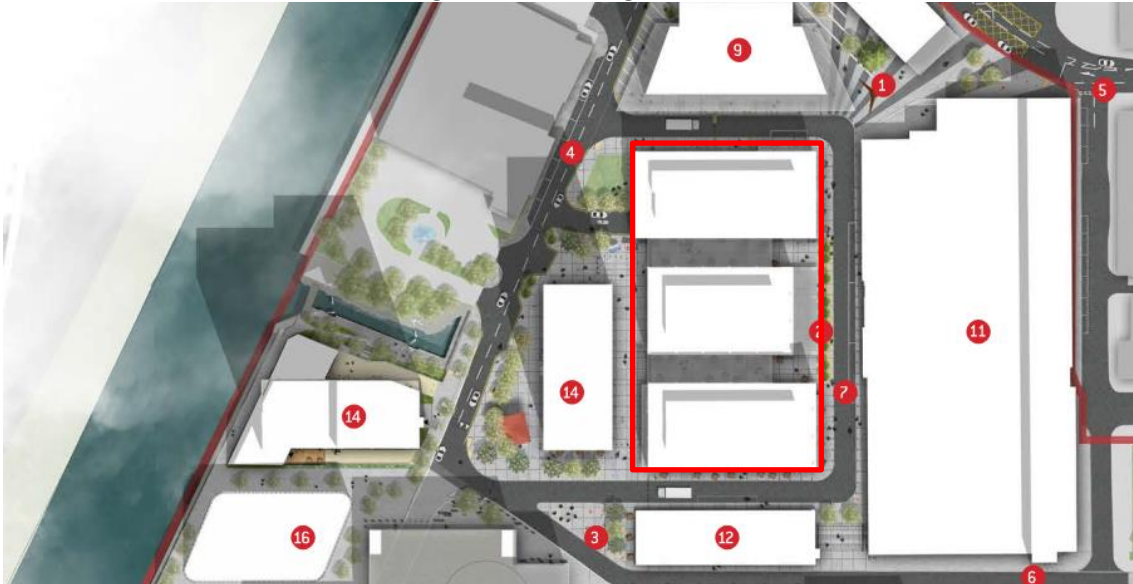


Figure 1 Site plan indicating building location

There are number of developments which contain noise sensitive premises close to the site within the St John's Masterplan development which include:

- Old Granada Studios to the east which includes hotel, commercial and TV studio uses ('11' in Figure 1)
- St John's Place to the north which includes commercial offices ('19' and 'in Figure 1)
- Nickel & Dime to the west – two residential towers ('14' in Figure 1)
- No.1 Grape Street to the south - a 9-storey commercial office building ('12' in Figure 1)
- The Factory Performing Arts Centre to the south west
- The Bonded Warehouse to the south beyond No.1 Grape Street – a Grade II listed building which includes commercial office space and leisure facilities

3 Acoustic criteria

3.1 Planning condition 21

Planning condition 21 imposed by Manchester City Council states the following:

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

The scheme shall be submitted to and approved in writing by the City Council as local planning authority prior to occupation of each phase in order to secure a reduction in the level of noise emanating from the site’

Based on the above, the cumulative noise levels resulting from the operation from all new plant at 1 m from the worst affected windows of the nearest noise sensitive premises shall not exceed the limits provided within Table 1.

Table 1 Plant noise limits for MGY development

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, L_{Aeq} (dB)
Daytime (07:00 – 23:00)	48
Night-time (23:00 – 07:00)	42

3.2 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.

On this basis, emergency plant limits are given in Table 2.

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

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, L_{Aeq} (dB)
Daytime (07:00 – 23:00)	63
Night-time (23:00 – 07:00)	57

4 Plant proposals

4.1 Normally operating plant items

A number of plant items are proposed to the rooftop of Manchester Goods Yard. These are as follows:

- 3 x chillers (highlighted in blue within Figure 2)
- AHU-1 (highlighted in red within Figure 2)
- AHU-2 (highlighted in red within Figure 2)
- AHU-3 (highlighted in green within Figure 2)
- AHU-4 (highlighted in yellow within Figure 2)
- AHU-5 (highlighted in pink within Figure 2).

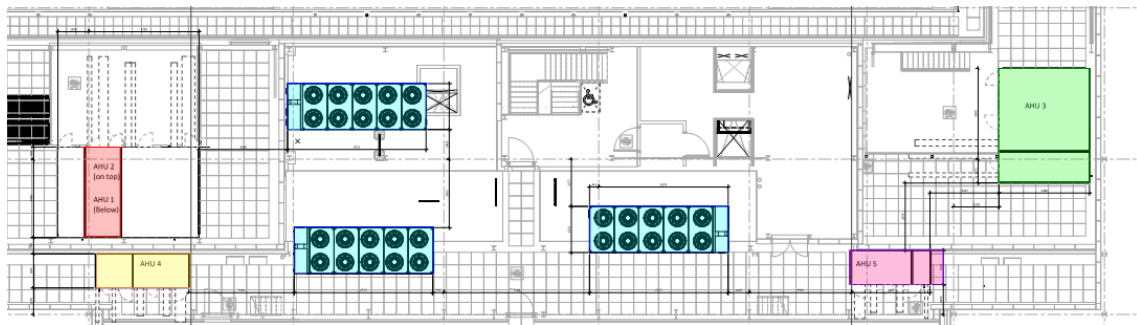


Figure 2 Proposed rooftop plant layout

AHU1 is located underneath AHU2, below a plant deck. AHU3 and AHU5 are also below this plant deck. The plant deck floor is proposed to be 20 mm expanded metal grating which is perforated and therefore provide little screening from an acoustic perspective. This arrangement is shown in Figure 3.

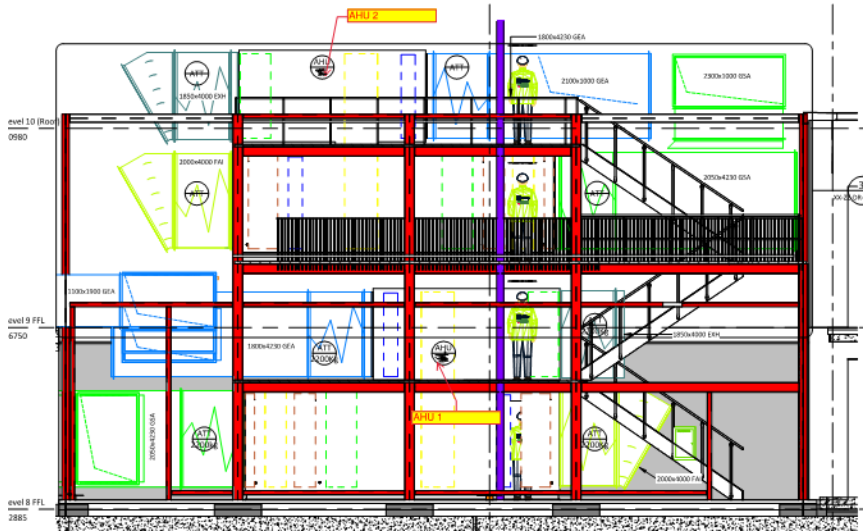


Figure 3 AHU1 and AHU2 arrangement

4.1.1 Operational hours

The plant will be in operation during the daytime (07:00-23:00) and will be switched off during the night-time (23:00-07:00).

4.2 Emergency plant items

An emergency generator is proposed to the rooftop of Manchester Goods Yard. The location of the emergency generator is shown in Figure 4 highlighted in red.

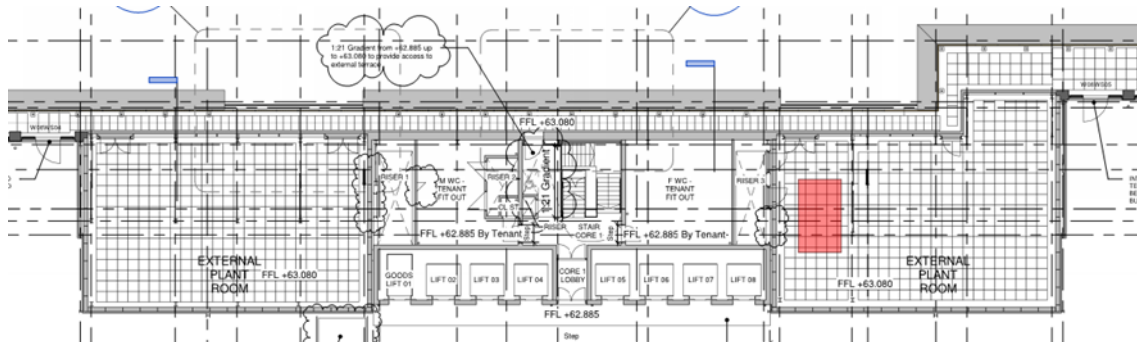


Figure 4 Location of emergency generator

4.2.1 Operational hours

The emergency generator will be capable of operating during the daytime (07:00-23:00) and night-time (23:00-07:00) for life safety purposes. It is also expected that the generator will need to be operated periodically for routine maintenance.

5 Plant data

5.1 Normally operating plant items

5.1.1 Chiller noise data

It has been confirmed that the chiller can achieve a sound pressure level of L_{Aeq} 55 dB at 1 m with the AA303S acoustic shroud proposed.

Octave band acoustic data was previously provided for the chiller with an alternative AA205LS/305LS acoustic shroud. This octave band data has been adjusted to equate to a sound pressure level of L_{Aeq} 55 dB at 1 m and is summarised in Table 3.

Table 3 Sound pressure data for chiller with acoustic shroud

	Sound pressure level at 1 m, L_{eq} (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Chiller with acoustic shroud	44	61	54	56	45	45	41	42

5.1.2 AHU noise data

The received AHU in-duct sound power data is summarised in Table 4.

Table 4 AHU sound power data

	Sound power level, L_w (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
<u>AHU 1</u>								
Inlet	89	95	86	81	79	76	73	74
Exhaust	84	90	79	81	77	74	71	67
<u>AHU 2</u>								
Inlet	89	95	86	81	79	76	73	74
Exhaust	95	96	90	90	86	83	79	78
<u>AHU 3</u>								
Inlet	89	95	86	81	79	76	73	74
Exhaust	95	96	90	90	86	83	79	78

	Sound power level, L_w (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
<u>AHU 4</u>								
Inlet	80	88	82	79	76	75	72	67
Exhaust	81	87	83	83	80	76	72	69
<u>AHU 5</u>								
Inlet	80	88	82	79	76	75	72	67
Exhaust	81	87	83	83	80	76	72	69

The AHU breakout noise data is summarised below:

- AHU 1 L_{Aeq} 52 dB at 5 meters
- AHU 2 L_{Aeq} 51 dB at 5 meters
- AHU 3 L_{Aeq} 53 dB at 5 meters
- AHU 4 L_{Aeq} 46 dB at 5 meters
- AHU 5 L_{Aeq} 48 dB at 5 meters

5.2 Emergency plant items

5.2.1 Emergency generator

The emergency generator has been acoustically treated to achieve a sound pressure level of L_{Aeq} 70 dB at 1 m. Octave band noise data has not been provided for the generator, and so for the purpose of this assessment, a representative spectrum has been used. This is provided in Table 5.

Table 5 Sound pressure data for emergency generator

	Sound pressure level at 1 m, L_{eq} (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Emergency generator	62	67	67	64	65	64	61	58

5.3 Proposed mitigation

5.3.1 Air handling unit mitigation

The proposed in-duct AHU attenuator insertion losses are provided in Table 6.

Table 6 AHU attenuator insertion losses

Attenuator	Attenuator insertion loss (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
<u>AHU 1</u>								
Inlet	9	13	25	49	55	42	26	17
Exhaust	9	13	26	53	55	49	31	24
<u>AHU 2</u>								
Inlet	13	18	31	55	55	55	42	32
Exhaust	14	18	32	55	55	55	41	31
<u>AHU 3</u>								
Inlet	10	13	27	55	55	43	26	19
Exhaust	9	13	25	49	55	44	27	19
<u>AHU 4</u>								
Inlet	8	13	24	48	55	47	29	22
Exhaust	10	16	30	54	55	40	26	19
<u>AHU 5</u>								
Inlet	8	13	24	48	55	47	29	22
Exhaust	10	16	30	54	55	40	26	19

5.4 Screening

A screen is proposed to be provided along the edge of the roof and behind the plant deck as shown in Figure 5. This screen is to be solid and to be equal to the height of the lift overrun.

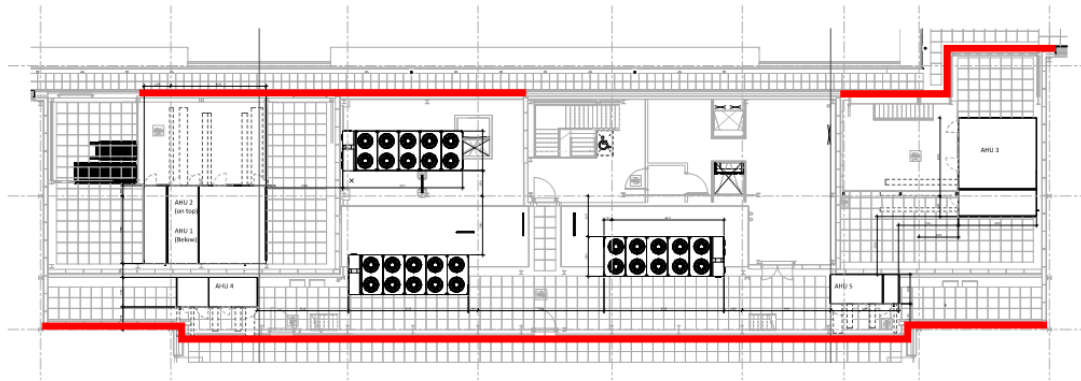


Figure 5 Screening extent

6 Plant noise egress assessment

6.1 Normally operating plant items

A 3D environmental noise model of the site and its surrounding has been built using CadnaA software by Datakustik to model plant noise egress.

The software carries out calculation using a ray tracing technique. This takes into account the effects to topography, reflections, screening and distance attenuation for noise sources to predicts noise levels in three dimensions. Calculations are carried out in accordance with ISO 9613 *Attenuation of sound during propagation outdoors*.

A screengrab of this 3D model is provided in Figure 6.

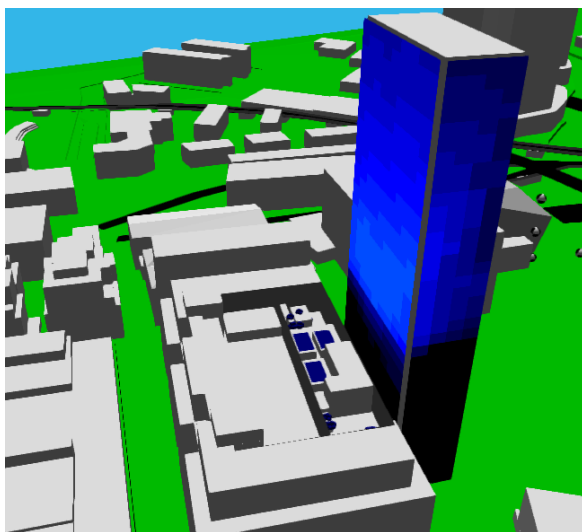


Figure 6 Screengrab of 3D model

The worst effected noise sensitive receptor is considered to be the two residential towers to the west, Nickel & Dime ('14' in Figure 1).

Based on the above mitigation being implemented, the predicted level of plant noise egress is expected to comply with the daytime (07:00-23:00) plant noise egress criteria as per Table 1.

6.2 Emergency plant items

Calculations have been carried out to assess noise egress from the emergency generator. The results of these calculations predict that the emergency generator will comply with the daytime (07:00-23:00) and night-time (23:00-07:00) emergency plant noise egress criteria as per Table 2.

7 Conclusion

A plant noise egress assessment has been undertaken. Based on the proposed mitigation which is summarised below:

- The chillers are to be provided with an acoustic shroud
- In-duct attenuators proposed to the air handling
- A solid screen is proposed to be provided along the edge of the roof and behind the plant deck

The daytime (07:00-23:00) plant noise egress criteria as per Table 1 is expected to be complied with. As the plant will not operate during the night-time (23:00-07:00), the night-time plant noise egress criteria will also be achieved. As such, planning condition 21 should be discharged.

An assessment of noise egress from the rooftop emergency generator has been undertaken. It is predicted that the emergency generator will comply with the daytime (07:00-23:00) and night-time (23:00-07:00) emergency plant noise egress criteria.