



Hann Tucker Associates

Consultants in Acoustics Noise & Vibration

346 Deansgate, Manchester M3 4LY

(t) +44 (0) 1483 770595

(e) enquiries@hanntucker.co.uk

(w) hantucker.co.uk

PROJECT TECHNICAL MEMORANDUM

JOB TITLE : St. Michael's, Manchester
REF : HT: 29787/PTM8
DATE : 21 March 2023
FROM : Michael Hartley
ISSUED TO : Design Team

RE: ST.MICHAEL'S, MANCHESTER PLANT NOISE ASSESSMENT

1.0 Introduction

This memo provides an assessment of fixed building services plant associated with the St. Michael's development, Manchester.

This Technical Memorandum presents the noise impact assessment and our advice on further mitigation measures where necessary, with the aim of achieving the require external plant noise egress limits (ie Condition 34).

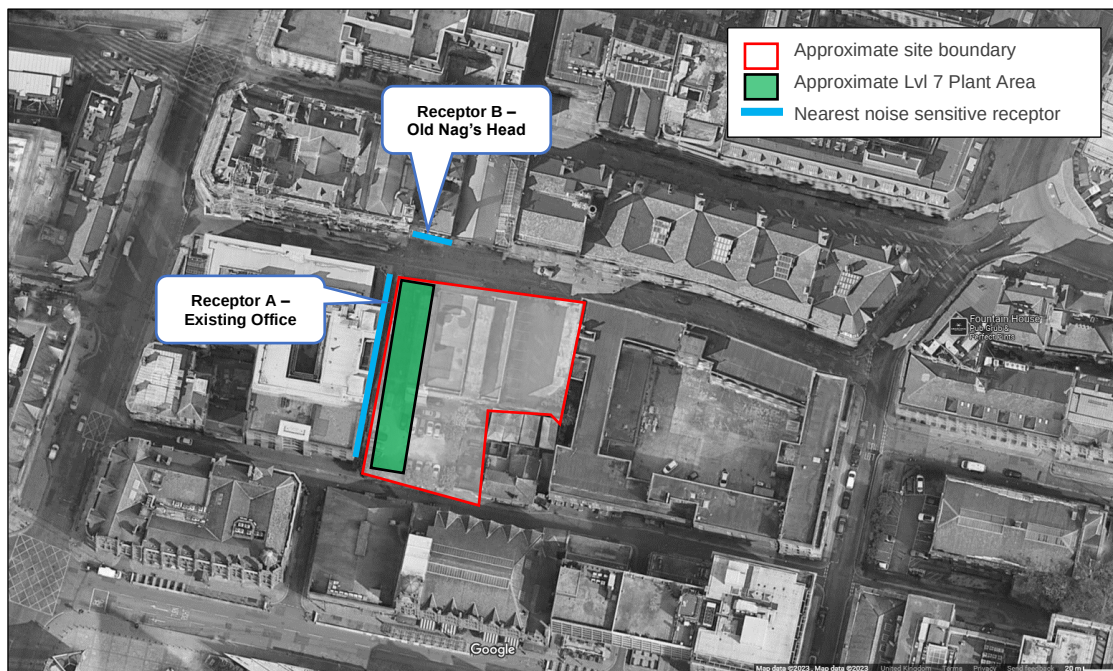
2.0 Site Description

The site is 41No. storey building comprising a mix of office, hotel and residential uses. The site is situated in a row of commercial and office properties.

The north of the site is bound by Jackson's Row. The south of the site is bound by Bootle Street. The site is adjacent to and office building to the west and Sir Ralph Abercromby Public House and residential apartments to the east.

The nearest noise sensitive receptors are understood to be the existing office building, 201 Deansgate, (Receptor A) approximately 5m east and the Old Nag's Head (Receptor B) approximately 15m north of the site.

The mark-up below indicates the receptor locations in relation to the proposed site and plant location.



Site Plan (© maps.google.co.uk)

3.0 Local Authority's Planning Condition

Planning permission has been granted for the redevelopment subject to a number of Planning Conditions. Condition 34 is noted to relate to noise from building services plant, and states the following:

“34) 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 noise level of 5dB below the existing background (LA90) in each octave band at the nearest noise sensitive location.”

It should be noted that the above wording relating to octave bands is not in-line with Section 3.6.1.5.1 Manchester City Council's Planning & Noise Technical Guidance document (December 2015) which outlines that the noise assessment for fixed plant should be based on BS 4142:2014 and the assessment must demonstrate that:

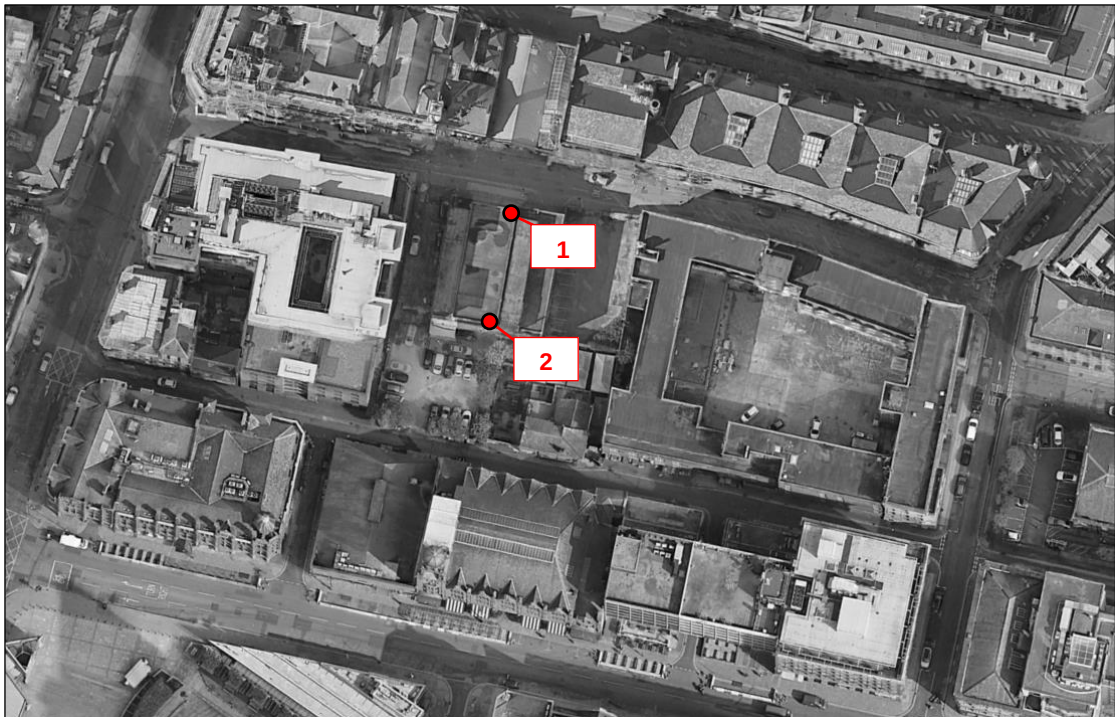
“Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme so as to achieve a rating level of 5 dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location.”



4.0 Previous Baseline Noise Survey

Fully automated, environmental noise monitoring was undertaken at the site between the following dates in the locations highlighted below:

- 07 September 2022 and 15 September 2022
- 29 September 2022 and 03 October 2022



Measurements Locations (© Google Earth)

The A-weighted results of the survey are shown below and full details can be found in Hann Tucker Acoustic Design Report (to be issued in due course):

Position	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
	L _{Aeq,16h} (dB)	L _{A90,15min} (dB)	L _{Aeq,8h} (dB)	L _{A90,15min} (dB)	10th L _{Afmax,15min} (dB)
1	61	55	62	50	89
2	64	56	63	51	84

As Condition 34 relates to octave band noise levels, the octave band L₉₀ measured in Position 1 are presented below.



Positon	Measured Sound Pressure Level, L_{90} , at each Octave Band Central Frequency (Hz)							
	Period	63	125	250	500	1000	2000	4000
B	Day	66	58	55	51	50	47	40
	Night	53	53	51	47	46	40	33

5.0 Plant Noise Limits

Based on the typical background sound pressure levels measured by Hann Tucker Associates, and on the wording of Planning Condition 34, the following plant noise emission limits are considered applicable for the consented development. These limits are presented as free-field limits.

Period	BS 4142 Plant Noise Rating Limit (dB)							
	63	125	250	500	1000	2000	4000	Broadband
Daytime (07:00-23:00)	61	53	50	46	45	42	35	50
Night-time (23:00-07:00)	48	48	46	42	41	35	28	45

6.0 Plant noise Assessment

6.1 Overview

Hann Tucker Associates have undertaken an assessment of atmospheric plant noise emissions of the proposed condenser and AHU systems based on manufacturer noise level data with a view to calculating the noise level at the surrounding receptors.

The calculations take into account distance propagation losses, any screening provided by the site geometry, as well as any noise mitigation measures included within the installation.

As noted in Section 2.0, the worst affected noise sensitive receptor is considered to be the old Nags Head and the adjacent offices. It is understood that the proposed that all plant can operating during the daytime and night-time assessment periods, so subsequently has be assessed using the more onerous night-time criteria set out in this report.



6.2 Proposed Plant

The proposed external noise generating items of building services plant are as follows along with the associated noise data.

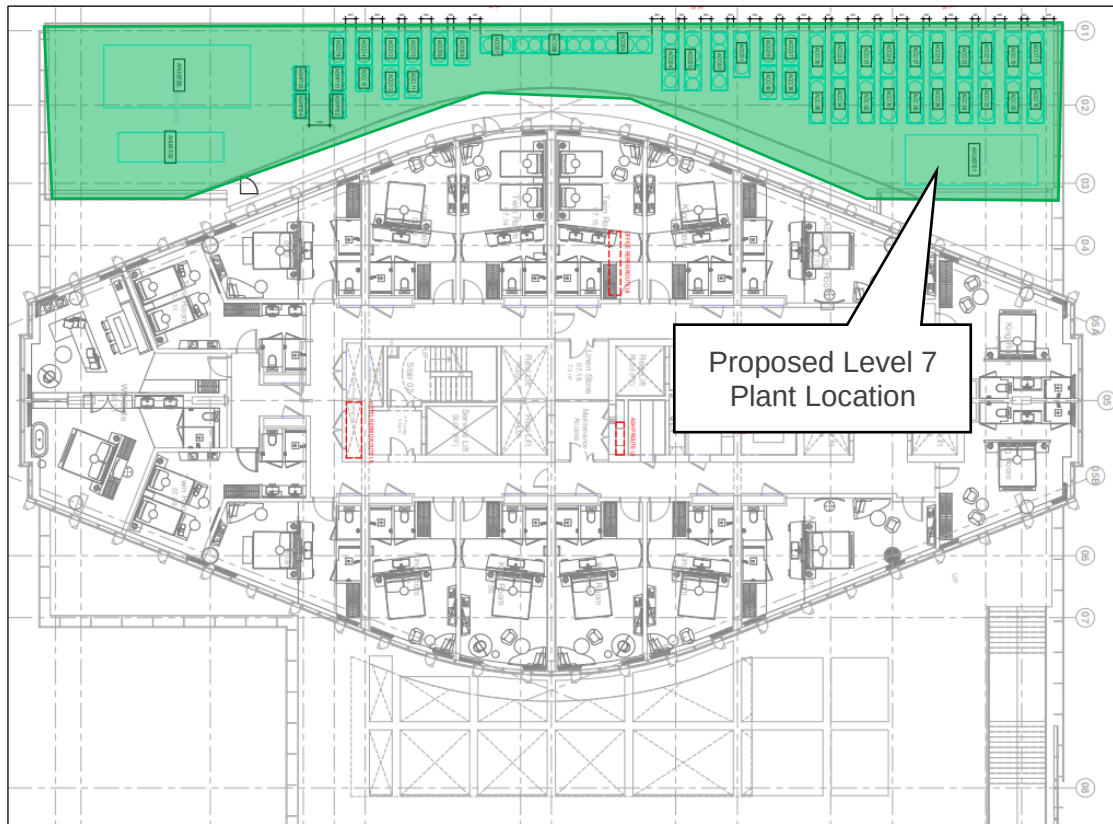
Make	Model	Location	Units	Noise Level
Hitachi	RAS 20FSXNSE	Level 7 Plant Area	13	86 dB SWL
Hitachi	RAS 26FSXNSE	Level 7 Plant Area	20	87 dB SWL
Hitachi	RAS 18FSXNSE	Level 7 Plant Area	1	86 dB SWL
Hitachi	RAS 40FSXNSEX2	Level 7 Plant Area	4	88 dB SWL
Hitachi	RAS 52FSXNSE	Level 7 Plant Area	1	90 dB SWL
Hitachi	RAS28/RAS 30FSXNSE	Level 7 Plant Area	1	80 dB SWL
Mitsubishi	QAHV-N560YA-HPB	Level 7 Plant Area	4	56 dB @ 1m
AirSource	ASV1150-2420 INT	Level 7 Plant Area	1No Inlet	86 dB SWL
			1No Outlet	78 dB SWL
AirSource	ASV1150-2020 INT	Level 7 Plant Area	1No Inlet	87 dB SWL
			1No Outlet	73 dB SWL
Hitachi	RAS 26FSXNSE	Basement Plant Area	1	87 dB SWL
Hitachi	RAS 26FSXNSE	Ground Floor Plant Area	1	87 dB SWL
Hitachi	RAS 18FSXNSE	Ground Floor Plant Area	1	86 dB SWL
AirSource	ASV1550-3820 INT	Ground Floor Plant Area	1No Extract	87 dB SWL
			1No Supply	82 dB SWL
AirSource	ASV650-920 INT	Ground Floor Plant Area	1No Extract	84 dB SWL
			1No Supply	71 dB SWL
AirSource	ASV1000-1420 INT	Ground Floor Plant Area	1No Extract	78 dB SWL
			1No Supply	69 dB SWL
AirSource	SV1000-1620 INT	Ground Floor Plant Area	1No Extract	79 dB SWL
			1No Supply	72 dB SWL

It should be noted that for the Hitachi and Mitsubishi condensers and ASHPs the available noise data is in single figure only. As such, we have adjusted the spectrum for similar sized units to establish the likely octave band noise levels. However, it should be noted that this does add some level of uncertainty to the assessment of octave band noise levels.

In addition to the above, noise breakout data was not available for the AHUs, as such we have used empirical calculations to estimate the expected noise breakout sound power level based on the available sound power level of the fans for each unit.



The plan below highlights the roof area where the proposed units will be installed.



Level 7 Roof plant layout with proposed plant area (highlighted in green)

6.3 Initial Assessment

The sound pressure level at each of the worst affected noise sensitive receptor have been calculated based on no mitigation being present with the cumulative sound pressure level resultant from the various units summarised below. Full calculations can be made available upon request.

	BS 4142 Plant Noise Rating Limit (dB)							
	63	125	250	500	1000	2000	4000	Broadband
Resultant Noise Level at Receptor A	76	78	73	70	67	62	54	72
Daytime Criteria (07:00-23:00)	61	53	50	46	45	42	35	50
Exceedance	+15	+15	+23	+24	+22	+20	+19	+22

The above result indicate that the plant noise level at Receptor A (nearby office receptor) would exceed the daytime criteria by up to 22dB. As such, mitigation would be required. This is discussed further in Section 6.4.



	BS 4142 Plant Noise Rating Limit (dB)							
	63	125	250	500	1000	2000	4000	Broadband
Resultant Noise Level at Receptor B	55	54	46	41	37	32	24	44
Criteria - Night-time (23:00-07:00)	48	48	46	42	41	35	28	45
Exceedance	+7	+6	0	-1	-4	-3	-4	-1

The above results indicated that noise levels at Receptor B would likely be 1 dB below the broadband criteria. However, the criteria are unlikely to be achieved at the 63Hz and 125Hz octave bands. As such, mitigation would be required. This is discussed further in Section 6.4.

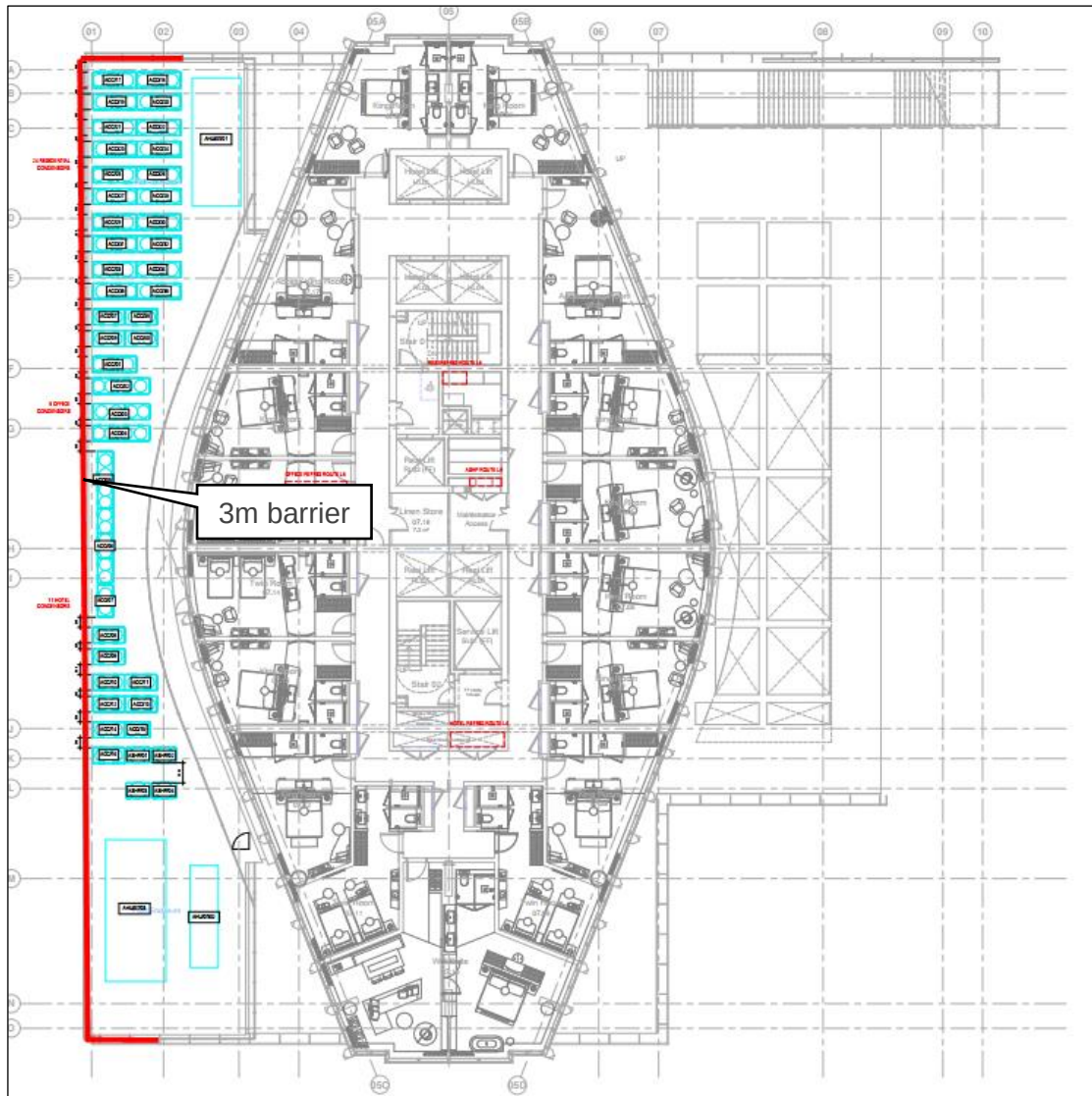
Our assessment indicates that plant noise levels do not currently comply with the daytime or night-time plant limits set in accordance with Planning Condition 34 and background noise levels measured by Hann Tucker Associates.

6.4 Noise Mitigation Option - Barrier Attenuation Method

Consideration can be given to the inclusion of a solid barrier to achieve required noise limits. A solid impermeable barrier would be required along the edge of building. The barrier would require a minimum mass per unit area of 11 kg/m², and would need to extend directly from the roof surface to a height of 3m with no gaps at the base. This is shown in the plan overleaf:

If gaps are required at low level for air flow reasons the plant deck should sit on a raised frame, which the solid screen should extend from. The subsequent gap at the base of the screen, between the roof level and the screen, should contain an attenuated louvre. The louvre should be capable of achieving the below minimum insertion loss performance.

Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)							
63	125	250	500	1000	2000	4000	8000
7	8	13	23	37	33	29	29



Plan detailing solution to achieving noise limits with inclusion of barrier

With the above mitigation measures the sound pressure level at each of the worst affected noise sensitive receptor have been calculated, with the cumulative sound pressure level resultant from the various units summarised below. Full calculations can be made available upon request.

	BS 4142 Plant Noise Rating Limit (dB)							
	63	125	250	500	1000	2000	4000	Broadband
Resultant Noise Level at Receptor A	65	65	57	51	45	37	29	54
Criteria - Daytime (07:00-23:00)	61	53	50	46	45	42	35	50
Exceedance	+4	+12	+7	+5	0	+5	+6	+4



The above results indicate that the plant noise level at Receptor A (nearby office receptor) would exceed the broadband daytime criteria by up to 4 dB. However, it should be noted that the resultant broadband level at Receptor A is 1 dB below the background noise level at this location which is an indication of a low impact in-line with BS4142:2014.

Also, when considering the use of the office building windows are likely to be shut, this would result in a level of attenuation from outside noise to inside noise. As such we would expect that the incident noise level from the Level 7 plant area would be unlikely to cause an adverse impact on the occupiers of the office space and could be deemed acceptable with the inclusion of the proposed mitigation.

The resultant plant noise egress levels at Receptor B are provided below:

	BS 4142 Plant Noise Rating Limit (dB)							
	63	125	250	500	1000	2000	4000	Broadband
Resultant Noise Level at Receptor B	51	50	41	35	32	27	19	39
Criteria - Night-time (23:00-07:00)	48	48	46	42	41	35	28	45
Exceedance	+3	+2	-5	-7	-9	-8	-9	-6

The above results indicated that noise levels at Receptor B would likely be 6 dBA below the broadband criteria. However, there are minor exceedances of the criteria is not at the 63 Hz and 125 Hz octave bands. Our assessment has been based on assumed octave band data for the condenser units as exact measurement data is not currently available. Based on this we would expect that noise levels at the receptor to be in-line with the typical MCC criteria and should be considered acceptable with the proposed mitigation measures.

Yours sincerely

Michael Hartley
for HANN TUCKER ASSOCIATES