

DDN-AC-12

DATE:	25 May 2023	CONFIDENTIALITY:	Confidential
SUBJECT:	Condition 6 - Fixed Plant Noise Emissions (Validation Testing)		
PROJECT:	Spa @ KSTH	AUTHOR:	Michael Ridley
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INTRODUCTION

Overview

A new gym/spa development at 2-4 Booth Street, Manchester has been granted planning permission (ref. 127325/FO/2020) by Manchester City Council (MCC), subject to conditions.

This report presents an assessment of fixed plant noise emissions (as installed) to discharge Condition 6, repeated below for reference.

“6) Externally mounted ancillary plant, equipment, servicing and louvres shall be selected and/or acoustically treated in accordance with a scheme 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 in order to secure a reduction in the level of noise emanating from the site. The approved scheme shall be completed before the premises is occupied.

Upon completion of the development a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that the noise criteria has been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.

Reason - To minimise the impact of the development and to prevent a general increase in pre-existing background noise levels around the site, pursuant to policy DM1 (Development Management) and policy SP 1 (Spatial Principles) within Manchester Core Strategy.”

An assessment of fixed plant noise emissions (DDN-AC-07) was accepted by MCC to provide a partial discharge of the above. This report presents the results of validation testing that has been undertaken to assist with the full discharge of Condition 6 upon completion.

Site Description

The new gym/spa is located on the ground and basement floors of 2-4 Booth Street which is bounded by Booth Street, Clarence Street and Kennedy Street, with residential dwellings on upper floors.

The nearest residential receptors are as follows:

- **Receptor A** – Windows of residential properties within 2-4 Booth Street
- **Receptor B** – Guest room windows of the King Street Townhouse Hotel
- **Receptor C** – Windows of residential properties on Kennedy Street

ON-SITE PLANT NOISE MEASUREMENTS

Proposed Plant

The relevant (i.e. noise generating) fixed plant items associated with the development are as follows:

- Kitchen extract fan (KEF) – Nuaire AM23ES
- Air handling unit (AHU) – iV Produkt Envistar Flex 360-1V
- Dirty extract fan (EF) – Nuaire DE4H-ES-C4
- VRF condenser (VRF) – Mitsubishi PURY-EP450YNW-A

The kitchen extract fan is located internally at basement level and ducted to an exhaust grille at first floor level. The air handling unit, dirty extract fan and VRF condenser are all located externally at rooftop level.

Equipment

All measurements were made using type 1 sound monitoring equipment as detailed below. All equipment was within calibration at the time of the undertaking of the measurements.

Table 1 – Noise measurement equipment details

Equipment Item	Make / Model	Serial Number	Calibration Due
Sound Level Meter	01dB-METRAVIB Blue Solo 'Datalogging Integrating Sound Level Meter'	60531	09 December 2023
Pre-amplifier	01dB-MATRAVIB PRE 21 S Preamplifier	16422	
Microphone	Microtech Gefell GmbH MCE212 Condenser Microphone	333438	
Calibrator	01dB-Stell Cal 21	1558662	06 December 2023

Measured Plant Noise Levels

The measured noise levels at 1 m from each plant item are presented below.

Table 2 – Plant noise data

Plant Item	Element	Sound Pressure Level (L_{eq} , dB @ 1 m) at Octave Band Centre Frequency (Hz)								dBA @ 1 m
		63	125	250	500	1k	2k	4k	8k	
Kitchen Extract Fan (KEF)	Exhaust grille	63	55	55	55	54	48	41	28	57
Air Handling Unit (AHU)	Fresh air grille	79	71	58	58	58	54	50	45	63
	Exhaust grille	60	66	56	56	54	47	42	46	58
	Casing	64	64	56	55	54	49	46	50	59
Dirty Extract Fan (EF)	Exhaust grille	62	59	57	56	56	53	46	34	60
	Casing	60	58	56	55	54	49	41	30	58
VRF Condenser (VRF)	-	60	59	57	55	55	51	50	51	60

Whilst onsite, noise from the Kitchen Extract Fan was subjectively inaudible to the surveyor. A further background sound level measurement was therefore undertaken at 1m from the kitchen extract exhaust grille when the kitchen extract was switched off, as presented below.

Table 2 – Plant noise data (switched off)

Plant Item	Element	Sound Pressure Level (L_{eq} , dB @ 1 m) at Octave Band Centre Frequency (Hz)								dBA @ 1 m
		63	125	250	500	1k	2k	4k	8k	
Kitchen Extract Fan (KEF) Switched Off	Exhaust grille	60	56	56	55	53	48	40	26	57

When comparing the measured sound level measured at 1m from the kitchen extract exhaust grille when the kitchen extract fan is on (57 dB $L_{Aeq,T}$) and the residual sound level when the kitchen extract fan is turned off (57 dB $L_{Aeq,T}$), it can be seen that the operation of the kitchen extract fan does not increase the sound level at the measurement location. Therefore, the specific sound level of the operational kitchen extract fan can be considered to be at least 10 dB below the residual sound level (47 dB $L_{Aeq,T}$).

ASSESSMENT OF MEASURED ON-SITE NOISE LEVELS

Criteria

Plant noise emissions criteria at the nearest residential receptors were agreed as part of the planning approval process and are repeated below for reference.

Table 3 – Fixed plant noise emissions criteria

Period	Plant Noise Emission Limit
Daytime (07:00 – 23:00 hrs)	48 dB L _{Ar,1h}
Night-time (23:00 – 07:00 hrs)	47 dB L _{Ar,15min}

Assessment Parameters

The distances between the plant items and the noise sensitive receptors are detailed below (as approved by MCC during the partial discharge of Condition 6).

Table 4 – Distances between plant and noise sensitive receptors

Description	Distance to Receptor (m)		
	Receptor A	Receptor B	Receptor C
KEF (Exhaust)	2	24	34
AHU (Exhaust)	15	11	18
AHU (Fresh Air Intake)	16	11	15
AHU (Casing Radiated)	15	11	17
EF (Exhaust)	15	15	18
EF (Casing Radiated)	15	15	18
Condenser	17	15	15

Where there is no direct line sight between the plant items included in the assessment and the noise sensitive receptors, the screening corrections included below have been applied (as approved by MCC during the partial discharge of Condition 6).

Table 5 – Acoustic screening losses

Plant Item	Receptor	Screening Correction (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Rooftop Plant	Receptor A	9	11	13	16	18	21	24	24
	Receptor B	6	6	7	9	11	14	16	19
	Receptor C	7	9	11	14	16	19	22	24
KEF	Receptor A	-	-	-	-	-	-	-	-
	Receptor B	12	15	17	20	22	23	24	24
	Receptor C	17	20	23	24	24	24	24	24

Assessment

As required by MCC, plant noise has been assessed at the nearest noise sensitive receptors taking into consideration the measured on-site plant noise levels, distance losses and screening corrections. The resulting calculated external plant noise levels are included in the table below along with the plant noise limits for comparison.

NB: The surveyor noted that the plant did not contain any attention-grabbing features such as tonality or impulsivity, and the operation of the plant is not understood to have clearly defined on/off periods. No acoustic feature corrections have therefore been applied.

Table 6 – Fixed plant noise assessment

Description	Sound Pressure Level (dB) at Receptor		
	Receptor A	Receptor B	Receptor C
KEF (Exhaust)	≤41	18	12
AHU (Exhaust)	25	33	25
AHU (Fresh Air Intake)	19	28	21
AHU (Casing Radiated)	19	28	20
EF (Exhaust)	19	26	20
EF (Casing Radiated)	17	24	18
Condenser	17	25	20
Cumulative Specific Noise Level	60	36	29
Acoustic Feature Correction	+0	+0	+0
Rating Level	41	36	29
Limit	47	47	47
Compliance / Exceedance	✓	✓	✓

The assessment of fixed plant items (as installed) above indicates that the plant noise emission limit is achieved at all receptors.

I trust the above is clear. If you have any further queries, please do not hesitate to contact me.

Yours sincerely

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