

DATE:	22 December 2021	CONFIDENTIALITY:	Public
SUBJECT:	Condition 6 - Fixed Plant Noise Emissions		
PROJECT:	Spa @ KSTH	AUTHOR:	Jamie Murray
CHECKED:	Mark Hinds	APPROVED:	Mark Hinds

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."

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

PROJECT PROPOSALS

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.

It is understood that the fixed plant may operate during some parts of the night-time period.

Plant Noise Data

The manufacturers noise data for the relevant fixed plant is presented below.

Table 1 – Plant noise data

Plant Item	Element	Sound Power Level (SWL, dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Kitchen Extract Fan (KEF)	In-duct exhaust	76	77	74	67	60	63	59	56
Air Handling Unit (AHU)	In-duct fresh air	58	66	60	56	54	51	46	30
	In-duct exhaust	68	75	71	74	75	74	71	65
	Casing radiated	67	70	55	49	48	48	48	36
Dirty Extract Fan (EF)	In-duct exhaust	88	88	71	69	65	63	58	59
	Casing radiated	64	62	52	52	43	39	32	30
VRF Condenser (VRF)	-	89 dBA							

Ducted plant items have been fitted with attenuators which provide the following insertion losses.

Table 2 – Attenuator insertion losses

Location	Insertion Loss (D _i , dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
KEF Exhaust	2	4	8	14	24	24	17	13
AHU Fresh Air Intake	3	5	11	17	15	8	5	3
AHU Exhaust	6	9	17	26	20	13	10	7
EF Exhaust	1	2	5	11	23	14	12	11

FIXED PLANT NOISE EMISSIONS ASSESSMENT

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.

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.

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 distance losses, screening corrections and attenuator insertion losses. The calculated external plant noise levels are included in the table below along with the plant noise limits for comparison.

NB: The likely operation of the plant has been discussed with the building services engineer and no correction for intermittency has been applied and it is not expected to be either tonal or impulsive.

Table 6 – Fixed plant noise assessment

Description	Sound Pressure Level (dB) at Receptor		
	Receptor A	Receptor B	Receptor C
KEF (Exhaust)	41	3	≤ 0
AHU (Exhaust)	8	29	10
AHU (Fresh Air Intake)	≤ 0	7	5
AHU (Casing Radiated)	12	20	13
EF (Exhaust)	20	24	17
EF (Casing Radiated)	7	16	8
Condenser	37	46	41
Cumulative Specific Noise Level	43	46	41
Acoustic Feature Correction	+0	+0	+0
Rating Level	43	46	41
Limit	47	47	47
Compliance	✓	✓	✓

The assessment of fixed plant items (as installed) above indicates compliance with the plant noise emission limits required by MCC under normal operation.

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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