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Technical Memorandum

Plant Noise Impact Assessment, 117-119 Portland Street, Manchester

1 Introduction

- 1.1 Works are currently underway to refurbish the office premises at 117-119 Portland Street in Manchester. As part of the proposed works existing plant items in the rear courtyard will be relocated with new items of plant installed within both the rear courtyard and on the roof of the building.
- 1.2 Planning permission has been granted subject to conditions. Condition 6a pertains to plant items and states the following:

"...6)a) Prior to any implementation of any plant associated with (a) the office accommodation and (b) the gym a scheme for the acoustic insulation of any plant including externally mounted ancillary equipment, lift equipment and substation associated with the development to ensure that it achieves a background noise level of 5dB below the existing background (La90) at the nearest noise sensitive location 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 equipment. The approved scheme(s) shall be completed before the (a) office accommodation and (b) the Gym are occupied..."

2 Plant Noise Emission Limits

- 2.1 Plant noise emission limits have been calculated based upon a baseline noise survey undertaken by Sol Acoustics in January 2024, the full details of which are set out in the Sol Acoustics Environmental and Intrusive Noise Assessment (ref P2285-REP01-JLS P02).
- 2.2 On the basis of the results of the baseline noise survey and the requirements of Manchester City Council as set out in Condition 6a, Table 1 below sets out the maximum permissible Rating Level to be achieved by the proposed M&E plant associated with the development at the nearest noise sensitive premises.

Location	Maximum Permissible Rating Level, dB $L_{A,Tr}$	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Any noise sensitive façade	47	43

Table 1: Plant Rating Limits

3 Proposed Plant Items

3.1 Based on the information provided to Sol Acoustics it is understood that the items of new and relocated plant are to be installed within either the rear courtyard plant compound or on the roof are as set out in Table 2 below.

Plant Reference	Manufacturer	Model	Status	Location
EC01	Mitsubishi Electric	PURY EP500YNW-A2	New	Courtyard
EC02	Mitsubishi Electric	PURY EP350YNW-A2	New	Courtyard
EC03	Mitsubishi Electric	PUZ-ZM140VHA2	New	Courtyard
EC04	Mitsubishi Electric	PUZ-ZM35VKA2	New	Courtyard
EC05	Mitsubishi Electric	PURY EP400YNW-A2	New	Courtyard
EC06	Mitsubishi Electric	PURY EP350YNW-A2	New	Courtyard
EC07	Mitsubishi Electric	PURY EP500YNW-A2	New	Courtyard
EC08	Mitsubishi Electric	PURY EP300YNW-A2	New	Courtyard
EC09	Mitsubishi Electric	PURY EP550YNW-A2	New	Courtyard
EC10A	Mitsubishi Electric	FDC100CSX	New	Rooftop
EC10B	Mitsubishi Electric	FDC125VSX	New	Rooftop
EC10C	Mitsubishi Electric	FDC125VSX	New	Rooftop
EC10D	Mitsubishi Electric	FDC100CSX	New	Rooftop
EC10E	Mitsubishi Electric	FDC100CSX	New	Rooftop
EC10F	Mitsubishi Electric	FDC125VSX	New	Rooftop
EC11-1	Mitsubishi Electric	PURY EP450YNW-A2	New	Rooftop
EC11-2	Mitsubishi Electric	PURY EP400YNW-A2	New	Rooftop
EC12	Mitsubishi Electric	PUZ-ZM100VHA2	New	Courtyard
EC13	Mitsubishi Electric	PUZ-ZM35VKA2	New	Courtyard
EC14	Mitsubishi Electric	PUZ-ZM50VKA2	New	Courtyard
EC15	Mitsubishi Electric	PUZ-ZM71VHA2	New	Courtyard
EC16	Mitsubishi Electric	PUZ-ZM50VKA2	New	Courtyard
EC17	Mitsubishi Electric	PUZ-ZM50VKA2	New	Courtyard
AC1	Midea	MDV-V100W/ON1(C)	Relocated	Courtyard
AC2	Midea	MOE-30U-55HFN8-R	Relocated	Courtyard
AC3	Midea	MOD-30U-42HFN8-R	Relocated	Courtyard
AC4	Midea	MOX330U-18HFN8	Relocated	Courtyard
AC5	Midea	MOE330U-55HFN8	Relocated	Courtyard
AC6	Midea	MDV-V100W/ON1(C)	Relocated	Courtyard
113-115	Mitsubishi Electric	PURY-P500YLM-A1(-BS)	Relocated	Courtyard

Table 2: Proposed Plant Items

4 Proposed Plant Locations

- 4.1 It is proposed to locate the condensers either within the ground level plant compound at the rear of the building or on the roof of 117-119 Portland Street. The proposals include the relocation of the existing courtyard condensers associated with 113-115 Portland Street.
- 4.2 Details of the specific plant locations is set out in the Kaizen Consulting Engineer drawings 1168-KCE-ZZ-XX-DR-M-5800 and 1168-KCE-ZZ-XX-DR-M-5801.
- 4.3 Internal heat recovery plant will be ducted to external louvres along the eastern façade of the building, to the west of the outdoor plant area. Noise from these ducted units will be controlled by means of in-line attenuators installed in the ductwork between the unit and the louvres such that contribution from the internal plant cannot give rise to an exceedance of the external plant noise limits when considered in tandem with the external plant.

5 External Plant Operational Hours

- 5.1 It is understood that the proposed plant could operate at all hours during both the daytime (07:00-23:00) and the night-time (23:00-07:00).

6 Plant Noise Data

- 6.1 Sol Acoustics have gathered octave band sound pressure level data for the majority of new and existing units from various manufacturer's websites and manuals based on the information provided by others.
- 6.2 Table 3 below sets out the manufacturers sound pressure levels at 1 metre from each of the relocated or new units gathered by Sol Acoustics to enable an assessment. Items marked with an asterisk denote units for which no suitable octave band source noise data has been identified and an assumed spectrum shape has been used based on the closest available unit data and the quoted single figure broadband noise level available from the manufacturer.

Manufacturer	Model	Sound Pressure Level @ 1m, dB per Octave Band Centre Frequency (Hz)							
		63	125	250	500	1000	2000	4000	dBA
Mitsubishi	PURY-EP300YNW-A2	75	70	69	66	61	57	52	67
Mitsubishi	PURY-EP350YNW-A2	69	64	64	62	57	52	47	40
Mitsubishi	PURY-EP400YNW-A2	74	64	66	64	59	55	49	65
Mitsubishi	PURY-EP450YNW-A2	74	64	67	65	60	55	50	65
Mitsubishi	PURY-EP500YNW-A2	77	68	66	61	56	54	51	64
Mitsubishi	PURY-EP550YNW-A2	80	69	68	64	59	56	52	47
Mitsubishi	PUZ-ZM35VKA2	58	51	45	44	40	37	32	46
Mitsubishi	PUZ-ZM50VKA2	58	51	45	44	40	37	32	46
Mitsubishi	PUZ-ZM100YKA2	65	56	57	49	45	42	38	51
Mitsubishi	PUZ-ZM140YKA2	62	54	52	50	46	42	42	52
Mitsubishi	PUZ-ZM71VHA2	54	53	51	45	45	39	34	49
Mitsubishi	FDC100CSX	35	42	46	48	45	42	38	50
Mitsubishi	FDC125VSX	34	44	45	48	46	41	39	50
Mitsubishi	PURY-P500YLM-A1(-BS)	73	70	66	62	56	52	47	64

Manufacturer	Model	Sound Pressure Level @ 1m, dB per Octave Band Centre Frequency (Hz)							
		63	125	250	500	1000	2000	4000	dBA
Midea	MDV-V100W/ON1(C)	67	62	55	55	51	46	42	57
Midea	MOE-30U-55HFN8-R*	71	55	54	52	45	42	40	53
Midea	MOD-30U042HFN8-R*	70	54	53	51	44	41	39	52
Midea	MOX330U-18HFN8*	71	55	54	52	45	42	40	53
Midea	MOE330U-55HFN8*	70	54	53	51	44	41	39	52

Table-3: Plant Noise Data

6.3 Based on design stage assessment, it is proposed to enclose a number of the new courtyard condenser units in acoustics 'jackets' that reduce the noise output of the units. Table 4 below shows the attenuation performance as stated by the manufacturer of the proposed 'jackets' and identifies which units need to have 'jackets' installed. All other units

Plant Reference	Sound Reduction R , dB per Octave Band Centre Frequency (Hz)						
	63	125	250	500	1000	2000	4000
EC01	3	4	6	7	10	10	8
EC02	3	4	6	7	10	10	8
EC05	3	4	6	7	10	10	8
EC06	3	4	6	7	10	10	8
EC07	3	4	6	7	10	10	8
EC08	3	4	6	7	10	10	8
EC09	3	4	6	7	10	10	8
113-115	3	4	6	7	10	10	8

Table 4: Proposed Attenuation Measures

7 Plant Noise Assessment

7.1 In order to predict the likely resultant plant noise levels at the identified noise sensitive receptors, a 3D computer based environmental noise model has been created using the proprietary DataKustik "CadnaA" Noise Mapping software. The following assumptions have been made in the generation of the noise model:

- ◆ The noise model was set up to apply the noise prediction methodology set out in ISO 9613-2: 'Acoustics – Attenuation of Sound propagation outdoors – Part 2: General Method of Calculation';
- ◆ The model was set up to include up to second-order reflected noise from solid structures;
- ◆ Acoustic screening and reflections afforded by nearby buildings and solid structures.

7.2 The model predicts the resultant plant noise Specific Level at the noise sensitive receptors with all plant running simultaneously.

7.3 A visualisation of the noise model is presented in Figure 1 overleaf.

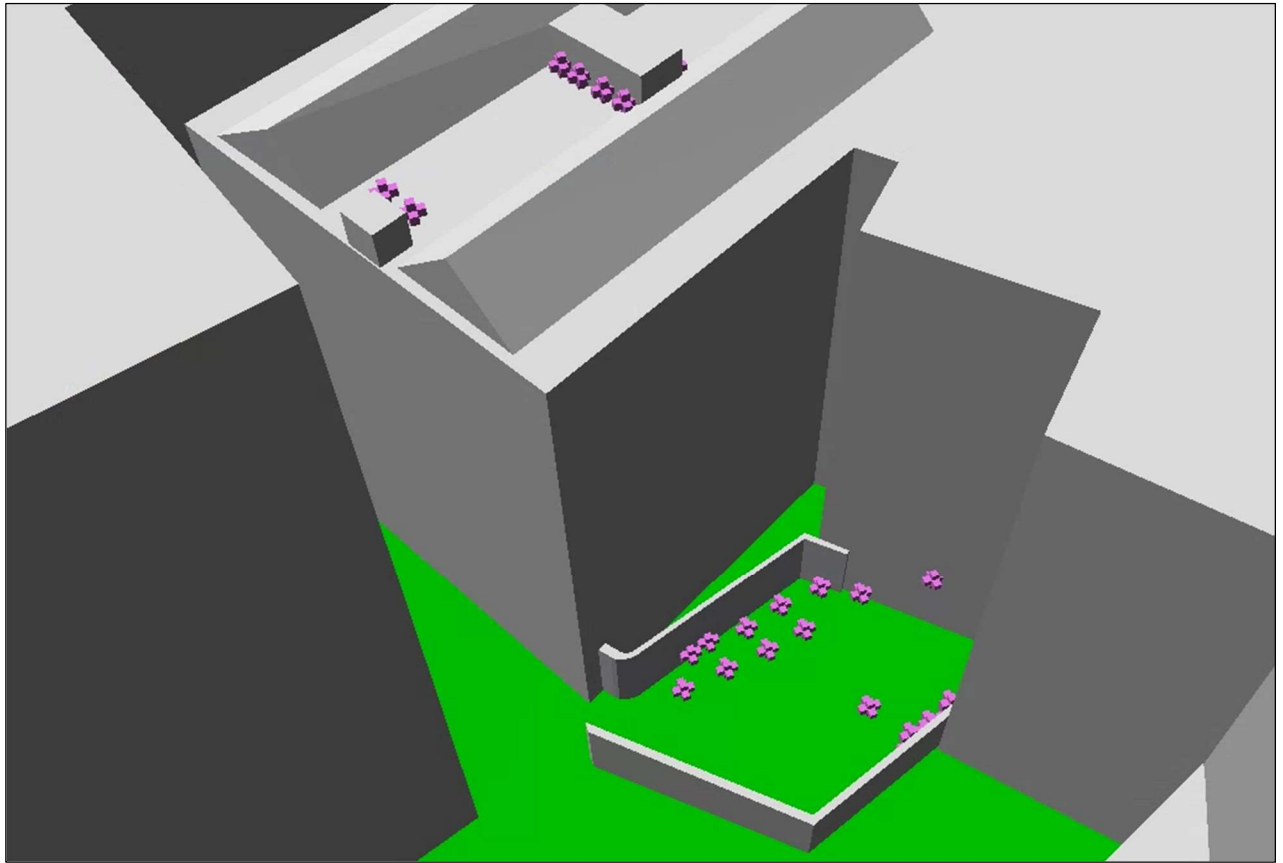


Figure 1: Visualisation of 3D plant noise model, Specific Sound level, dB, L_{Aeq}

BS 4142 Rating Penalty

- 7.4 It is assumed that all units will operate free from tonality and without any impulsive characteristics, as such no BS 4142 rating penalty is deemed necessary.

Context

- 7.5 In full accordance with BS 4142 methodology, the context in which the sound occurs must be taken into consideration when determining the magnitude of the noise impact. In this case, the background noise level at site is dominated by transportation noise and other noise sources typical of an urban location. As such, the context of the site is not expected to affect the BS 4142 predicted magnitude of the noise impact generated.

Summary of Results

- 7.6 Table 5 below summarises the results of the plant noise impact assessment.

Receptor	Specific Noise Level dB, $L_{Aeq,T}$	Rating Level dB, $L_{Ar,Tr}$	Maximum Permissible Rating Level dB, $L_{Ar,Tr}$	Exceedance dB
Linley House Offices	47	47	47	+0
Harter Street Offices	46	46	47	-1
Harter Street Residential	43	43	43	+0

Table 5: Summary of results

Yours sincerely

For and on behalf of Sol Acoustics Limited

A handwritten signature in dark ink, appearing to read 'Joe Sinker', with a long horizontal flourish extending to the right.

Joe Sinker

Executive Consultant

APPENDIX A

Glossary of Acoustic Terms

Term	Abbreviation	Description
Decibel	dB	A scale for comparing the ratios of two quantities, including sound pressure and sound power.
A-weighting	dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the change in sensitivity of the human ear at varying frequencies.
Sound Pressure Level	L_{pA}	A measure of the sound pressure at a particular location. Typically expressed in dB(A) referenced to 2×10^{-5} Pascals.
Equivalent Continuous Sound Level	$L_{Aeq,T}$	The steady level of sound over a prescribed period of time which would contain the same total sound energy as the actual fluctuating noise under consideration in the same period of time.
Statistical Sound Levels	L_{A10} and L_{A90}	The level of noise exceeded for a percentage of the time period being sampled, namely 10% or 90% respectively.
Background Sound Level	$L_{A90,T}$	The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of the time period being sampled.
Maximum Sound Level	L_{Amax}	The maximum sound or noise level determined with instrumentation set to either a fast time weighting, L_{AFmax} , or a slow time weighting, L_{ASmax} , as occurring during the time period being sampled.
Sound Power Level	L_{WA}	A measure of the total sound energy radiated from a source. Like sound pressure levels, this is also expressed in dB(A) terms, but it is referenced to 1×10^{-12} W.
Broadband		Sound sampled over a wide range of frequencies.
Narrow band		Sound sampled over a specific, restricted frequency range. Used to ascertain the amplitude and significant of individual, audible tones, and to assist in identifying particular sources of noise within a complex, multi-source soundscape environment.
Ambient Sound	$L_{eq,T}$	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, both near and far.
Specific Sound Level	$L_{eq,T}$	The Equivalent Continuous A-Weighted Sound Level at an assessment position produced by a specific sound over a given reference time interval, T_r
Rating Level	L_{Ar,T_r}	The Specific Sound Level plus any adjustment for the acoustic characteristic features of the noise (e.g. intermittency, tones etc.).
Residual Noise	$L_{Aeq,T}$	The ambient sound remaining at given position in a given situation, when the specific sound source is suppressed to such an extent that it no longer contributes to the ambient sound.
Sound Reduction Index	SRI	The reduction in sound energy when transmitted through a panel or similar planar element, typically used in relation to single octave or one-third octave frequency band values.
Weighted Sound Reduction Index	R_w	The Sound Reduction Index expressed as a single figure, as expressed against a reference curve.
Dynamic Insertion Loss	DIL	Reduction in acoustic energy resulting from the insertion of a noise control element (e.g. an attenuator, acoustic enclosure etc.).
Free Field		Noise measuring location that is free from the presence of sound reflecting objects (except the ground), usually taken to mean being at least 3.5 metres distance from reflective surface(s) or greater.