



Building Services Noise Impact Assessment

Victoria Mills

Manchester

M40 7LH

Stroma Built Environment Ltd.

SBE Ref: 08-20-84338 – AC - 1v2

I. Revision History

Revision	Date	Description	
1v1	10/11/2021	First Issue	
		Compiled By	Authorised By
		Tom Chaffer MIOA Principal Acoustic Consultant	Ben Reed MIOA Senior Acoustic Consultant
1v2	11/11/2021	Update to planning references	
		Compiled By	Authorised By
		Tom Chaffer MIOA Principal Acoustic Consultant	Ben Reed MIOA Senior Acoustic Consultant

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III. Contents

I.	Revision History	2
III.	Contents	3
1.	Introduction	4
2.	Baseline Noise Conditions	5
3.	Noise Assessment Guidance and Criteria	6
4.	Noise Impact Assessment	8
5.	Conclusions	10
Appendix I.	Noise Impact Assessment Calculation	11
Appendix II.	Mechanical Services Layouts	12
Appendix III.	Mechanical Services Noise Data	13
Appendix IV.	ADC Acoustics Noise Survey	15
Appendix V.	Correspondence with MCC	19
Appendix VI.	Acoustic Glossary	21
Appendix VII.	SBE Acoustic Credentials	23
Appendix VIII.	Report Conditions	24

1. Introduction

- 1.1 Stroma Built Environment (SBE) has been appointed by Medlock FRB to provide acoustic consultancy for the conversion of Victoria Mills, Lower Vickers Street, Manchester, from commercial to residential accommodation.
- 1.2 The purpose of this report is to assess the acoustic impact of mechanical building services plant associated with the new buildings on the existing noise climate at the nearest noise sensitive receptors, with regards to the requirements of Planning Condition 13.
- 1.3 This assessment utilises up to date plant selections, building geometry and assesses noise impact during the daytime and night-time periods.
- 1.4 Assessments are based on manufacturer supplied plant equipment data including type, locations, operating hours and noise emissions supplied to SBE.
- 1.5 This document has been prepared for the sole use, benefit and information of the client for the purposes set out in the document or instructions commissioning the works. The liability of SBE in respect of the information contained herein will not extend to any third party.
- 1.6 Whilst every effort has been made to ensure that this report is easy to understand, it is technical in nature. A glossary of terminology is included in Appendix VI.

2. Baseline Noise Conditions

Site Description

- 2.1 The development site is located on Lower Vickers Street, Manchester. The project involves refurbishment of the north eastern wing of the existing Victoria Mills building to form new residential accommodation.
- 2.2 The closest identified Noise Sensitive Receptors (NSR) to the development have been identified as existing residential accommodation in the south western wing of Victoria Mill (NSR A). Residential houses are also located to the north of Lower Vickers Street approximately 50m north west of the site (NSR B). Locations are indicated in Figure 1.

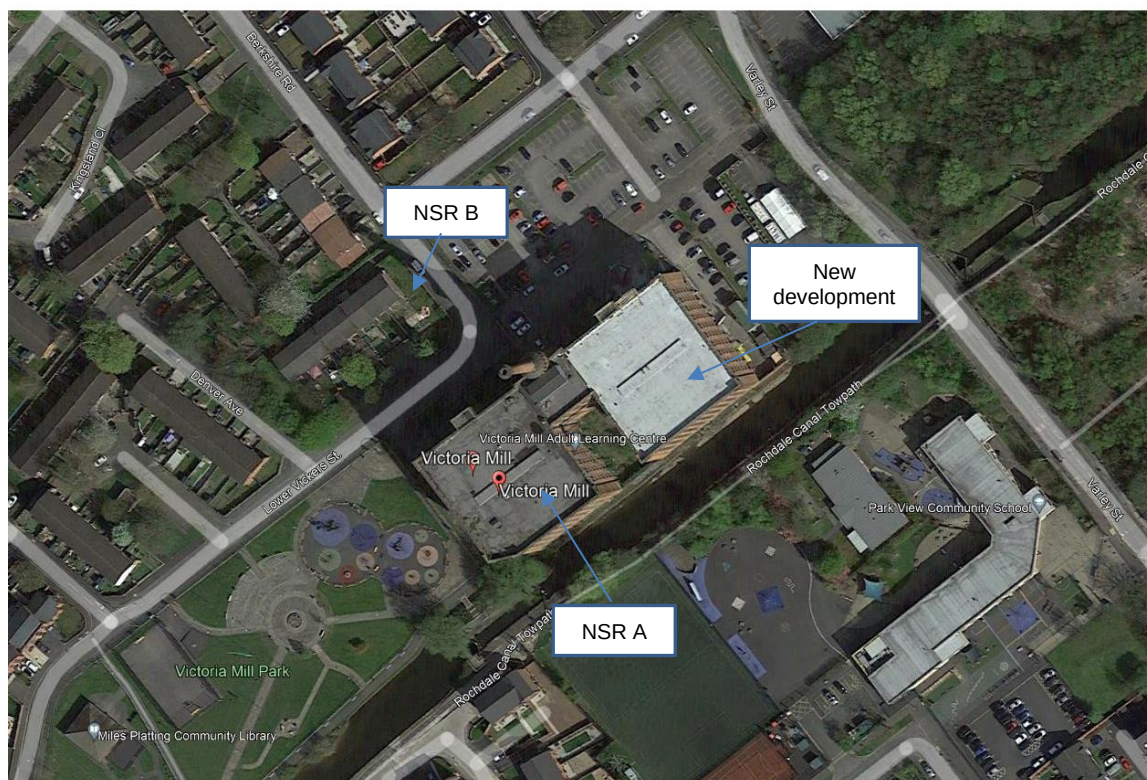


Figure 1: Site plan

Site Noise Survey

- 2.3 A site noise survey has been undertaken by a third party consultant ADC Acoustics and summarised in report 'Assessment of noise at the Victoria Mill Building, M40 7EL, for proposed residential development ref ARR/PPN/C/2671.04' dated October 2017. The report was submitted in support of the project planning application ref 114600/FO/2016 (reissued as 119321/JO/2018).
- 2.4 Stroma have not been appointed to undertake a further site noise survey, therefore all assessment and commentary relating to external noise levels is based solely on information provided within the ADC Acoustics report.

3. Noise Assessment Guidance and Criteria

Planning Requirements

- 3.1 Planning consent for the scheme is set out in planning decision note ref 119321/JO/2018 issued by Manchester City Council. Condition 13 relates to control of external building services plant noise.
- 3.2 SBE have liaised with Manchester City Council Environmental Health team to confirm the requirements and have received the following updated condition wording via email from Karen Williamson. The email correspondence is included as Appendix V.

“a) 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 rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location. Prior to commencement of the use hereby approved 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.

b) Prior to occupation of the development a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall also undertake post completion testing to confirm that the noise criteria have 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.”

- 3.3 Based on the control of plant noise requirements set out above and measured background noise survey data, total emission levels for plant noise, including acoustic feature corrections where applicable, should not exceed the maximum noise rating level values provided in Table 1.
- 3.4 Representative background sound levels have been identified from site noise survey data in accordance with BS 4142 guidance. A summary of the noise survey data is included in Appendix IV.

Table 1: Condition 13 Fixed building services plant noise limits

Assessment period	Representative background noise level (dB $L_{A90,T}$)	Maximum Rating Noise Level – assessed in line with BS 4142 (dB $L_{Ar,Tr}$)
Daytime (07:00-23:00)	45	40
Night-time (23:00-07:00)	37	32

BS 4142:2014 +A1:2019 ‘Methods for rating and assessing industrial and commercial sound’

- 3.5 BS 4142 describes a method for assessing the impact of noise from sources that are of an industrial nature (e.g. fans, pumps, chillers, air handling units etc.). The assessment methodology is based upon determining a ‘rating level’ for the equipment being assessed, which is the level of noise from the item or items of plant being assessed (measured as L_{Aeq}).
- 3.6 The rating level is then compared with the underlying background noise level (measured as L_{A90}) in the absence of noise from the item or items of plant being assessed.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
 - A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
 - The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
- 3.7 BS 4142 states that a penalty should be added for any plant which gives rise to noise features that may increase disturbance such as tonal, impulsive or intermittent characteristics. With respect to the acoustic feature correction, BS 4142 states:
- “Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level.”*
- 3.8 A rating penalty for a sound may be based on a subjective assessment of its characteristics or using objective methods to determine tonality.

4. Noise Impact Assessment

- 4.1 Fixed building services plant serving the scheme is summarised in Table 2. All plant is located at roof level.

Table 2: Building services plant summary

Reference	Type	Unit	Location
AHU-01	Air Handling Unit	D-AHU MODULAR_R	Roof
AC-UPS-01	Condenser	Daikin RZASG-MV1	Roof
AC-AHU-01	Condenser	Daikin ERQ-AV1	Roof
AC-AHU-02	Condenser	Daikin ERQ-AV1	Roof

- 4.2 Building services plant layouts are shown in Appendix II. Manufacturers noise data used to inform the assessment is included in Appendix III.
- 4.3 The assessment has considered the potential for all plant to operate simultaneously during daytime and night-time periods.
- 4.4 Acoustic losses due to ducting and ducting terminations have not been included; as such, the resultant noise levels on site are anticipated to be lower than calculated. Losses due to attenuators fitted to the AHU atmosphere side supply and exhaust have been included. Losses due to building geometry and screening have been included.
- 4.5 The results of the assessment are summarised in Table 3. Detailed calculations are provided in Appendix I.
- 4.6 Calculations have been undertaken to the most exposed noise sensitive receptor which has been identified as existing residential accommodation in the south western block of Victoria Mill. Calculations have considered the receptor to be the most noise exposed residential window.

Table 3: Noise impact assessment against planning limits

Period	Representative background noise level (dB $L_{A90,T}$)	Rating noise limit (dB $L_{A,r,T,r}$)	Calculated noise rating level $L_{A,r,T,r}$ (dB)	BS 4142 Assessment
Daytime (07:00 – 23:00)	45	≤ 40	32	Low Noise Impact
Night Time (23:00 – 07:00)	37	≤ 32	32	Low Noise Impact

- 4.7 Based on the type of plant equipment and manufacturer noise data provided it is not expected that there will be impulsive or tonal characteristics, or distinctive intermittency to the noise emitted. The predicted plant noise level is suitably below the background sound level such that it is expected to be generally inaudible meaning any acoustic features are unlikely to be audible; however a +2dB correction has been applied to account for the potential limited tonality in line with BS 4142 guidance.
- 4.8 The calculated building services plant noise rating level is 5 dB below the existing background sound level. BS 4142 states that is an indication of the specific sound source having a 'low impact'.

Estimate of Calculation Uncertainty

- 4.9 An assessment of uncertainty in measurement and calculation is undertaken following guidance in University of Salford document '*A good practice guide on the sources and magnitude of uncertainty arising in the practical measurement of environmental noise*' (2007).
- 4.10 Assessment is undertaken against site background sound level measurements. The uncertainty of noise survey measurements is expected to be ± 1 dB based on the allowable uncertainty for a calibrated Class 1 precision integrating sound level meter, quoted by BS 61672-1:2003 as ± 1.1 dB at 1kHz.
- 4.11 Sound data for plant equipment has been taken from manufacturer quoted noise. In accordance with BS EN ISO 3740:2001 the uncertainty of source measurement is expected to be between 1 dB and 2 dB in each octave band.
- 4.12 The uncertainty in a distance attenuation calculation over a distance of <100 m is quoted by ISO 9613-2:1996 as ± 1 dB for rooftop sources (>5 m) and ± 3 dB for sources <5 m from ground level.
- 4.13 It is therefore considered that the maximum uncertainty in measurement and calculation is ± 2 dB.
- 4.14 The calculated rating levels are at least 5 dB below the background sound level, therefore it is not expected that uncertainty in measurement or calculation will affect the outcome of the assessment.

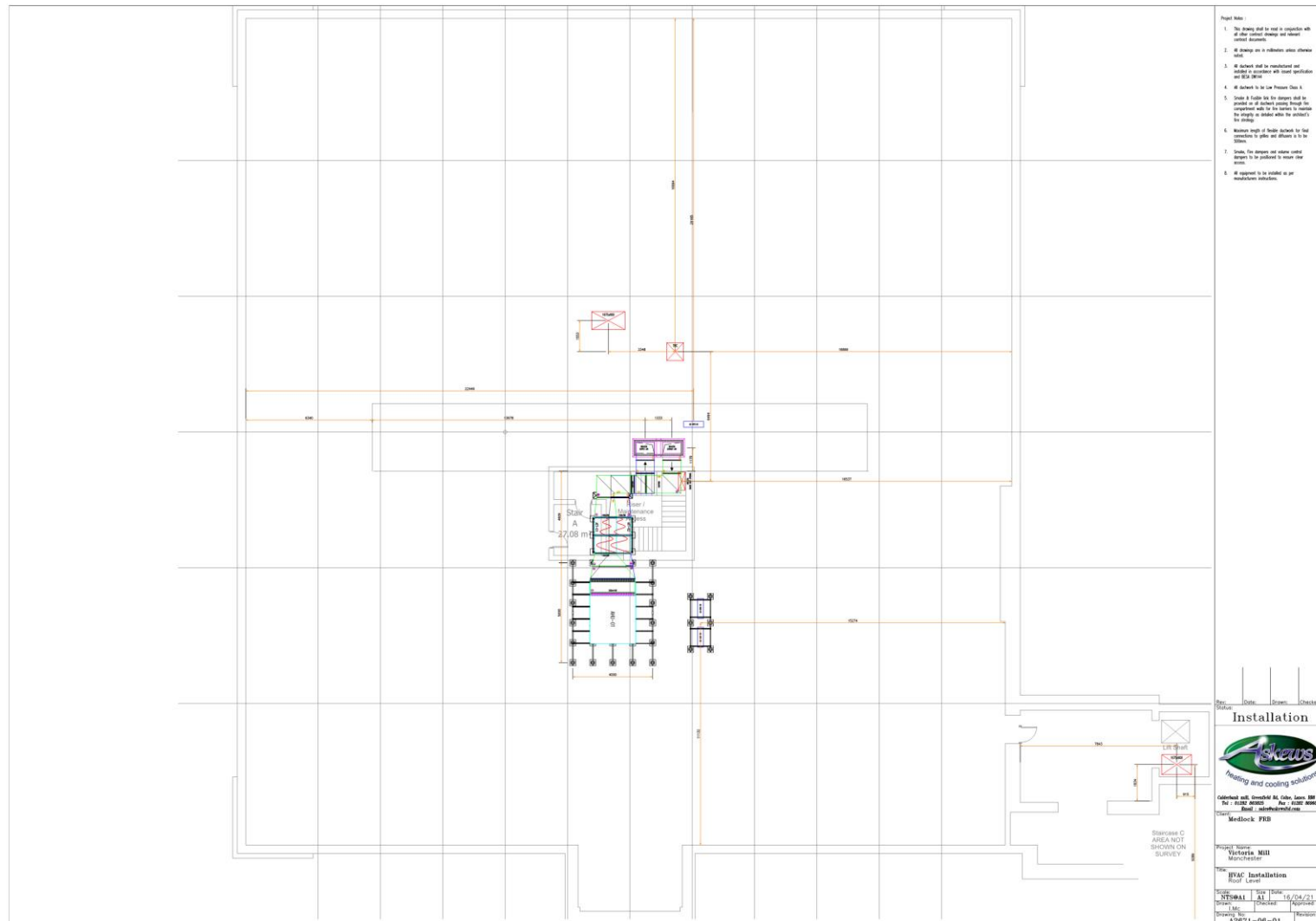
5. Conclusions

- 5.1 A plant noise impact assessment has been undertaken for external building services plant associated with the conversion of Victoria Mills, Lower Vickers Street, Manchester, from commercial to residential accommodation. The assessment considers the cumulative plant noise impact from equipment associated with the building.
- 5.2 The assessment indicates that the noise rating level of building services plant considered at the most exposed noise sensitive receptors will be at least 5 dB below the existing background sound level during daytime and night-time periods. BS 4142 states that is an indication of the specific sound source having a 'low impact'.
- 5.3 It is concluded that the plant noise rating level meets the project requirement set out in Planning Condition 13.
- 5.4 Uncertainty in measurement and calculation has been considered and is not expected to change the outcome of the assessment.

Appendix I. Noise Impact Assessment Calculation

Noise sensitive receptor (NSR)	Noise sources within plant area	Number of units	Minimum distance to NSR, m	Unit Sound power level, L_{WA} dB	Attenuator losses	Distance attenuation, dB	Correction for number of units, dB	Screening Correction	Directivity Correction	Sound pressure level at NSR, $L_{Aeq,T}$
Closest dwelling Victoria Mills	AHU 1 Intake	1	38	88	-10	-42		-6	-8	22
	AHU 1 Exhaust	1	38	90	-13	-42		-6	-8	21
	AHU Condenser	2	31	69		-38	+3	-7		27
	UPS AC	1	31	65		-38		-7		20
Total Specific sound pressure level at receptor, $L_{Aeq,T}$ dB										30
Correction for intermittency incorporated to result, dB										0
Correction for tonality incorporated to result, dB										+2
Calculated plant noise rating level, $L_{A,T}$ dB										32
Background Sound Level, $L_{A90,T}$ dB										37
Difference, dB										-5
BS 4142 Assessment										Low Impact

Appendix II. Mechanical Services Layouts



Appendix III. Mechanical Services Noise Data

AHU 01



Project Unit
victoria mill manchester
AHU1

Technical Report
ASTRAWEB 10.1.4.1
Material Name

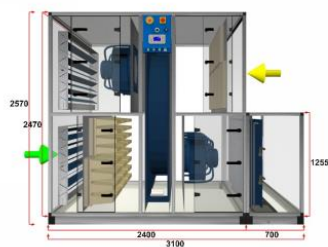
17/05/2021 - 642
Ref. 834143/Rev. 01
ADT10FCD1



Technical Report • 17/05/2021 • ASTRAWEB 10.1.4.1 • Material Name:ADT10FCD1 • Ref. 834143/Rev. 01



Sound Report



Unit Data

Range / Series	D-AHU MODULAR_R
Model	SIZE 10
Panel • Insulation	42 mm • Foam
Model Box Ref.	Energy Thermic® F2
Panel Inner Skin	Aluzinc 0.5 mm
Panel Outer Skin	Precoated 0.7 mm
Profile	Aluminium Anodized Thermal Break

Supply Sound Power (dB)	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	AVG dB (A)
Fan Inlet	85	99	90	81	78	77	79	69	88
Fan Outlet	87	98	89	87	84	83	82	74	91
Unit Inlet	85	96	86	77	72	70	68	58	83
Unit Outlet	87	93	84	82	78	75	70	62	85
Airborne	73	86	73	69	66	63	62	40	74
Pressure (1m) *	62	75	62	58	55	52	51	29	63

* Simple source in free field, spherical propagation

Return Sound Power (dB)	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	AVG dB (A)
Fan Inlet	84	99	88	80	77	75	76	67	87
Fan Outlet	85	98	88	86	83	82	79	72	90
Unit Inlet	84	98	87	79	74	71	68	59	85
Unit Outlet	85	98	88	86	83	82	79	72	90
Airborne	71	86	72	68	65	62	59	38	73
Pressure (1m) *	60	75	61	57	54	51	48	27	62

* Simple source in free field, spherical propagation

Attenuators

Attenuator Schedule

Notes

- All attenuators shall be supplied by Caice or equal and approved.
- The Contractor shall order the attenuators scheduled below, and shall send finalised drawings and equipment noise levels to the attenuator supplier to check the selections prior to manufacture.
- The attenuator supplier shall then undertake acoustic calculations to ensure that the attenuators achieve the specified noise criteria, based upon the finalised information.
- A Technical Submittal comprising acoustic calculations and a finalised schedule of attenuators shall then be issued to the Consultant for final approval.
- If an alternative attenuator supplier is proposed then the Contractor shall allow for them to undertake witnessed tests to prove their claimed insertion loss performance in a UKAS accredited BS EN ISO 7235: 2009 test facility, for two sample units. This shall be undertaken prior to order.
- Pressure losses are stated in accordance with ISO 7235, which is based on laminar airflow conditions. The system designer shall make allowance for increased attenuator pressure losses where turbulent airflow conditions exist on the attenuator entry or exit.
- Unless stated otherwise all attenuators shall be constructed as follows: Galvanised sheet steel casings with 30mm profile flanges that are fully compliant with DW/TM1 at a high pressure rating (+2000/-750Pa). Profile flanges shall be compatible with Doby, Mez & Metu flanging systems. Elements shall be installed in the vertical plane, with side elements provided as standard, and all elements shall have aerodynamic inlet and outlet fairings. Element facings shall be constructed from expanded galvanised steel mesh with fibre glass tissue bonded to the inner face. Mineral wool infill shall be overpacked to minimise voids due to settlement. Attenuator ends shall be protectively wrapped, and all attenuators shall be delivered to site on pallets and individually labelled.

Ref.	Description	Type and Model Code	Dimensions (mm)			Insertion Loss (dB)								Vol (m³/s)	PL (Pa)	Qty	Noise Criteria	Features
			W	H	L	63	125	250	500	1k	2k	4k	8k					
ATT03	AHU FAI Atmosphere side	Rectangular SG01V/3C/L/S	1200	1000	600	4	7	13	19	15	11	9	6	2.75	14	1	40dB(A) at 35m	
ATT04	AHU EXHAUST Atmosphere side	Rectangular SG01V/3C/L/S	1200	1000	900	6	9	17	26	20	13	10	7	2.83	17	1	40dB(A) at 35m	

AC-AHU-01



Condensing units for air handling applications (pair) • ERQ-AV1

2 Specifications

1 - 1 ERQ-AV1

VIC MILL - MAIN AHU

Technical specifications				ERQ100AV1	ERQ125AV1	ERQ140AV1
Cooling capacity	Nom.		kW	11.2 (1)	14.0 (1)	15.5 (1)
Heating capacity	Nom.		kW	12.5 (2)	16.0 (2)	18.0 (2)
Capacity range			HP	4	5	6
Power input	Cooling	Nom.	kW	2.81 (1)	3.51 (1)	4.53 (1)
	Heating	Nom.	kW	2.74 (2)	3.86 (2)	4.57 (2)
EER				3.99 (1)		
COP				4.56 (2)	4.15 (2)	3.94 (2)
PED	Category				Category I	
Dimensions	Unit	Height	mm		1,345	
		Width	mm		900	
		Depth	mm		320	
	Packed unit	Height	mm		1,524	
		Width	mm		980	
		Depth	mm		420	
Weight	Unit		kg		120	
	Packed unit		kg		130	
Packing	Material				Carton / EPS / Wood	
	Weight		kg		8	
Casing	Colour				Daikin White	
	Material				Painted galvanized steel plate	
Heat exchanger	Length		mm		857	
	Rows	Quantity			2	
	Fin pitch		mm		2	
	Passes	Quantity			10	
	Face area		m ²		1,131	
	Stages	Quantity			60	
	Tube type				ø8 Hi-XSS	
	Fin	Type			Non-symmetric waffle louver	
		Treatment			Corrosion resistant	
		Discharge direction			Propeller fan	
Fan	Quantity				2	
	Air flow rate	Cooling	Nom.	m ³ /min	106	
		Heating	Nom.	m ³ /min		105
	Quantity				2	
Fan motor	Model				Brushless DC motor	
	Output		W		70.00	
	Drive				Direct drive	
	Speed	Cooling	Nom.	rpm	850	
Fan motor 2		Heating	Nom.	rpm		840
	Speed	Cooling	Nom.	rpm	820	
		Heating	Nom.	rpm		805
	Speed	Heating	Nom.	rpm	785	
Compressor	Quantity				1	
	Model				JT100G-VOL	
	Type				Hermetically sealed scroll compressor	
	Speed		rpm		6,480	
	Output		W	2,500	3,000	3,500
	Starting method				Direct on line	
Operation range	Crankcase heater	W			33	
					-5	
	Cooling	Min.	°CDB		46	
		Max.	°CDB		-20	
	Heating	Min.	°CWB		15.5	
		Max.	°CWB		10	
	Oil temperature	Heating	Min.	°CDB	35	
		Cooling	Max.	°CDB		
Sound power level	Cooling	Nom.	dBA	66	67	69
	Heating	Nom.	dBA	50	51	53
	Heating	Nom.	dBA	52	53	55
Refrigerant	Type				R-410A	
	Charge		kg		4.0	
	Charge		TCO2Eq		8.4	
	GWP				2,087.5	
	Control				Expansion valve (electronic type)	
	Circuits	Quantity			1	

AC-UPS-01



Sky Air Advance-series • RZASG-MV1

2 Specifications

1 - 1 RZASG-MV1

VIC MILL - UPS AC

Technical Specifications				RZASG71MV1	RZASG100MV1	RZASG125MV1	RZASG140MV1
Casing	Colour						
	Material						
Dimensions	Unit	Height	mm	770		990	
		Width	mm	900		940	
		Depth	mm		320		
	Packed unit	Height	mm	900		1,170	
		Width	mm	980		1,015	
		Depth	mm	420		422	
Weight	Unit		kg	60	70		78
	Packed unit		kg	64	78	79	87
Packing	Weight		kg	4		9	
	Fin	Type			WF fin		
Fan		Treatment			Anti-corrosion treatment (PE)		
	Type				Propeller		
	Discharge direction				Horizontal		
	Quantity				1		
	Air flow rate	Cooling	Nom.	m ³ /min	56	69	71
		Heating	Nom.	m ³ /min	50		82
Fan motor	Quantity				1	55 (1)	
	Model				Brushless DC motor		
	Output		W	94		200	
	Drive				Direct drive		
Compressor	Quantity				1		
	Type				Hermetically sealed swing compressor		
Operation range	Cooling	Ambient	Min.	°CDB	-15		
			Max.	°CDB	46		
	Heating	Ambient	Min.	°CWB	-15		
			Max.	°CWB	15.5		
	Sound power level	Cooling	dBA	65	70	71	73
		Heating	dBA			71 (1)	73 (1)
Sound pressure level	Cooling	Nom.	dBA	46		53	
	Heating	Nom.	dBA	47		57	
	Refrigerant	Type			R-32		
	Charge		kg	2.45	2.60		2.90
	Charge		TCO2Eq	1.65	1.76		1.96

Appendix IV. ADC Acoustics Noise Survey

5.0 SURVEY DETAILS

5.1 Site Times and Personnel

The measurements were carried out by Mark Pickering of ADC Acoustics.

Daytime measurements were carried out on 23rd October 2017 between approximately 16:00 hours and 18:00 hours to represent rush hour and

between 2300 hours and 0100 hours, representing what was likely to be a noisier time of night.

5.2 Instrumentation

Instrumentation used was a Rion N28. This is a precision grade sound level meter which holds a current calibration certificate and which was field-calibrated before and after the measurements with no drift noted. The meter was set up to measure consecutive 5 minute samples in terms of dB L_{eq}, dB L_{max} and dB L₉₀ in overall A-weighted terms, and in octave bands across the frequency range. See Definition of Acoustic Terms in Appendix 1.

5.3 Measurement Positions

The main measurement positions were as shown on the following plan.



The microphone was 1.5 m above ground and well away from other reflecting surfaces.

5.4 Survey Conditions

We have no reason to believe that the conditions we found on the survey were anything other than representative of normal conditions.

Weather conditions were as follows :-

Rain	:	none, dry roads
Cloud	:	100%
Temperature	:	13 to 16 Celsius
Wind	:	negligible

6.0 **RESULTS AND DISCUSSIONS**

The area is not particularly noisy with predominantly middle-distance traffic noise and no significant local sources.

6.1 **Basic Results**

Full details are given in Appendix 2. A summary is as follows:-

Time	Position	Index	dB(A)
Overall Rush Hour	1	Leq	53
		Lmax	75
		L90	48
	2	Leq	51
		Lmax	68
		L90	47
Overall Early Night	1	Leq	44
		Lmax	60
		L90	39
	2	Leq	42
		Lmax	57
		L90	38

Night Time Measurements

Position	Time	Index	dB(A)	63	125	250	500	1k	2k	4k	8k
1	23:00	Leg	48	58	53	48	46	44	37	29	22
		Lmax	66	73	66	61	63	63	54	49	43
		L90	40	52	47	42	36	36	28	22	16
	23:05	Leg	46	53	48	44	45	43	36	25	17
		Lmax	61	60	56	52	61	58	49	38	29
		L90	40	51	46	42	36	36	28	21	15
	23:10	Leg	43	54	49	45	38	39	32	23	16
		Lmax	53	63	62	53	47	49	44	30	21
		L90	40	51	45	42	35	36	28	21	15
	00:01	Leg	41	53	47	43	36	37	30	23	16
		Lmax	55	72	64	57	49	48	45	39	35
		L90	38	50	44	40	34	34	27	21	15
	00:06	Leg	43	54	47	44	38	39	33	25	20
		Lmax	57	73	65	58	50	49	47	44	41
		L90	39	49	44	40	34	35	27	21	15
	00:11	Leg	42	53	47	43	38	38	32	25	18
		Lmax	53	63	56	54	50	50	42	37	34
		L90	39	49	44	40	34	35	27	21	15
	00:32	Leg	41	52	47	43	37	37	30	23	16
		Lmax	57	74	66	60	52	52	42	40	34
		L90	38	49	43	40	33	33	26	21	15
	00:37	Leg	40	54	46	42	36	36	29	22	15
		Lmax	54	71	57	56	48	50	41	32	28
		L90	37	48	43	39	33	33	25	21	14
	00:42	Leg	44	52	48	45	42	40	34	27	20
		Lmax	64	62	63	60	60	59	58	49	39
		L90	37	49	44	40	33	33	26	21	15
2	23:40	Leg	44	56	49	45	39	39	34	25	19
		Lmax	58	71	63	57	53	54	48	44	39
		L90	39	50	45	41	34	35	28	21	15
	23:45	Leg	43	56	49	44	38	39	33	26	20
		Lmax	55	67	58	54	49	52	46	42	40
		L90	39	51	45	41	34	34	27	22	15
	23:50	Leg	45	58	49	47	42	40	33	24	16
		Lmax	63	74	67	66	64	53	44	37	30
		L90	39	51	45	40	33	35	28	21	15
	23:55	Leg	42	53	47	44	38	38	32	27	22
		Lmax	55	68	63	54	46	48	46	48	39
		L90	38	50	45	40	34	34	27	19	14
	00:16	Leg	41	51	46	42	36	37	30	23	17
		Lmax	55	72	64	57	49	49	41	40	37
		L90	38	48	43	40	33	33	26	21	15
	00:21	Leg	44	54	57	43	37	38	32	23	16
		Lmax	57	66	72	53	49	50	42	32	23
		L90	38	49	44	40	33	33	26	21	15
	00:26	Leg	42	53	46	43	37	38	31	23	16
		Lmax	53	62	55	53	52	48	42	33	29
		L90	38	49	44	40	33	34	26	21	15
	00:47	Leg	40	52	46	41	35	36	30	23	16
		Lmax	56	72	64	56	48	52	43	39	33
		L90	37	48	43	39	32	32	26	21	15
	00:52	Leg	39	52	45	41	35	35	28	22	15
		Lmax	51	63	53	51	49	48	39	32	30
		L90	36	49	43	38	32	32	25	21	15
	00:57	Leg	39	52	46	41	34	34	28	21	15
		Lmax	49	59	56	49	43	45	39	28	19
		L90	37	49	43	39	32	32	25	21	15

Daytime Measurements

Position	Time	Index	dB(A)	63	125	250	500	1k	2k	4k	8k
1	16:01	Leq	50	60	55	51	46	45	41	37	32
		Lmax	63	73	70	64	59	56	53	50	49
		L90	46	56	51	46	41	41	36	30	23
	16:06	Leq	54	62	56	52	48	47	43	48	43
		Lmax	70	79	68	67	61	61	57	66	61
		L90	47	56	52	48	43	42	37	32	25
	16:11	Leq	57	61	57	55	58	50	45	40	35
		Lmax	81	74	76	75	83	72	68	61	61
		L90	46	56	52	47	43	41	36	31	23
	16:56	Leq	51	60	53	47	46	48	44	39	32
		Lmax	68	68	63	62	61	66	60	54	48
		L90	48	58	51	44	43	45	39	33	29
	17:01	Leq	54	61	53	47	46	50	50	40	31
		Lmax	80	73	65	59	59	72	78	58	48
		L90	48	58	51	45	43	45	39	33	29
	17:06	Leq	51	62	55	48	46	48	43	38	31
		Lmax	66	74	64	62	57	60	59	61	54
		L90	49	59	52	45	43	46	39	34	29
	17:29	Leq	51	61	55	49	46	47	42	37	30
		Lmax	67	68	63	61	56	58	63	60	51
		L90	48	59	52	46	43	45	38	33	29
	17:34	Leq	53	63	55	49	46	50	45	40	32
		Lmax	71	75	66	62	61	69	63	63	57
		L90	48	59	52	46	43	45	38	33	29
	17:39	Leq	52	62	55	49	47	49	45	38	31
		Lmax	71	69	65	67	61	66	66	60	43
		L90	48	60	52	46	44	45	38	33	29
2	16:17	Leq	52	61	59	50	47	47	43	38	30
		Lmax	69	69	81	66	69	60	56	52	49
		L90	48	59	52	46	43	45	38	33	28
	16:22	Leq	50	62	55	48	48	46	40	35	29
		Lmax	60	71	64	56	58	55	51	49	44
		L90	48	59	53	46	44	44	38	33	28
	16:27	Leq	50	62	55	48	47	46	41	35	29
		Lmax	65	78	66	61	65	57	56	47	41
		L90	48	59	53	46	44	45	38	33	28
	17:13	Leq	52	63	60	52	48	47	44	41	33
		Lmax	66	81	70	69	62	59	57	55	47
		L90	47	58	51	48	42	42	37	29	19
	17:18	Leq	48	60	53	49	44	44	39	32	25
		Lmax	59	68	63	57	53	53	50	51	42
		L90	44	56	50	46	40	40	34	24	16
	17:23	Leq	49	62	55	50	44	44	38	29	25
		Lmax	59	72	65	57	52	51	45	44	55
		L90	45	57	50	47	40	41	35	24	15
	17:46	Leq	51	61	57	51	48	47	42	37	29
		Lmax	67	76	77	62	61	61	57	55	47
		L90	46	57	51	47	41	41	35	28	19
	17:51	Leq	52	62	59	52	48	47	42	39	33
		Lmax	73	79	68	63	62	68	67	66	60
		L90	46	57	51	47	42	42	35	26	19
	17:56	Leq	51	61	58	54	48	45	40	34	28
		Lmax	70	71	74	69	72	55	51	54	55
		L90	46	56	52	47	42	41	36	27	20

Appendix V. Correspondence with MCC

Tom Chaffer

From: Karen Williamson <karen.williamson@manchester.gov.uk>
Sent: 20 September 2021 14:51
To: Tom Chaffer
Subject: RE: Victoria Mill - Planning Condition 13

Hi Tom

The methodology is acceptable. The condition should read:

a) 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 rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location. Prior to commencement of the use hereby approved 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.

b) Prior to occupation of the development a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall also undertake post completion testing to confirm that the noise criteria have 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.

Thanks
Karen

From: Tom Chaffer <Tom.Chaffer@stroma.com>
Sent: 10 September 2021 13:13
To: Laura Miller <laura.miller@manchester.gov.uk>
Cc: Don Murphy <don@paulbutlerassociates.co.uk>; Peter Graves <petergraves@medlockfrb.com>
Subject: Victoria Mill - Planning Condition 13

Good afternoon Laura,

I've been passed your details by my client in relation to the Victoria Mills development (application 119321/JO/2018)

I have been instructed to undertake a noise impact assessment in relation to the requirements of condition 13 below.

13) Before first occupation of the development, any externally mounted ancillary equipment, shall be acoustically insulated in accordance with a scheme 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 condition does not provide any targets for external noise due to external plant equipment, therefore I am proposing to undertake a noise assessment in line with British Standard 4142 2014 'Methods for rating and assessing

industrial and commercial sound' (BS 4142) to demonstrate that noise does not exceed 5 dB below the representative predevelopment background sound levels. This relates to a BS 4142 assessment of 'low noise impact'. I believe this noise level is in line with MCC policy.

The background sound levels will be taken from the attached ADC noise survey report which was submitted with the original planning application.

I would be grateful if you could confirm acceptance of the above approach, or let me know any comments.

Kind regards

Tom

Tom Chaffer MSc MIOA
Principal Acoustic Consultant
T: 0114 228 3303
M: 07943 805 629
E: tom.chaffer@stroma.com



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Appendix VI. Acoustic Glossary

Sound pressure level and the decibel, dB

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. The decibel is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Frequency and hertz, Hz

Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz. The human range of hearing is commonly accepted to be 20 Hz to 20,000 Hz. Additionally, an octave can be used to describe the interval between a frequency in Hz and either half or double that frequency.

Frequency weighting

Different weighting networks can be applied to a given sound level in each stated octave band by a specified amount, in order to better represent the response of the human ear. The most commonly used weighting network is the 'A' weighting, and the letter 'A' will be included within a descriptor to indicate that the value has been 'A' weighted, e.g. $L_{Aeq,T}$ or L_{A90} . An 'A' weighted noise level may also be written as dB(A). Other weightings less commonly used are 'C' and 'D' weighting.

Noise indices

When a noise level varies with time, the measured 'A' weighted dB level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple 'A' weighted dB value. In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The various indices used are described as below:

$L_{Aeq,T}$	The 'A' weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period, T
L_{Amax}	The maximum 'A' weighted noise level that was recorded during the monitoring period.
L_{A10}	The 'A' weighted noise level that was recorded for at least 10% of the monitoring period.
L_{A90}	The 'A' weighted noise level that was recorded for at least 90% of the monitoring period, usually taken as the underlying 'background' noise level.

Sound level difference, D

The sound level difference between two internal spaces, or between internal and external spaces. The ' D ' value is used to denote the differences at each third octave or octave band, with a single figure 'weighted' value to

describe an overall performance. Note that the 'D' value will always describe an in-situ or on-site acoustic performance. All values are described using the decibel.

D_w	Single figure weighted sound level difference, simply the measured source noise level minus receiver noise level, not adjusted to reference conditions
$D_{nT,w}$	Weighted normalised sound level difference – a single, weighted sound insulation value, normalised to a reference reverberation time using the measured reverberation time in the receive room
$D_{nT,w} + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise
$D_{nf,w}$	Overall flanking normalised level difference - A parameter that defines the flanking transmission of sound from room to room where a dividing partition or floor construction abuts a flanking building element common to both rooms, such as the building façade or ceiling

Sound reduction index, R

This describes the sound transmitted through a material or building element, such as a wall, door or window. It is measured in a laboratory with suppressed flanking transmission. The 'R' value is used to denote the differences at each third octave or octave band, with a single figure 'weighted' value to describe an overall performance. All values are described using the decibel.

R_w	Weighted single figure sound reduction index
$R_w + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise
R'_w	The 'apparent sound reduction index', a field measurement to obtain the sound reduction index of a material or element, with all effects of site installation accepted.

Noise rating, NR

The noise rating or NR system is commonly used in the design of noise emitted by internal building services systems. The system is frequency dependent, and was empirically derived to prevent disturbance to occupants in habitable or working areas from building services noise that exhibits 'tonal' elements, e.g. rumbles, whines, whistles etc. There is no direct relationship between the average 'A' weighted noise level in dB and the NR. However, as a guide, and assuming the absence of strong low frequency content in a given noise, the NR could generally be said to be 6 dB less than the average 'A' weighted dB value.

Appendix VII. SBE Acoustic Credentials

SBE have specialised in providing the UK Construction Industry with a range of acoustics services since 2006. Specialising in Building Acoustics, all SBE acousticians are members of the Institute of Acoustics.

SBE has been accredited for on-site acoustic testing by United Kingdom Accreditation Service (UKAS) since 2006 (Testing Laboratory Number 2587).

SBE meet the relevant acoustic requirements typically required in the UK, including for sound insulation testing as defined in Approved Document E for the purposes of testing for Part E to the Building Regulations 2010.

This report has been prepared by Tom Chaffer, Principal Acoustic Consultant who meets the BREEAM requirements for a suitably qualified acoustician (SQA) as follows;

1. Holds an MSc degree in Audio Acoustics from the University of Salford
2. Has been an Acoustic Consultant for more than three year's (within the last five years). This experience includes a practical understanding of factors affecting acoustics in relation to construction and the built environment; including, acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures.
3. Holds Membership of the Institute of Acoustics - MIOA membership.

This report has been read and reviewed by Tom Chaffer and has been found to;

1. Represent sound industry practice
2. Be appropriate given the building being assessed and scope of works proposed
3. Avoid invalid, biased and exaggerated recommendations.

Appendix VIII. Report Conditions

This document has been prepared for the sole use, benefit and information of the Client. The liability of Stroma Built Environment Ltd. in respect of the information contained herein will not extend to any third party unless prior agreement is obtained in writing from Stroma Built Environment Ltd.

This report is limited to addressing the specific acoustic issues contained herein. Advice has been provided for acoustic reasons only and it is recommended that appropriate expert advice be sought on all the ramifications, e.g. safety, fire, structural, CDM etc., associated with any proposals contained herein.

The in-situ performance of acoustic measures is influenced to a large extent by the quality of workmanship and compliance with the specifications on-site during construction, as such, Stroma Built Environment Ltd. accepts no liability for issues with acoustic performance arising from such factors.

Acoustic survey and testing work carried out for the project is representative of the prevailing conditions at the time of the work. Conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

In particular, it should be noted that where calculations are carried out that are based on assumptions regarding certain aspects where information has not been supplied, these are provided for indicative purposes only and should be treated as such.