

Papa John's Havant

Plant Noise Assessment

Report 18/0273/R1

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Report 18/0273/R1

Papa John's UK

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0	1 st Issue	2 July 2018	Jo Lacy	Matthew Heyes

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Plant Noise Assessment

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18/0273/SP1

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18/0273/SPC2

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Proposed Plan and Elevations at 2-4 Park Parade, Havant

 End of Section



Plant Noise Assessment

1 Introduction

- 1.1 Planning permission is being sought for the conversion of 2-4 Park Parade, Havant from A2 to A5 use (hot food takeaway). As part of the development, new mechanical services plant will be introduced on site.
- 1.2 Cole Jarman have been instructed to complete a noise survey and plant noise assessment to demonstrate that the requirements of the Local Planning Authority can be met.
- 1.3 This report documents the methodology used to conduct a noise survey and the calculation of noise emissions from the proposed plant to noise sensitive locations, in line with the requirements of the council. Mitigation measures are provided, where necessary and practicable, in order to meet the requirements of the planning authority.

2 Site Description

- 2.1 This site is on the ground floor of a mixed use building, where the ground floor consists of retail and the upper floors are residential. This site has been used previously as a bank, with residential on the floors above as part of a large terrace.
- 2.2 It is proposed that a Cold Store Condenser be mounted on the West elevation of the rear of the building at approximately 2m above local ground level with an acoustic roof. An extract duct is to penetrate the Western façade of the rear of the building and pass along the wall below an existing duct for the next-door unit, and then rising up the side of the building to vent at high level above the eaves.
- 2.3 To the East lie car parks for local retail units, with residential beyond. To the West and South are mixed use terraces forming part of a pedestrianised zone with ground-floor retail units and upper floor residences. To the North is the rear of another terrace of retail units on the ground floor with residences on the upper floors.
- 2.4 The site and surrounding area can be seen on the attached site plan 18/0273/SP1.

3 Guidance

- 3.1 Mark Moss, Regulatory Officer in the Environmental Health department at Havant Borough Council gave the following guidance after discussion of the area and the noise survey results:

"We would expect BS 4142:2014 to be employed to ensure no adverse impact on nearby residential occupants of new & existing flats. We would normally condition to BS8233:2014 for new build residential developments.

In this instance we would expect to see NOAEL achieved or not exceeding existing background levels."



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- 3.2 Where background sound levels and rating levels are low, BS4142:2014 states that absolute levels can be more relevant than a margin compared to the existing level. The 2014 edition of the standard doesn't provide any guidance on what noise levels would be considered low, however the previous edition of the standard stated that background levels below 30 dBA and rating levels below 35 dBA are considered 'very low'. For this reason, it was agreed with Mark Moss that a rating level of 30 dB be taken as a lower limit for design criterion.

4 Environmental Noise Survey

4.1 Methodology and Instrumentation

- 4.1.1 An attended noise survey was undertaken at the site between 22:00 on 6th June and 01:45 on 7th June 2018.
- 4.1.2 Measurements of the background noise levels were taken in a free-field position in the car park to the rear of the property, approximately 1.5m above the local ground floor level. The measurement position is indicated as MP1 on the attached site plan 18/0273/SP1.
- 4.1.3 This position was selected to quantify the background noise levels representative of those at the nearest noise sensitive receptors to the proposed items of mechanical services plant.
- 4.1.4 Measurements of the L_{Aeq} , L_{Amax} , and L_{A90} indices were recorded over consecutive 15 minute periods for the duration of the survey using the equipment listed within T1 below (see attached Glossary of Acoustic Terms for an explanation of the noise units used).

Item	Manufacturer	Type
Sound Level Analyser	Norsonic	118
Acoustic Calibrator	Norsonic	1251
Weatherproof windshield	Norsonic	1212

T1 Equipment used during attended noise survey.

- 4.1.5 The microphone was fitted within a weatherproof enclosure, and the sound level meter was calibrated before and after the survey period in order to confirm an acceptable level of accuracy. No significant drift was noted to have occurred.
- 4.1.6 The weather conditions during the course of the attended survey were clear and cool with dry roads and a slight breeze. These conditions are deemed acceptable and are not considered to have affected measurement results.



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4.2 Results

- 4.2.1 The results of the noise measurements are presented in the attached time history figure 18/0273/TH01.
- 4.2.2 The noise climate to the rear of the building was observed to consist primarily of mechanical services noise from mechanical services located within the existing retail units to the North of the site. Intermittent traffic activity along Somborne Drive and Bordon Road led to elevated noise levels when present. Infrequent aircraft flyovers were also noted.
- 4.2.3 The minimum measured background noise levels can be seen in T2 below.

Location	Minimum Background Noise Level, dB(A)	
	Daytime (0700-2300 only)	Night time (24-hour)
MP1	31	28

T2 Measured minimum background noise levels, $L_{A90,15min}$

5 Plant Noise Limits

- 5.1 Mark Moss, an Environmental Health Officer at the Havant Borough Council gave the guidance outlined in section **Error! Reference source not found..** Using his guidance and the results of the undertaken noise survey, the following noise emission limits have been defined:

Location	Noise Emission Limit, dB	
	Daytime (0700-2300 only)	Night time (24-hour)
All nearby sensitive receptor locations	31	30

T3 Plant noise emission limits at the sensitive receptors

- 5.2 These noise limits are to apply 1m from the windows of the receiver locations. Any plant with tonal, impulsive or intermittent components would be subject to a further penalty in line with BS4142:2014.



Plant Noise Assessment

6 Plant Noise Assessment

6.1 Proposed Installation

6.1.1 The proposed plant items to be installed with external noise emissions are as follows:

- Cold Store Condenser: Karbox 2464
- Extract Fan: Vent Axia TP500

6.1.2 The cold store condenser is proposed to be mounted on the West exposure of the rear of the building below the existing extract ducting from 6 Park Parade and the proposed new extract ducting. The new extract ducting will pierce the West exposure of the rear of the building below the existing extract duct, run North to the rear of the building and then up to the roof where it will terminate at 1m above the roof line.

6.1.3 Noise from the proposed plant has been assessed to the four most noise sensitive windows detailed below and shown on site plan 18/0273/SP1:

- AP1 – Nearest residential window to South with a line-of-sight to equipment
- AP2 – Nearest residential window to North with a line-of-sight to equipment
- AP3 – New residential window in first floor flat above property
- AP4 - New residential window on top floor overlooking condenser location

6.1.4 The noise data from the proposed plant items has been provided by the manufactures and is shown in the attached plant noise schedule 18/0273/PNS1.

6.1.5 The intake air supply is a passive system, and so does not explicitly include a fan or silencer in its design, therefore it is not considered in our calculations.

6.2 Mitigation Measures

6.2.1 Details of mitigation measures being installed have been provided by Papa John's and assessed to determine compliance with the noise emission limits set out in table T3 above.

6.2.2 An atmospheric-side silencer is proposed within the extract fan ducting. The attenuator specified has the insertion losses in each octave band as defined in table T4.

Silencer	Insertion Loss (dB) at							
	Octave Band Centred Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Extract Fan	10	21	41	48	50	45	29	17

T4 Attenuator insertion losses (Atmospheric Side)



Plant Noise Assessment

- 6.2.3 We would expect the insertion losses required for the extract fan to be achievable with a Melinex faced silencer of 2400mm with a 38% free area. Any pressure drops from the attenuator or the atmospheric duct termination grilles will be limited to 40Pa.
- 6.2.4 The silencer will be located within the hot food takeaway demise, close to the fan so that noise breakout from the duct is also attenuated.
- 6.2.5 The fan will be mounted on anti-vibration mounts and will have flexible ductwork connections to control structure-borne sound transmission. The fresh air intake and extract air discharge louvres will be sized at a face velocity of not more than 2m/s.
- 6.2.6 The cold room condenser is mounted on the West exposure of the rear of the building at high ground floor level, below the extract condenser ducting. The condenser will have a small roof over the unit which overhangs the front of the unit by 0.2m and wraps around the side of the unit. This is shown in the attached Appendix A.
- 6.2.7 The roof will be no more than 0.5m above the unit and be constructed out of an imperforate material with a minimum surface density of 10kg/m², achievable with timber or metal as required. The inner faces of the roof will be lined with 25mm thick mineral wool or Rockwool to provide the acoustic absorption. Full details are provided in the attached specification 18/0273/SPC2.

6.3 Assessment Results

- 6.3.1 All plant items are required to be operational during opening hours, while only the cold room condenser is required when the store is closed. Therefore, both the day time (opening hours) and night time (closed hours) have been taken into consideration.
- 6.3.2 With the provided mitigation measures in place, we have assessed the following noise levels at each respective assessment position:



Plant Noise Assessment

Location	Rating Noise Level, dB(A) <i>(Limit)</i>	
	Daytime (0700-2300 only)	Night time (2300-0700)
AP1 – Nearest residential window to South with a line-of-sight to equipment	24 (31)	22 (30)
AP2 – Nearest residential window to North with a line-of-sight to equipment	29 (31)	29 (30)
AP3 – New residential window in first floor flat above property	25 (31)	24 (30)
AP4 - New residential window on top floor overlooking condenser location	31 (31)	30 (30)

T5 Plant Noise Emission Levels at the Nearest Residential Properties

- 6.3.3 The results of these calculations can be found in the attached calculation sheets 18/0273/CS1-CS20.
- 6.3.4 Following the assessment, no further mitigation measures or alteration to the proposed mitigation measures are required.

7 Conclusion

- 7.1 It is proposed than an existing property at 2-4 Park Parade, Havant be converted for use as a hot food takeaway. As part of this use, new mechanical services plant will be introduced on site.
- 7.2 This report has provided details of a noise survey conducted at the site and has set noise limits for the proposed plant items in line with the guidance provided by the Havant Borough Council.
- 7.3 A noise impact assessment has been conducted of noise from the proposed plant items. The assessment has shown that with the proposed mitigation measures in place, the plant noise limits will be achieved.

■ End of Section



Plant Noise Assessment

Glossary of Acoustic Terms

L_{Aeq} :

The notional steady sound level (in dB) which over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measurement over that period. Values are sometimes written using the alternative expression dB(A) L_{eq} .

L_{Amax} :

The maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise when occasional loud noises occur, which may have little effect on the L_{Aeq} noise level. Unless described otherwise, L_{Amax} is measured using the “fast” sound level meter response.

L_{A10} & L_{A90} :

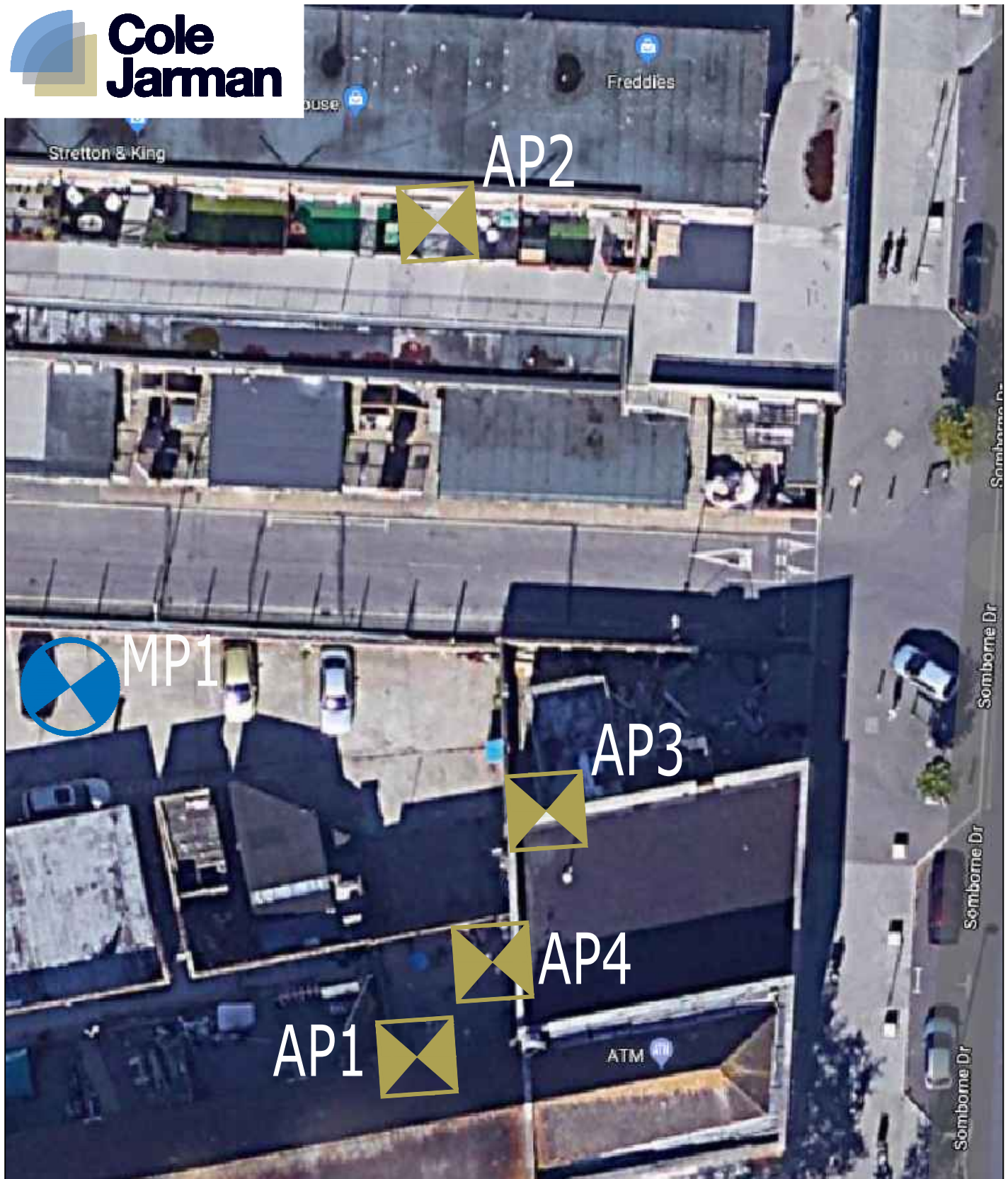
If non-steady noise is to be described, it is necessary to know both its level and degree of fluctuation. The L_{An} indices are used for this purpose. The term refers to the A-weighted level (in dB) exceeded for n% of the time specified. L_{A10} is the level exceeded for 10% of the time and as such gives an indication of the upper limit of fluctuating noise. Similarly L_{A90} gives an indication of the lower levels of fluctuating noise. It is often used to define the background noise.

L_{A10} is commonly used to describe traffic noise. Values of dB L_{An} are sometimes written using the alternative expression dB(A) L_n .

L_{AX} , L_{AE} or SEL

The single event noise exposure level which, when maintained for 1 second, contains the same quantity of sound energy as the actual time varying level of one noise event. L_{AX} values for contributing noise sources can be considered as individual building blocks in the construction of a calculated value of L_{Aeq} for the total noise. The L_{AX} term can sometimes be referred to as Exposure Level (L_{AE}) or Single Event Level (SEL).

■ End of Section



Title: Site plan showing measurement and assessment positions on site

Figure 18/0273/SP1

Project: Papa John's, Havant

Date: 27 June 2018

Revision: -

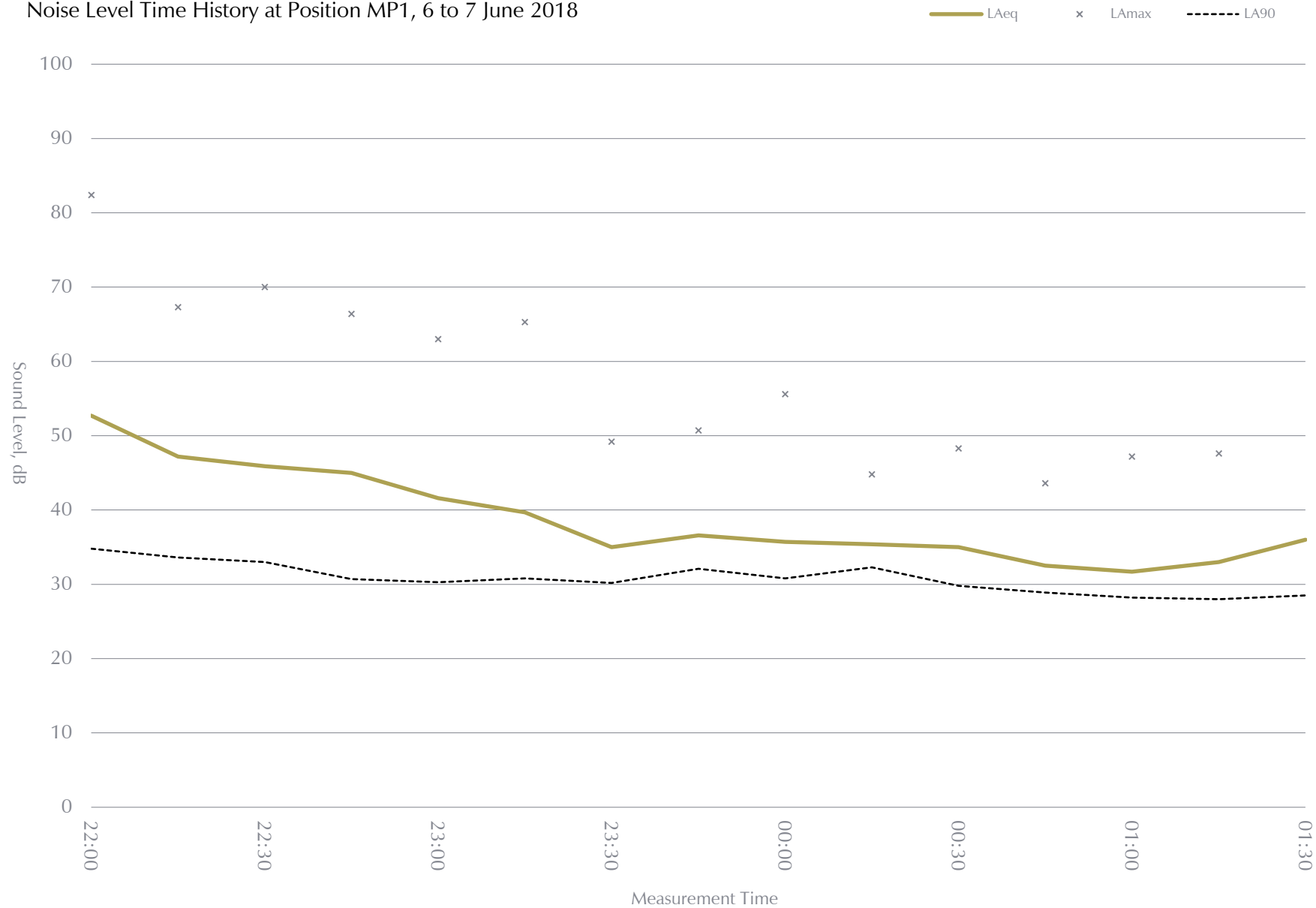
Scale: Not to scale

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Figure 18/0273/TH01





Schedule of Plant and Air Handling Equipment Sound Levels, dB

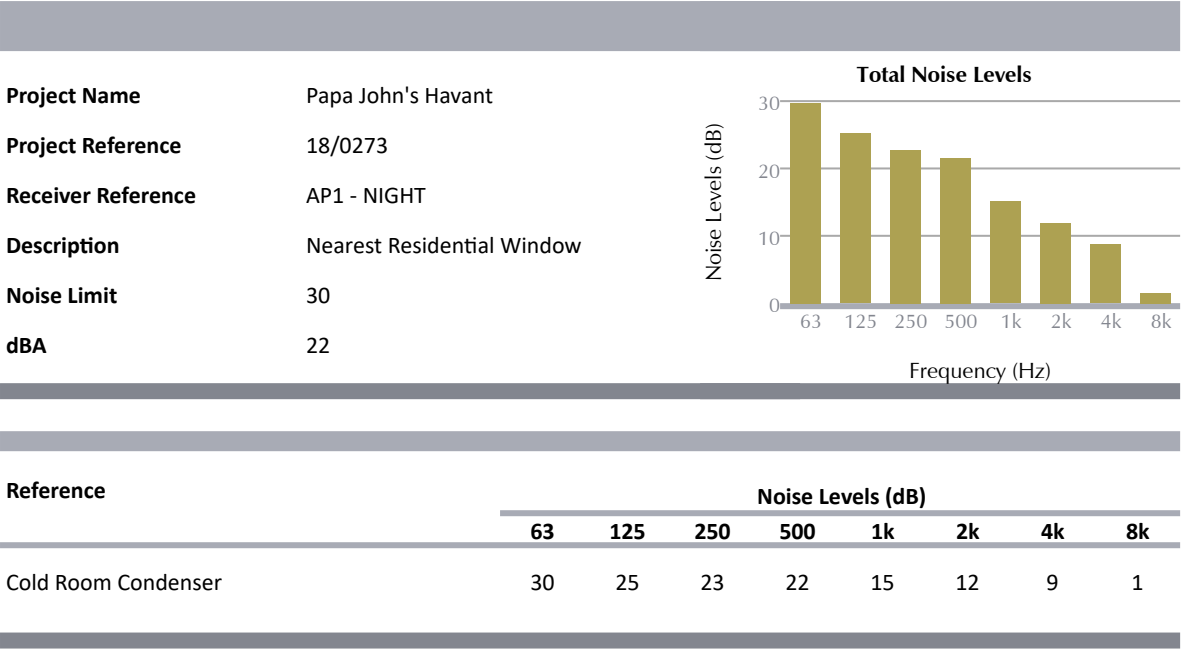
Reference	Description	Data ¹ Source	Noise Level Type	Noise Levels (dB)							
				63	125	250	500	1k	2k	4k	8k
Extract Fan	Vent Axia TP500	Man	Sound Power, Lw	88	91	95	90	88	82	75	70
Cold Room Condenser	Karbox 2464	Man	Sound Power, Lw	64	61.5	61.5	63	59.4	57.3	54.1	46.9

Notes

1 - Man refers to data supplied by the equipment manufacturer or supplier, Emp refers to data calculated using empirical formulae, and Meas refers to data measured by Cole Jarman



Reference	Noise Levels (dB)							
	63	125	250	500	1k	2k	4k	8k
Extract Fan	35	33	18	2	-10	-14	-5	2
Cold Room Condenser	30	25	23	22	15	12	9	1

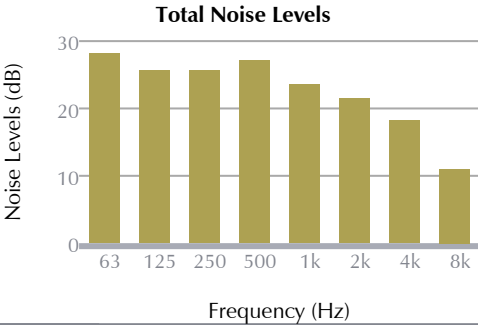




Reference	Noise Levels (dB)							
	63	125	250	500	1k	2k	4k	8k
Extract Fan	27	24	10	-6	-19	-23	-14	-7
Cold Room Condenser	28	26	26	27	24	21	18	11



Project Name	Papa John's Havant
Project Reference	18/0273
Receiver Reference	AP2 - NIGHT
Description	Residential Window to North
Noise Limit	30
dBA	29



Reference	Noise Levels (dB)							
	63	125	250	500	1k	2k	4k	8k
Cold Room Condenser	28	26	26	27	24	21	18	11



Project Name Papa John's Havant

Project Reference 18/0273

Receiver Reference AP3 - DAY

Description First Floor Residence

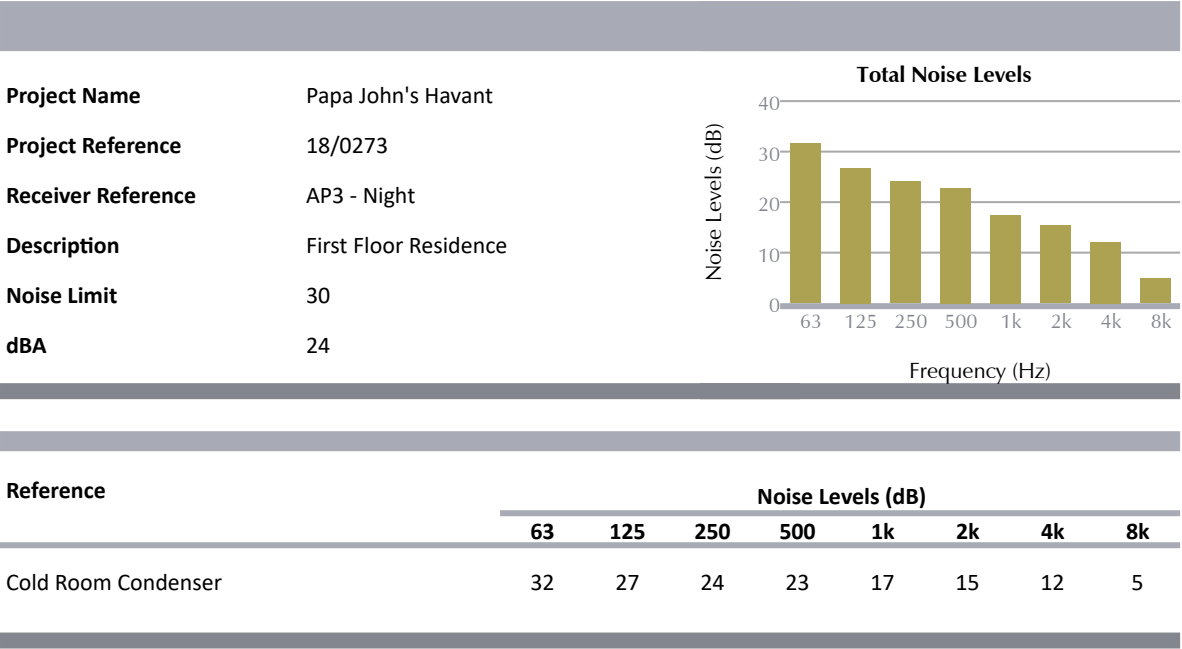
Noise Limit 31

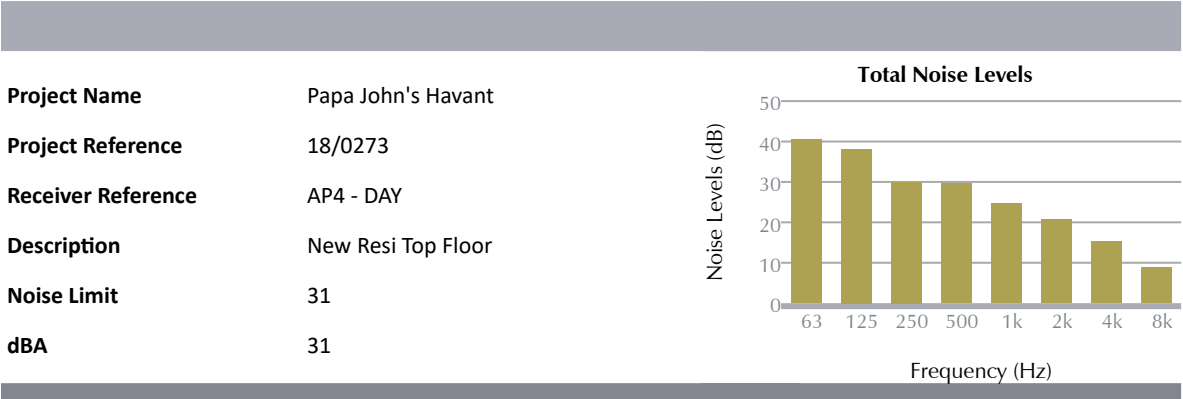
dBA 25

Total Noise Levels

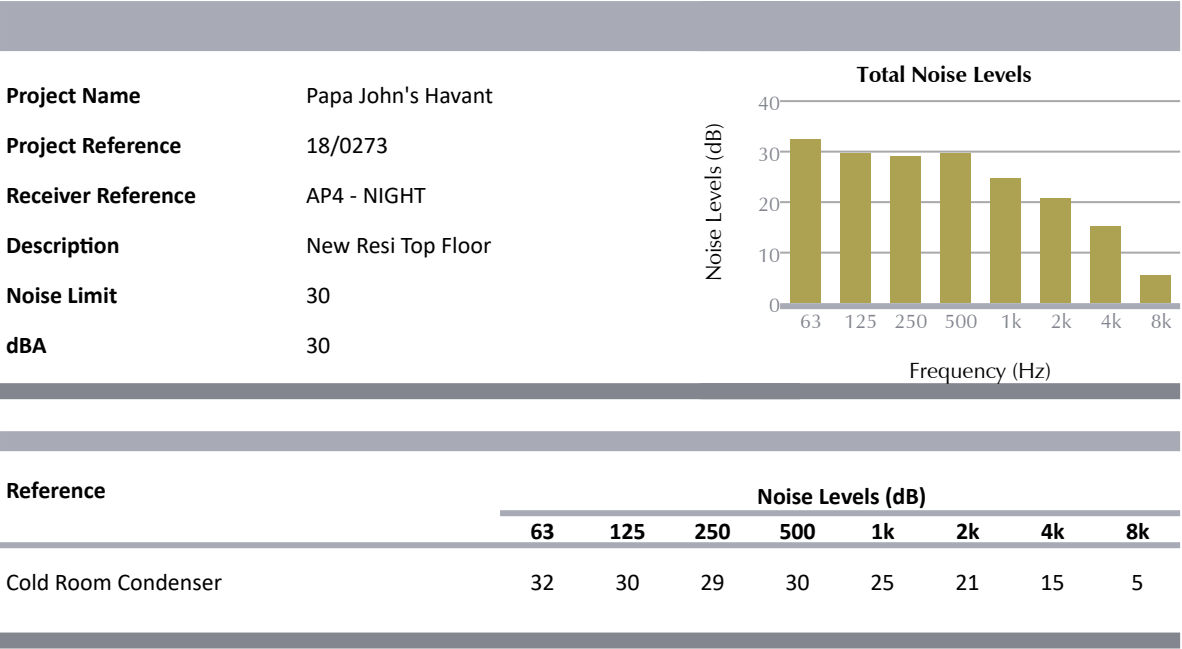
Frequency (Hz)	Noise Levels (dB)
63	35
125	32
250	25
500	23
1k	18
2k	16
4k	13
8k	8

Reference	Noise Levels (dB)							
	63	125	250	500	1k	2k	4k	8k
Extract Fan	33	31	16	0	-13	-17	-8	-1
Cold Room Condenser	32	27	24	23	17	15	12	5





Reference	Noise Levels (dB)							
	63	125	250	500	1k	2k	4k	8k
Extract Fan	40	37	23	7	-6	-10	-1	6
Cold Room Condenser	32	30	29	30	25	21	15	5





Calculation Sheet

18/0273/CS9

Extract Fan to AP1 - DAY



		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k

Noise Source

Noise Source - Extract Fan

Sound Power Levels	88.0	91.0	95.0	90.0	88.0	82.0	75.0	70.0
---------------------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------

Circular Unlined Duct Losses CJ

Diameter (mm)	500.0								
Length (m)	16.0								
		-1.0	-1.0	-1.0	-1.6	-2.4	-2.4	-2.4	-2.4

Bend Loss CJ

Dimension (mm)	500.0								
No. of Bends (no.)	4.0								
Type - Radiussed Bend - With Vanes									
		0.0	0.0	-4.0	-8.0	-12.0	-12.0	-12.0	-12.0

Silencer

Silencer - EX1									
		-10.0	-21.0	-41.0	-48.0	-50.0	-45.0	-29.0	-17.0

End Reflection

Width/Diameter (m)	0.5								
Length (m)	0.5								
Rec or Circ - Circular									
Free or Flush - Free Space									
		-11.9	-6.5	-1.1	0.0	0.0	0.0	0.0	0.0

Point Source Radiation Loss

Radiation - Spherical									
Single Figure Read	11.0								
		-11.0	-11.0	-11.0	-11.0	-11.0	-11.0	-11.0	-11.0





18/0273/CS9

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
External Grille Directivity									
Width (m)	0.5								
Height (m)	0.5								
Vertical (°)	90.0								
Horizontal (°)	0.0								
		0.0	0.2	0.2	0.0	-4.0	-7.0	-7.0	-7.0
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	12.5								
		-21.9	-21.9	-21.9	-21.9	-21.9	-21.9	-21.9	-21.9
Facade Reflection									
Reflection (dB)	3.0								
		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
External Receiver									
External Receiver - AP1 - DAY									
Sound Pressure, Lp		35.3	32.9	18.3	2.5	-10.3	-14.3	-5.3	1.7



Calculation Sheet

18/0273/CS10

Extract Fan to AP2 - DAY



		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k

Noise Source

Noise Source - Extract Fan

Sound Power Levels	88.0	91.0	95.0	90.0	88.0	82.0	75.0	70.0
---------------------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------

Circular Unlined Duct Losses CJ

Diameter (mm)	500.0								
Length (m)	16.0								
		-1.0	-1.0	-1.0	-1.6	-2.4	-2.4	-2.4	-2.4

Bend Loss CJ

Dimension (mm)	500.0								
No. of Bends (no.)	4.0								
Type - Radiussed Bend - With Vanes									
		0.0	0.0	-4.0	-8.0	-12.0	-12.0	-12.0	-12.0

Silencer

Silencer - EX1									
		-10.0	-21.0	-41.0	-48.0	-50.0	-45.0	-29.0	-17.0

End Reflection

Width/Diameter (m)	0.5								
Length (m)	0.5								
Rec or Circ - Circular									
Free or Flush - Free Space									
		-11.9	-6.5	-1.1	0.0	0.0	0.0	0.0	0.0

Point Source Radiation Loss

Radiation - Spherical									
Single Figure Read	11.0								
		-11.0	-11.0	-11.0	-11.0	-11.0	-11.0	-11.0	-11.0





18/0273/CS10

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
External Grille Directivity									
Width (m)	0.5								
Height (m)	0.5								
Vertical (°)	90.0								
Horizontal (°)	0.0								
		0.0	0.2	0.2	0.0	-4.0	-7.0	-7.0	-7.0
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	33.0								
		-30.4	-30.4	-30.4	-30.4	-30.4	-30.4	-30.4	-30.4
Facade Reflection									
Reflection (dB)	3.0								
		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
External Receiver									
External Receiver - AP2 - DAY									
Sound Pressure, Lp		26.8	24.4	9.8	-6.0	-18.8	-22.8	-13.8	-6.8



Calculation Sheet

18/0273/CS11

Extract Fan to AP3 - DAY



		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k

Noise Source

Noise Source - Extract Fan

Sound Power Levels	88.0	91.0	95.0	90.0	88.0	82.0	75.0	70.0
---------------------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------

Circular Unlined Duct Losses CJ

Diameter (mm)	500.0								
Length (m)	16.0								
		-1.0	-1.0	-1.0	-1.6	-2.4	-2.4	-2.4	-2.4

Bend Loss CJ

Dimension (mm)	500.0								
No. of Bends (no.)	4.0								
Type - Radiussed Bend - With Vanes									
		0.0	0.0	-4.0	-8.0	-12.0	-12.0	-12.0	-12.0

Silencer

Silencer - EX1									
		-10.0	-21.0	-41.0	-48.0	-50.0	-45.0	-29.0	-17.0

End Reflection

Width/Diameter (m)	0.5								
Length (m)	0.5								
Rec or Circ - Circular									
Free or Flush - Free Space									
		-11.9	-6.5	-1.1	0.0	0.0	0.0	0.0	0.0

Point Source Radiation Loss

Radiation - Spherical									
Single Figure Read	11.0								
		-11.0	-11.0	-11.0	-11.0	-11.0	-11.0	-11.0	-11.0



18/0273/CS11

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
External Grille Directivity									
Width (m)	0.5								
Height (m)	0.5								
Vertical (°)	90.0								
Horizontal (°)	0.0								
		0.0	0.2	0.2	0.0	-4.0	-7.0	-7.0	-7.0
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	6.6								
		-16.4	-16.4	-16.4	-16.4	-16.4	-16.4	-16.4	-16.4
Maekawa Screening Loss									
Path Difference (m)	0.0								
		-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8
External Receiver									
External Receiver - AP3 - DAY									
Sound Pressure, Lp		33.0	30.6	16.1	0.2	-12.6	-16.6	-7.6	-0.6



Calculation Sheet

18/0273/CS12

Extract Fan to AP4 - DAY



		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k

Noise Source

Noise Source - Extract Fan

Sound Power Levels	88.0	91.0	95.0	90.0	88.0	82.0	75.0	70.0
---------------------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------

Circular Unlined Duct Losses CJ

Diameter (mm) 500.0

Length (m) 16.0

	-1.0	-1.0	-1.0	-1.6	-2.4	-2.4	-2.4	-2.4
--	------	------	------	------	------	------	------	------

Bend Loss CJ

Dimension (mm) 500.0

No. of Bends (no.) 4.0

Type - Radiussed Bend - With Vanes

	0.0	0.0	-4.0	-8.0	-12.0	-12.0	-12.0	-12.0
--	-----	-----	------	------	-------	-------	-------	-------

Silencer

Silencer - EX1

	-10.0	-21.0	-41.0	-48.0	-50.0	-45.0	-29.0	-17.0
--	-------	-------	-------	-------	-------	-------	-------	-------

End Reflection

Width/Diameter (m) 0.5

Length (m) 0.5

Rec or Circ - Circular

Free or Flush - Free Space

	-11.9	-6.5	-1.1	0.0	0.0	0.0	0.0	0.0
--	-------	------	------	-----	-----	-----	-----	-----

Point Source Radiation Loss

Radiation - Spherical

Single Figure Read 11.0

	-11.0	-11.0	-11.0	-11.0	-11.0	-11.0	-11.0	-11.0
--	-------	-------	-------	-------	-------	-------	-------	-------





18/0273/CS12

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
External Grille Directivity									
Width (m)	0.5								
Height (m)	0.5								
Vertical (°)	90.0								
Horizontal (°)	0.0								
		0.0	0.2	0.2	0.0	-4.0	-7.0	-7.0	-7.0
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	5.2								
		-14.3	-14.3	-14.3	-14.3	-14.3	-14.3	-14.3	-14.3
External Receiver									
External Receiver - AP4 - DAY									
Sound Pressure, Lp		39.9	37.5	22.9	7.1	-5.7	-9.7	-0.7	6.3



Calculation Sheet

18/0273/CS13

Cold Room Condenser to AP1 - DAY

Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Cold Room Condenser								
Sound Power Levels	64.0	61.5	61.5	63.0	59.4	57.3	54.1	46.9
Point Source Radiation Loss								
Radiation - Hemispherical								
Single Figure Read	8.0							
	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Point Source Distance Loss								
Start Distance (m)	1.0							
End Distance (m)	10.5							
	-20.4	-20.4	-20.4	-20.4	-20.4	-20.4	-20.4	-20.4
Maekawa Screening Loss								
Path Difference (m)	0.6							
	-8.9	-10.9	-13.4	-16.1	-18.9	-20.0	-20.0	-20.0
Facade Reflection								
Reflection (dB)	3.0							
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
External Receiver								
External Receiver - AP1 - DAY								
Sound Pressure, Lp	29.7	25.2	22.7	21.5	15.1	11.9	8.7	1.5



Calculation Sheet

18/0273/CS14

Cold Room Condenser to AP2 - NIGHT

Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Cold Room Condenser								
Sound Power Levels	64.0	61.5	61.5	63.0	59.4	57.3	54.1	46.9
Point Source Radiation Loss								
Radiation - Hemispherical								
Single Figure Read	8.0							
	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Point Source Distance Loss								
Start Distance (m)	1.0							
End Distance (m)	35.0							
	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9
Facade Reflection								
Reflection (dB)	3.0							
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
External Receiver								
External Receiver - AP2 - NIGHT								
Sound Pressure, Lp	28.1	25.6	25.6	27.1	23.5	21.4	18.2	11.0



Calculation Sheet

18/0273/CS15

Cold Room Condenser to AP1 - NIGHT

Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Cold Room Condenser								
Sound Power Levels	64.0	61.5	61.5	63.0	59.4	57.3	54.1	46.9
Point Source Radiation Loss								
Radiation - Hemispherical								
Single Figure Read	8.0							
	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Point Source Distance Loss								
Start Distance (m)	1.0							
End Distance (m)	10.5							
	-20.4	-20.4	-20.4	-20.4	-20.4	-20.4	-20.4	-20.4
Maekawa Screening Loss								
Path Difference (m)	0.6							
	-8.9	-10.9	-13.4	-16.1	-18.9	-20.0	-20.0	-20.0
Facade Reflection								
Reflection (dB)	3.0							
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
External Receiver								
External Receiver - AP1 - NIGHT								
Sound Pressure, Lp	29.7	25.2	22.7	21.5	15.1	11.9	8.7	1.5



Calculation Sheet

18/0273/CS16

Cold Room Condenser to AP2 - DAY

Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Cold Room Condenser								
Sound Power Levels	64.0	61.5	61.5	63.0	59.4	57.3	54.1	46.9
Point Source Radiation Loss								
Radiation - Hemispherical								
Single Figure Read	8.0							
	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Point Source Distance Loss								
Start Distance (m)	1.0							
End Distance (m)	35.0							
	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9
Facade Reflection								
Reflection (dB)	3.0							
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
External Receiver								
External Receiver - AP2 - DAY								
Sound Pressure, Lp	28.1	25.6	25.6	27.1	23.5	21.4	18.2	11.0



Calculation Sheet

18/0273/CS17

Cold Room Condenser to AP3 - DAY

Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Cold Room Condenser								
Sound Power Levels	64.0	61.5	61.5	63.0	59.4	57.3	54.1	46.9
Point Source Radiation Loss								
Radiation - Hemispherical								
Single Figure Read	8.0							
	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Point Source Distance Loss								
Start Distance (m)	1.0							
End Distance (m)	5.0							
	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0
Maekawa Screening Loss								
Path Difference (m)	1.1							
	-10.4	-12.8	-15.4	-18.2	-20.0	-20.0	-20.0	-20.0
External Receiver								
External Receiver - AP3 - DAY								
Sound Pressure, Lp	31.6	26.8	24.1	22.8	17.4	15.3	12.1	4.9



Calculation Sheet

18/0273/CS18

Cold Room Condenser to AP3 - Night

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Noise Source									
Noise Source - Cold Room Condenser									
Sound Power Levels		64.0	61.5	61.5	63.0	59.4	57.3	54.1	46.9
Point Source Radiation Loss									
Radiation - Hemispherical									
Single Figure Read	8.0								
		-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	5.0								
		-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0
Maekawa Screening Loss									
Path Difference (m)	1.1								
		-10.4	-12.8	-15.4	-18.2	-20.0	-20.0	-20.0	-20.0
External Receiver									
External Receiver - AP3 - Night									
Sound Pressure, Lp		31.6	26.8	24.1	22.8	17.4	15.3	12.1	4.9



Calculation Sheet

18/0273/CS19

Cold Room Condenser to AP4 - DAY

Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Cold Room Condenser								
Sound Power Levels	64.0	61.5	61.5	63.0	59.4	57.3	54.1	46.9
Point Source Radiation Loss								
Radiation - Hemispherical								
Single Figure Read	8.0							
	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Point Source Distance Loss								
Start Distance (m)	1.0							
End Distance (m)	8.5							
	-18.6	-18.6	-18.6	-18.6	-18.6	-18.6	-18.6	-18.6
Maekawa Screening Loss								
Path Difference (m)	0.0							
	-5.1	-5.4	-5.9	-6.8	-8.1	-10.0	-12.3	-14.9
External Receiver								
External Receiver - AP4 - DAY								
Sound Pressure, Lp	32.4	29.6	29.0	29.7	24.7	20.7	15.2	5.4



Calculation Sheet

18/0273/CS20

Cold Room Condenser to AP4 - NIGHT

Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Cold Room Condenser								
Sound Power Levels	64.0	61.5	61.5	63.0	59.4	57.3	54.1	46.9
Point Source Radiation Loss								
Radiation - Hemispherical								
Single Figure Read	8.0							
	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Point Source Distance Loss								
Start Distance (m)	1.0							
End Distance (m)	8.5							
	-18.6	-18.6	-18.6	-18.6	-18.6	-18.6	-18.6	-18.6
Maekawa Screening Loss								
Path Difference (m)	0.0							
	-5.1	-5.4	-5.9	-6.8	-8.1	-10.0	-12.3	-14.9
External Receiver								
External Receiver - AP4 - NIGHT								
Sound Pressure, Lp	32.4	29.6	29.0	29.7	24.7	20.7	15.2	5.4

Specification 18/0273/SPC1

Project: Papa John's Havant
Subject: Acoustic specification of duct silencers
Date: 27 June 2018

1 General

1.1 Description

- 1.1.1 Furnish and install duct silencers of the types and sizes shown on the schedule.
- 1.1.2 Transitions and support or suspension systems are not included.

1.2 Quality Assurance

- 1.2.1 The dynamic insertion loss shall meet or exceed the values given in the schedules.
- 1.2.2 The static pressure drop shall not exceed the value given in the silencer schedules.
- 1.2.3 The levels of airflow noise generated by the silencers themselves at the operating conditions shall be provided by the supplier, if requested.
- 1.2.4 Performance data relating to dynamic insertion loss, static pressure drop and self-noise shall be obtained in accordance with BS 4718:1971 or BS EN ISO 7235 : 1996.

1.3 Submittals

- 1.3.1 Data sheets on the specific silencers utilised.
- 1.3.2 An itemised list showing the specific silencer utilised, its size, pressure drop at the required airflow volume, certified test data on dynamic insertion loss and self-noise power levels.

2 Materials and Construction

2.1 Outer casings and interior construction

- 2.1.1 Outer casings of rectangular silencers shall be made of 18 gauge galvanized steel or thicker in accordance with the HVCA recommended construction for high pressure rectangular ductwork. Seams shall be lock formed and mastic sealed.



- 2.1.2 Interior partitions for rectangular silencer splitters shall be made of not less than 26 gauge galvanized perforated steel.
- 2.1.3 Interior construction of tubular silencers shall be compatible with the outside casings.
- 2.1.4 Splitters in rectangular silencers of length not less than 900mm shall have aerodynamically shaped leading and trailing edges. Square or blunt ends are not acceptable.
- 2.1.5 Silencers shall be fitted with drilled angle flange connections unless other forms of connection are specified by the Mechanical Services Consultant or Contractor.

2.2 Configuration

- 2.2.1 Splitters within the silencer should generally be aligned with half width splitters affixed to each side wall of the casing. Splitters shall preferably be aligned vertically, and there shall be a regular splitter/airway dimension across the full width of the silencer. Horizontal splitters, where this orientation is required, shall be suitably supported and stiffened to prevent sagging and restriction of the airways. It is of particular importance that the supplier ensures that parallel splitter elements are orientated to suit the aerodynamic conditions arising from the adjacent duct geometry, particularly in the vicinity of bends and other transitions.
- 2.2.2 For silencers manufactured in modules, this specification shall apply to the unit as a whole.
- 2.2.3 The supplier shall comply with the cross-sectional sizes as shown in the schedule, unless alternative dimensions are agreed and approved by the Mechanical Services Contractor and the Acoustic Consultant. Silencers which are constructed to alternative cross-sectional dimensions must achieve the dynamic insertion loss and pressure drop requirements as set out in the schedule.

2.3 Standard silencers

- 2.3.1 Filler material shall be of inorganic mineral or glass fibre of a density sufficient to obtain the specified acoustic performance and be packed under not less than 5% compression to eliminate voids due to vibration and settling. Material shall be inert; rot, vermin and moisture proof; non-combustible and non-hygroscopic.
- 2.3.2 The filler material shall be retained in the splitters in such a manner that there is no egress of the fibres into the air stream at the prevailing flow conditions. Splitters will normally be faced with perforated galvanised sheet steel: any other facing material must be approved by the Acoustic Consultant.

2.4 Silencers with non-porous fibre protection membrane

- 2.4.1 Filler material shall be of inorganic mineral or glass fibre of a density sufficient to obtain the specified acoustic performance and be packed under not less than 5% compression to eliminate voids due to vibration and settling. Material shall be inert; rot, vermin and moisture



proof; non-combustible and non hygroscopic. Filler material shall be totally encapsulated and sealed with Melinex film of a thickness no less than 0.03mm.

2.5 **Special silencers with no acoustical fill**

- 2.5.1 No acoustic fill material: glass fibre, mineral wool, foam, etc., are not permitted.
- 2.5.2 Insertion loss provided by broadly tuned resonators and impedance membranes.

2.6 **Special Operating Conditions**

- 2.6.1 Where corrosive or toxic gases are contained in the air stream, special constructions and materials may be specified as an addendum to this specification.
- 2.6.2 Silencers which are expected to operate at high temperatures (e.g. turbine exhausts, boiler flues etc.) shall be constructed of a suitable gauge material, with precautions taken to allow for thermal expansion and shock. The filler material inside the splitters shall generally comply with the provisions outlined in Paragraph 2.1.C, with modifications as required to accommodate the high operating temperature. For very high temperatures, steel wool or equivalent approved may be used as the filler material.

3 Execution

- 3.1 Silencer units shall be delivered to site with blocked ends to prevent the ingress of rubble prior to installation and to reduce the risk of damage. The silencer identification shall be clearly marked on the casing, as shall the direction of airflow.
- 3.2 The silencers shall be installed in accordance with the manufacturer's recommendations to obtain the published acoustic and air flow performance.
- 3.3 The silencers shall be located as shown in the drawings.
- 3.4 Orientate the internal silencer splitters as follows for rectangular silencers:
 - Silencer splitters be oriented so as to be parallel to the plane of the turn if the silencer is located in a position less than 3 duct diameters in distance from the elbow. The duct diameter shall be based upon the maximum duct cross sectional dimension of the silencer.
 - If the silencer is located greater than 3 duct diameters away from an elbow, the orientation is not critical.
- 3.5 Locate no rectangular or circular silencers within one duct diameter from elbows, fan suction or discharge openings takeoffs, etc., unless indicated on the drawings and/or approved by the Acoustic Consultant.



4 Potential Product Suppliers

4.1 Allaway Acoustics

- Contact: Jim Grieve
- Telephone: 01992 550825
- enquiries@allawayacoustics.co.uk
- Address
Old Police Station
1 Queens Road, Hertford,
Hertfordshire, SG14 1EN
- www.allawayacoustics.co.uk

4.2 Caice Acoustic Air Movement Ltd

- Telephone: 0118 9186470
- enquiries@caice.co.uk
- Head Office Address
Riverside House
3 Winnersh Fields
Gazelle Close, Winnersh
Wokingham, RG41 5QS
- www.caice.co.uk

4.3 Environmental Equipment Corporation

- Contact: Tim Meed
- Telephone: 01932 230940
- info@eecnoisecontrol.co.uk
- Address
Richmond House
Churchfield Road
Walton-on-Thames,
Surrey, WV13 3RS
- www.eecnoisecontrol.co.uk

4.4 Noico Ltd

- Telephone: 01256 766207
- sales@noico.co.uk
- Address
Patrick House
Station Road, Hook
Hampshire, RG27 9HU
- www.noico.co.uk

4.5 TEK Limited

- Contact: Paul Virgo
- Telephone: 0121 766 5005
- sales@tek.ltd.uk
- Address
Seeleys Road, Greet
Birmingham B11 2LQ
- www.tek-ltd.com

■ End of Section

Specification 18/0273/SPC1

Project: Papa John's Havant
Subject: Acoustic Roof with Sound Absorptive Lining
Date: July 2018

1 General

- 1.1 This specification defines the applicable requirements for an acoustic roof, in addition to the applicable requirements for mineral fibre lining to the acoustic roof. The suppliers of the materials shall provide the necessary information and data to verify the required performance.
- 1.2 The supplier shall be responsible for ensuring that all the performance criteria set out herein are met by the product being offered.

2 Roof Specification

- 2.1 Roof heights shall be as shown in Appendix A. It is important to note that the roof height is specified relative to the height of the top of the condenser unit.
- 2.2 Minimum extents of the roof shall be as shown in Appendix A.
- 2.3 The roof shall achieve a minimum of 10 kg/m² uniform mass per unit area over the full area of the roof and for the duration of its design life.
- 2.4 The roof shall be of impermeable construction over the full area and remain so for the design life of the roof. It is essential, especially for roofs with butting or overlapping components, that the joints are well sealed to prevent leakage. This should be achieved without compromising the overall density requirement.
- 2.5 The roof structure is to be suitably designed and engineered with appropriate consideration for wind loading and aerodynamic forces.
- 2.6 No major maintenance should be required for the roof for 20 years and should remain serviceable for at least 40 years.



3 Sound Absorbent Lining

- 3.1 The acoustic absorbent panels (with the erosion resistive facing) shall be designed to give the following minimum average absorption coefficients when tested in accordance with BS 3638:1987:

Minimum Thickness (mm)	Octave Band Centred Frequency (Hz)					
	125	250	500	1k	2k	4k
25	0.15	0.35	0.70	0.85	0.95	0.95

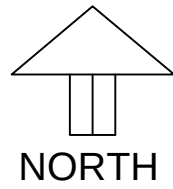
- 3.2 The acoustic lining is to be supplied in the minimum thickness stated and shall be inorganic glass fibre material with a minimum density of 48 kg/m³.
- 3.3 The absorbent lining shall be faced with glass fibre cloth or other infill protection membrane. The cloth or membrane shall be retained by perforated galvanised mild steel sheet, or hit-and-miss battens, having an open area in excess of 20%.
- 3.4 The acoustic media shall not comprise materials which are generally composed of mineral fibres, either man made or naturally occurring, which have a diameter of 3 microns or less and a length of 200 microns or less or which contain any fibres not sealed or otherwise stabilised to ensure that fibre migration is prevented.
- 3.5 Provision shall be made to prevent settling of the acoustic medium. The panels shall be suitably weather protected. In particular panels shall have drain holes as required to avoid soaking of the acoustic medium.
- 3.6 All available portions of the area designed to receive the acoustic liner shall be completely covered. All joints shall be neatly butted and there shall be no interruptions or gaps.
- 3.7 The acoustic liner shall be secured with mechanical fasteners which shall compress the liner sufficiently to hold it firmly in place.
- 3.8 The supplier shall ensure that the panels are designed and constructed to withstand site operating conditions.

 End of Section

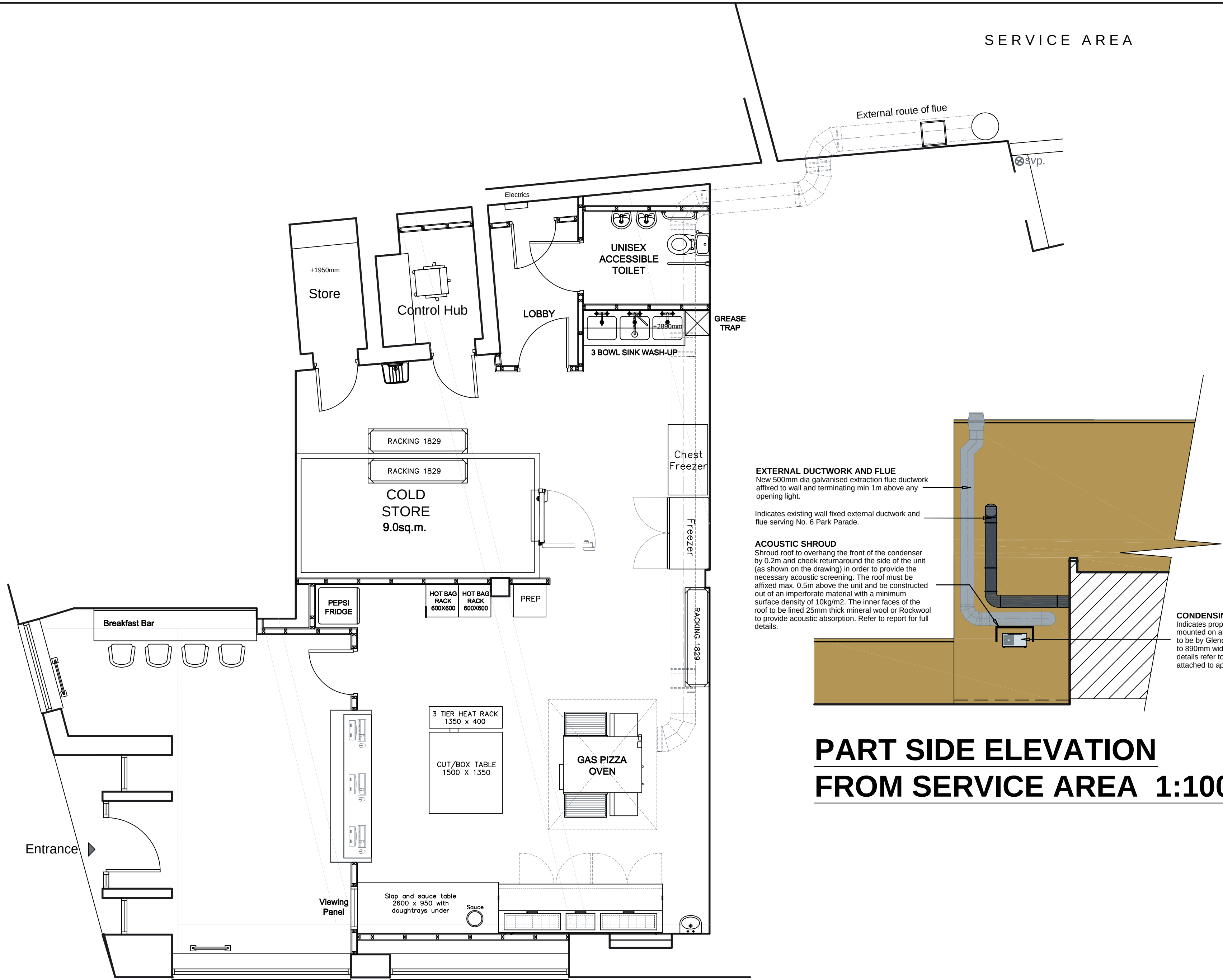
Appendix A



SCALE BAR IN METRES



SITE LOCATION PLAN 1:500



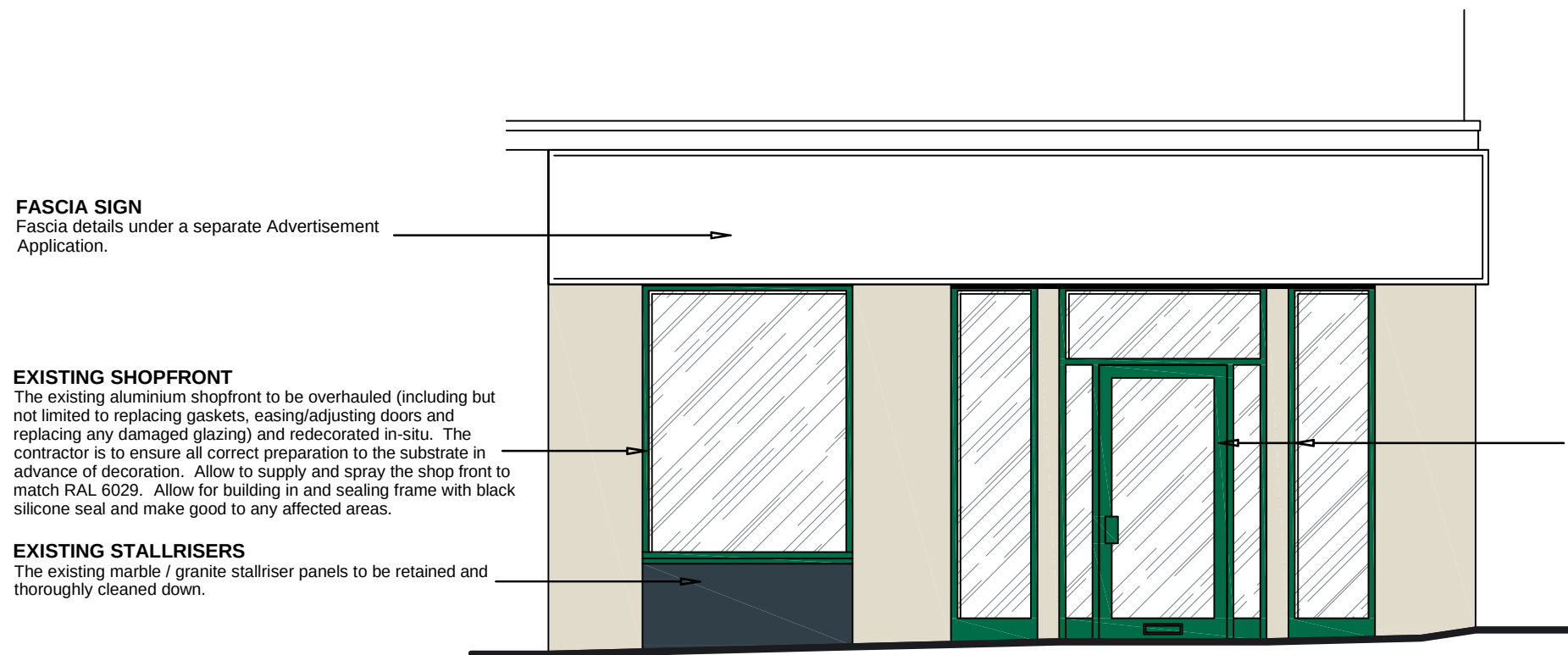
EXTERNAL DUCTWORK AND FLUE
New 500mm dia galvanised extraction flue ductwork affixed to wall and terminating min 1m above any opening light.

Indicates existing wall fixed external ductwork and flue serving No. 6 Park Parade.

ACOUSTIC SHROUD
Shroud roof to overhang the front of the condenser by 0.2m and cheek return around the side of the unit (as shown on the drawing) in order to provide the necessary acoustic screening. The roof must be affixed max. 0.5m above the unit and be constructed out of an impermeate material with a minimum surface density of 10kg/m2. The inner faces of the roof to be lined 25mm thick mineral wool or Rockwool to provide acoustic absorption. Refer to report for full details.

CONDENSING UNIT
Indicates proposed condensing unit mounted on anti-vibration mountings to be by Glendon or similar approved to 890mm wide x 500mm high. For full details refer to product information sheet attached to application.

PART SIDE ELEVATION
FROM SERVICE AREA 1:100



PROPOSED FRONT ELEVATION 1:50



PROPOSED SIDE ELEVATION 1:50

Rev B	01/07/2018	Acoustic shroud added and condenser repositioned.
Rev A	01/03/2018	Internal layout revisions.
Rev	Date	Description

McKeowns

Plans for Construction

301 Alvechurch Road, Birmingham, B31 4UB.

Tel: 0121 433 4745

E-mail: jamckeown@btinternet.com

Address
2 - 4 PARK PARADE
HAVANT
PO9 5AF

Title
PROPOSED PLAN AND
ELEVATIONS

Drawn	Date	Scale
JAM	21/02/2018	1:50 and 1:100 @ A1
Customer Area		
Drawing Number	PJ/HAV/03	Revision B



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