

Domino's, 51 London Road, Cowplain

Plant Noise Assessment

Report 17/0743/R1

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17/0743/SP01

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17/0743/TH01

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17/0743/PNS01

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17/0743/CS01 – 17/0743/CS10

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Plant Noise Assessment

1 Introduction

- 1.1 A change of use from Class A3 (Café) to Class A5 (Hot Food Takeaway) is proposed at the premises located at 51A London Road, Cowplain, Waterlooville, PO8 8UJ.
- 1.2 New mechanical services plant is proposed for installation to serve the unit. It is required that a noise report be submitted addressing the impact of the proposed fixed mechanical services plant upon the surrounding residences.
- 1.3 Cole Jarman has been appointed to carry out a noise survey to quantify the existing noise levels at the site, and carry assessments of noise from the proposed plant items to be installed. This report presents details of the noise survey and assessment work.

2 Site Description

- 2.1 The site address, located at 51A London Road, Cowplain, Waterlooville, PO8 8UJ, is a two-storey south-east facing mixed use property in a terrace of other mixed use properties of commercial buildings at ground floor level with residential dwellings above. The ground floor of the building is Class A3 (Café) and is currently unoccupied while the first floor is a residential flat.
- 2.2 To the north-west of the site lies a car park separate to the unit, accessed from a small road on King's Road to the south-west of the site. From the front of the unit, across London Road (A3) lies residential houses.
- 2.3 To the south-west, across a narrow alleyway lies a two storey dentist's office. The nearest noise sensitive receptors are both in the residential flat above the unit, with one window facing north-westerly, and another looking onto the south-westerly alleyway.
- 2.4 Traffic around the site runs in a north-east to south-west direction along London Road, and in a north-west to south-east direction along King's Road.
- 2.5 The site and surrounding area are shown in the attached site plan 17/0743/SP01.

3 Background Noise Survey

3.1 Methodology

- 3.1.1 Noise levels were recorded by unattended monitoring equipment at a single position, MP1, beginning at 1800 hours on Tuesday 19th December 2017 and ending at 1000 hours on Wednesday 20th December 2017.



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- 3.1.2 The survey duration was chosen to include the night time hours, expected to be the quietest period when a new noise source would be most readily perceptible, and the evening hours when traffic noise levels would typically decrease from their daytime peak.
- 3.1.3 MP1, labelled on the attached site plan 17/0743/SP01, was approximately 1.5m above local ground level behind the building.
- 3.1.4 Measurements of the L_{Aeq} , L_{Amax} , and L_{A90} indices were recorded over consecutive 15 minute periods (see the attached Glossary of Acoustic Terms for an explanation of the noise units used).
- 3.1.5 Noise measurements were made using the equipment listed in Table T1.

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

T1 Equipment used during unattended noise survey

- 3.1.6 The sound level analyser was calibrated before the survey commenced and after it concluded. No significant drift was noted to have occurred.

3.2 Results

- 3.2.1 The results of the noise measurements are presented in the attached time history graph 17/0743/TH01.
- 3.2.2 While on site, background noise levels were noted to be controlled by traffic on London Road. Audible but less significant contributions came from intermittently generated noise from vehicles in the adjacent car park.
- 3.2.3 The representative background noise levels at MP1 during the evening and night time periods are shown in Table T2.



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Location	Representative Background Noise Level, $L_{A90,15min}$ (dB)	
	Opening Hours (1100-2300)	Night Time (2300-0700)
MP1	52	40

T2 Representative measured $L_{A90,15min}$ background noise levels

- 3.2.4 The attached time history of noise survey results, 17/0743/TH01, shows noise levels vary with traffic volume, as evidenced by the increase in noise levels between 0700-0900.

4 Plant Noise Limits

- 4.1 The site falls within the jurisdiction of Havant Borough Council. Following review of the Havant Local Plan we have considered policy 'CS16 High Quality Design' when setting plant noise emission limits.
- 4.2 Policy CS16 states that: *'Planning permission will be granted for development that is designed to a high standard, which helps to create places where people want to live, work and relax. All development should demonstrate that its design...does not cause unacceptable harm to the amenity of neighbours through smell, the loss of privacy, outlook, noise or overlooking'.*
- 4.3 The likelihood of an adverse noise impact from fixed items of plant at any neighbouring residential buildings can be assessed based on guidance contained in BS4142:2014.
- 4.4 According to this standard, the rating level of the noise from the item of plant is determined and compared to the existing measured L_{A90} background noise level for that period. It states:

"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."

- 4.5 It also notes that:

"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."

"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."



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- 4.6 On this basis we recommend that plant noise at existing residences should be designed to 5 dB below the existing background noise level during the operational hours of the plant, resulting in a marginal and imperceptible 1 dB increase.
- 4.7 This approach is consistent with planning conditions imposed by Havant Borough Council on other developments where a new noise source is introduced to an area with sensitive receptors.
- 4.8 We recommend an opening hours plant noise limit of 47dB(A) and closed hours plant noise limit of 35dB(A), i.e. expressed in absolute terms rather than relative to background levels. In the previous version of BS4142:1997 it noted that “*rating levels below 35dB are considered very low*”. The current version of BS4142 states:
- “Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.”*
- 4.9 Taking the typical loss through a partially open window of 10-15dB(A), the proposed minimum plant noise limit of 35dB(A) would result in levels no greater than 25dB(A) within any nearby property, which is 5 dB below the standard for bedrooms cited in BS 8233:2014.
- 4.10 Plant noise limits derived according to the principles outlined above are stated in Table T3 for the day and night time periods. These criteria apply at 1m from any nearby residential window after applying any corrections deemed necessary to account for the character of noise from the new plant relative to the existing noise climate, as described in BS 4142:2014.

Location	Noise Emission Limit, dB(A)	
	Opening Hours (1100-2300)	Closed Hours (2300-1100)
Residential windows	47	35

T3 Plant noise emission limits at the nearest residential properties

5 Plant Noise Assessment

5.1 Details

- 5.1.1 The proposed plant items with external noise emissions are assumed to be:

- AC: Mitsubishi Heavy Industries FDC125VNX
- Coldroom: Karbox 2464
- Air Handling Unit (AHU): Air Vent Tech Model 5



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- Extract Fan: Vent Axia Black Sabre BSC500/4

- 5.1.2 The assumed units above form a standard services installation at all new Domino's Pizza outlets. With regard to the AC condensing unit, where varying units tend to be specified between sites, the unit with the highest sound power levels as quoted by the manufacturer was chosen. This therefore represents a robust assessment method.
- 5.1.3 The AC and Coldroom condensing units are to be installed at ground level to the rear (north-west) of the building. Air will be drawn into the building by the AHU through an intake grille on the south-west façade of the building, next to a residential first floor window on the same façade. The extract is to terminate at high level 1m above eaves level on the south-west façade.
- 5.1.4 Noise from the proposed plant has been assessed to the two nearest noise sensitive receptors. These assessment positions are indicated on the attached site plan 17/0743/SP01 and described below:
- AP1 – First floor residential window above the unit on the building's north-west façade;
 - AP2 – First floor residential window above the unit on the building's south-west façade.
- 5.1.5 It is assumed that all plant items will be in use during opening hours, and only the condensing unit in use during closed hours.
- 5.1.6 The noise data for the proposed plant items can be seen in the attached plant noise schedule 17/0743/PNS01.

5.2 Required Mitigation Measures

- 5.2.1 The results of our assessment indicate that mitigation of noise emissions from the AHU supply fan and extract fan will be required in order to meet the noise emission limits set within section 4.
- 5.2.2 The silencers required must meet the insertion losses in each octave band as defined in table T4 below:

Silencer	Location	Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
AS01	AHU Supply	4	8	14	21	27	27	21	16
AS02	Extract Fan	2	3	8	16	21	22	21	17

T4 Attenuator insertion loss requirements (atmospheric side)



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- 5.2.3 We would expect the insertion losses required for the silencer on the AHU to be achievable with a silencer of 35% free area and 900mm length. Any pressure drops from the silencers or the atmospheric duct termination grilles should be limited to 40Pa.
- 5.2.4 We would expect the insertion losses required for the silencer on the extract fan to be achievable with a direct fitted, podded circular silencer that has an internal diameter of 500mm and a length of 500mm. Any pressure drops from the silencers or the atmospheric duct termination grilles should be limited to 40Pa.
- 5.2.5 The atmospheric side silencers should be located within the Domino's demise, close to the fans so that noise breakout from the duct is also attenuated.
- 5.2.6 All fans should be mounted on anti-vibration mounts and have flexible ductwork connections to control structure-borne sound transmission.

5.3 Assessment Results

- 5.3.1 It is assumed that all plant items are required to be operational during opening hours, while only the Coldroom condensing unit is required when the store is closed. Therefore, both the day time (opening hours) and night time (closed hours) have been taken into consideration.
- 5.3.2 With the specified mitigation measures in place we have assessed the following noise levels of each respective assessment position in table T5 below:

Location	Rating Noise Level, dB(A) <i>(Limit)</i>	
	Opening Hours (1100-2300 only)	Closing Hours (2300-1100)
AP1 – First floor residential window on north-west façade.	39 (47)	29 (35)
AP2 – First floor residential window on south-west façade.	46 (47)	28 (35)

T5 Plant noise emission levels at the nearest residential properties.

- 5.3.3 It is seen that all plant noise limits are assessed to be achieved at all assessment positions.

6 Conclusion

- 6.1 It is proposed to convert the site of a former A3 building at 51A London Road, Cowplain, Waterlooville, PO8 8UJ into an A5 Hot Food Takeaway outlet.



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- 6.2 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 requirements of the local council and BS4142.
- 6.3 An assessment has been conducted of noise emissions from the proposed plant items. The assessment has shown that with the proposed mitigation measures in place, the plant noise limits set 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} :

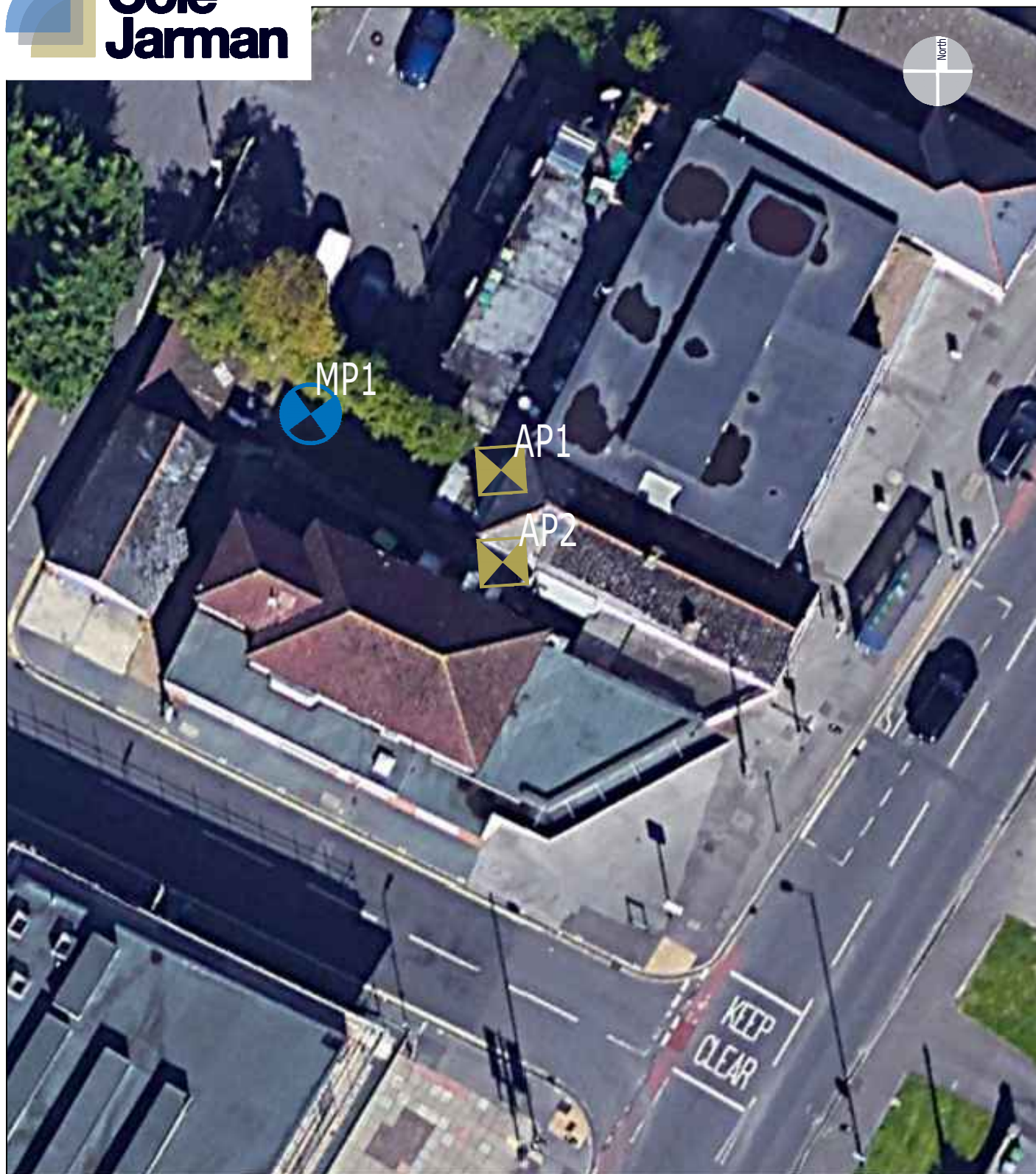
If non-steady noise is to be described, it is necessary to know both its level and degree of fluctuation. The L_{An} indices are used for this purpose. The term refers to the A-weighted level (in dB) exceeded for n% of the time specified. L_{A10} is the level exceeded for 10% of the time and as such 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 noise measurement positions and assessment positions

Project: 51A London Road, Cowplain, Waterlooville

Date: December 2017

Revision: -

Scale: Not to scale

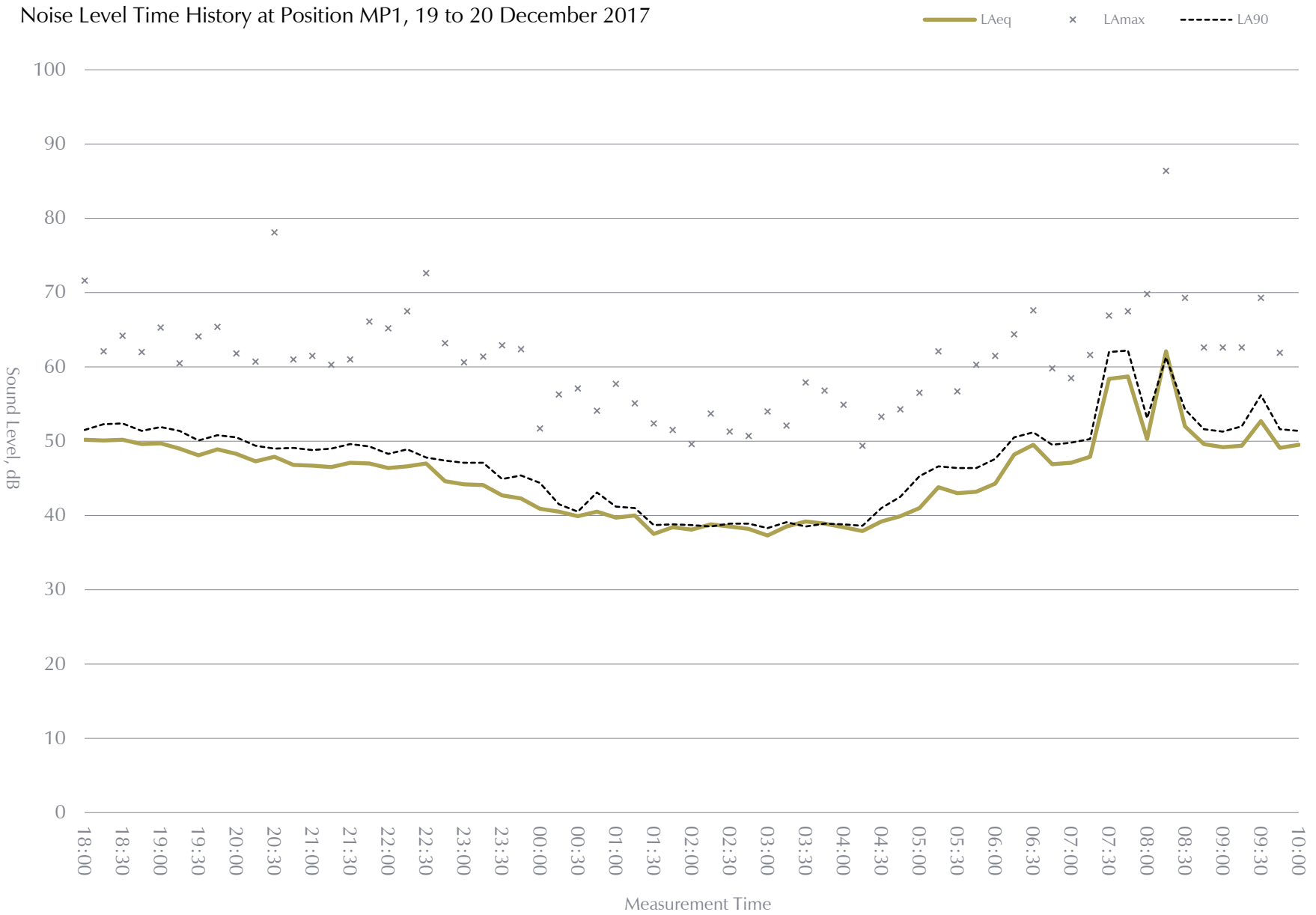
Figure 17/0743/SP01

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Figure 17/0743/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
Condensing Unit	Karbox 2464	Man	Sound Power, Lw	64	61.5	61.5	63	59.4	57.3	54.1	46.9
AHU	Air Vent Tech Model 5	Man	Sound Power, Lw	77	79	73	74	77	77	74	69
Extract Fan	Vent Axia Black Sabre BSC500/4	Man	Sound Power, Lw	80	79	76	72	75	75	68	61
AC	Mitsubishi Heavy Industries FDC125VNX	Man	Sound Power, Lw	78	77	71	68	64	57	54	51

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



Calculation Sheet

17/0743/CS4

AHU to AP1 Day

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Noise Source									
Noise Source - AHU									
Sound Power Levels		77	79	73	74	77	77	74	69 82dBA
Coil and Filter Losses									
Loss (dB)		3							
		-3	-3	-3	-3	-3	-3	-3	-3
Circular Unlined Duct Losses CJ									
Diameter (mm)		400							
Length (m)		1.7							
		0	0	0	0	0	0	0	0
Silencer									
Silencer - AS01									
		-4	-8	-14	-21	-27	-27	-21	-16
End Reflection									
Width/Diameter (m)		0.55							
Length (m)		0.55							
Rec or Circ - Rectangular									
Free or Flush - Flush									
		-8	-3	0	0	0	0	0	0
Point Source Radiation Loss									
Radiation - Hemispherical									
Single Figure Read		8							
		-8	-8	-8	-8	-8	-8	-8	-8

17/0743/CS4

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Point Source Distance Loss									
Start Distance (m)	1								
End Distance (m)	1.5								
		-4	-4	-4	-4	-4	-4	-4	-4
Maekawa Screening Loss									
Path Difference (m)	0.176								
		-6	-7	-9	-11	-14	-16	-19	-20
External Receiver									
External Receiver - AP1 Day									
Sound Pressure, Lp		44	45	35	27	22	19	19	18 33dBA



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17/0743/CS9

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Point Source Distance Loss									
Start Distance (m)	1								
End Distance (m)	1.9								
		-6	-6	-6	-6	-6	-6	-6	-6
External Receiver									
External Receiver - AP2 Day									
Sound Pressure, Lp		48	51	42	36	33	33	36	36



Calculation Sheet

17/0743/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	80	79	76	72	75	75	68	61	80dBA
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Bend Loss CJ

Dimension (mm) 500

No. of Bends (no.) 2

Type - Radiussed Bend - With Vanes

0	0	-2	-4	-6	-6	-6	-6	
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Circular Unlined Duct Losses CJ

Diameter (mm) 500

Length (m) 6.1

0	0	0	-1	-1	-1	-1	-1	
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Silencer

Silencer - AS02

-2	-3	-8	-16	-21	-22	-21	-17	
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End Reflection

Width/Diameter (m) 0.5

Length (m) 0.4

Rec or Circ - Circular

Free or Flush - Free Space

-12	-6	-1	0	0	0	0	0	
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Stack Directivity

Angle 135

Area (m2) 0.2

0	0	0	-2	-2	-4	-4	-4	
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17/0743/CS10

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Point Source Radiation Loss									
Radiation - Spherical									
Single Figure Read	11	-11	-11	-11	-11	-11	-11	-11	-11
Point Source Distance Loss									
Start Distance (m)	1								
End Distance (m)	2	-6	-6	-6	-6	-6	-6	-6	-6
External Receiver									
External Receiver - AP2 Day									
Sound Pressure, Lp	49	52	48	32	28	25	19	16	41dBA



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