

Acoustic assessment of proposed new mechanical services equipment

60 Christchurch Road, Reading, RG2 7AZ



Client: Mr A Rafique

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CONTENTS

0. SUMMARY	2
1. INTRODUCTION	3
2. ACOUSTIC CRITERIA	3
3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS	3
4. BACKGROUND SOUND LEVEL.....	5
5. ACOUSTIC ASSESSMENT.....	6
6. CONCLUSION.....	8
Appendix A.....	A

0. SUMMARY

- 0.1. ACA Acoustics Limited has been commissioned to assess the acoustic impact of proposed new mechanical services equipment to be installed at a new café/restaurant located at 60 Christchurch Road, Reading.
- 0.2. The assessment is required to provide evidence that noise emissions from the equipment will not be detrimental to the amenity of nearby noise-sensitive properties and complies with the requirements of Reading Borough Council.
- 0.3. A survey has been carried out in the vicinity to establish existing background sound levels. The minimum background sound levels during the most sensitive time of the proposed restaurant opening hours were LA90 46dB at the monitoring position. It is assumed the operating hours will be to around 23:00 hours throughout the week. The lowest measured background sound levels overnight were LA90 36dB.
- 0.4. The most sensitive residential receptors have been assessed as the rear windows of flats above commercial properties immediately adjoining the site.
- 0.5. Calculations using manufacturer's sound level data for the new equipment, allowing for the proposed discharge attenuator, confirm that the specific level from the new equipment at the receptor is LAeq 35dB. When assessed in accordance with BS 4142:2014+A1:2019 this equates to a rating level of LAr 35dB. The specific sound level and rating level are both more than 10dBA below the measured background sound level during operating times of the equipment.
- 0.6. Noise from the proposed new equipment will not be disturbing or detrimental to the amenity of any nearby residential occupants and complies with the requirements of Reading Borough Council.

1. INTRODUCTION

New mechanical services equipment associated with a new café/restaurant is to be installed at 60 Christchurch Road, Reading.

ACA Acoustics Limited has been commissioned by Mr Rafique to carry out an assessment of noise emissions from the proposed new kitchen extract ventilation system to ensure that the amenity of nearby noise-sensitive properties is not compromised.

The assessment is required to be submitted in support of a planning application for the new equipment. This report presents results of the assessment.

2. ACOUSTIC CRITERIA

Based on planning conditions imposed on a recent similar development within the Borough, it is anticipated that Reading Borough Council will require noise from the new equipment to be at least 10dBA below the lowest measured background sound level and the rating level, when assessed in accordance with BS 4142:2014+A1:2019, to not exceed the background sound level.

The criteria are applicable over a period of 60 minutes during the daytime (07:00 to 23:00 hours) and 15-minutes overnight (23:00 to 07:00 hours) and measured at a position 1m external to noise sensitive façades (typically outside residential windows).

At this level noise from the new equipment will be low, should not increase the prevailing background sound level and would not be detrimental to the amenity of nearby residents.

3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The development site is at 60 Christchurch Road, Reading. A café/restaurant is being formed within the unit and a planning application is being prepared for new mechanical equipment associated with the café/restaurant.

A kitchen extract fan will be installed externally on a new first floor flat roof to the rear of the site, ducted to inside. The system will exhaust vertically. A supply/make-up air louvre will be installed at low level on the ground floor, however it is understood this will be naturally ventilated and no supply fan will be installed.

It is anticipated that the café/restaurant will operate during daytime hours only, within the range 07:00 to 23:00 hours.

At this stage ACA Acoustics have not been advised of any air conditioning or refrigeration condensers being installed. Should any refrigeration condensers be fitted at a later stage these would have the potential to operate overnight and must therefore comply with the more stringent night-time criteria.

Figure 1 below details the proposed plant location in relation to the nearest noise-sensitive receptors.

The most sensitive residential receptors have been assessed as the rear windows of flats above the commercial units immediately adjacent to the development site, approximately 6-8m to the north-east of the equipment location.

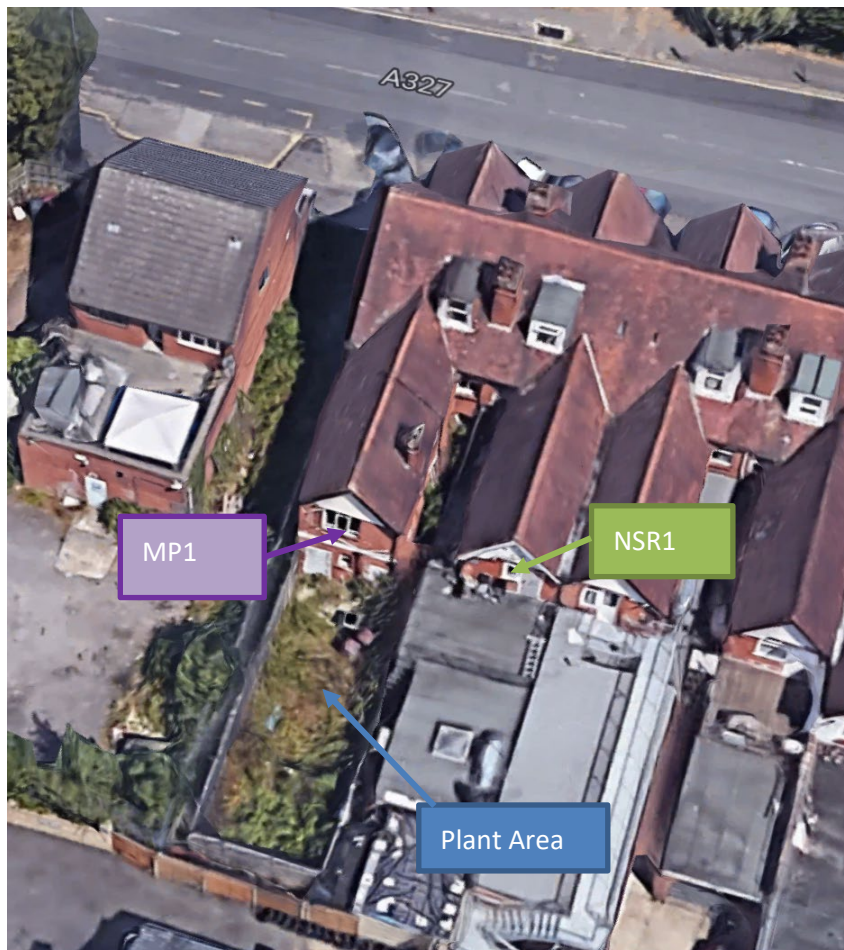


Figure 1: showing equipment location and closest noise-sensitive receptor (available at www.google.com/maps)

4. BACKGROUND SOUND LEVEL

To assess sound levels from the new mechanical equipment in accordance with Reading Borough Council's criteria it is necessary to establish existing background sound levels in the vicinity.

As the site was considered secure, the background sound level was measured via an unattended survey at the position indicated in Figure 1 above (MP1). The survey was conducted between the 25th and 26th April 2018.

The background sound level survey measurement position was selected with the microphone extending out of a first-floor window to the rear of the site, at a position considered equivalent of the closest sensitive receptor and is indicated in Figure 1 above.

During the survey, the acoustic environment in the vicinity of the receptor was influenced predominantly by local and distant road traffic.

The following equipment was used during the survey; the sound level meter was calibrated before the survey and checked after with no deviation noted.

Equipment	Serial Number
Rion Class 1 sound level meter type NL52, complete with weatherproof outdoor environmental kit	00564867
Castle calibrator type 4226. Compliant to IEC 60942-1:2003	1551589

Table 1: Equipment used

Weather conditions during the survey included dry and calm periods and meteorological conditions are not considered to have adversely impacted the outcome of the assessment.

Results of the survey are shown in Figure 2 below:

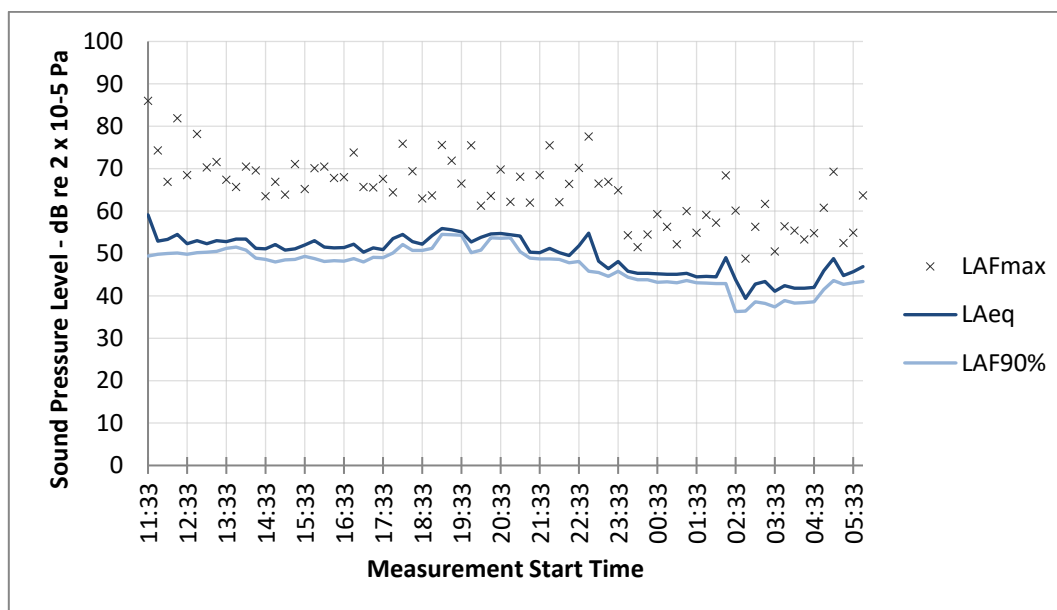


Figure 2: Sound level survey results at Position MP1 – 25th-26th April 2018

Summary of the measured sound levels are shown in Table 2 below.

Monitoring Position	Period	Minimum background sound level LA90	Reading Borough Council's Criteria LAeq
MP1	07:00 – 00:00	46dB	≤36dB
MP1	23:00 – 07:00	36dB	≤26dB

Table 2: Summary sound level survey results

The values recorded by ACA Acoustics Limited are used as basis for acoustic design such that sound emissions from any new equipment operating during daytime hours only are ≤36dBA outside the closest noise-sensitive windows.

Should any future plant operate overnight, such as a refrigeration condenser, it would be designed to not exceed a level of 26dBA outside closest noise-sensitive windows.

5. ACOUSTIC ASSESSMENT

The development includes the installation of a new kitchen extract system. Confirmation of the equipment model used in the assessment is provided in Table 3 below.

Description/Reference	Equipment Model	Quantity
KEF1 – Kitchen Extract Fan	AVT QMF500/4/1	1

Table 3: Proposed new mechanical equipment used in the assessment

Sound emissions from the mechanical equipment can be determined from manufacturer's published data. The extract fan will have an air flow rate of 2.1m³/s.

A computer model has been used to calculate the noise contribution from the proposed fan to outside nearest noise-sensitive windows. The model includes losses through the ductwork system set out in CIBSE Guide B4. Environmental corrections are based on the methodology in ISO 9613-2:1996.

The client has advised that a 1500mm long silencer will be installed on the discharge side of the unit. This silencer is included in the calculation model. The fan will be installed on vibration isolators and flexible connections used between the fan and adjoining ductwork both sides.

Based on the layout advised, it is assumed the fan will be at least 6m from the closest residential window and the exhaust terminal will be at least 8m from the window. It is anticipated that there will be minimal external ductwork on the roomside of the fan, which will penetrate to inside immediately after the unit. Should there be more external ductwork then an attenuator may be required on the roomside of the fan to control duct noise breakout.

The cumulative calculated specific sound level to outside the most sensitive receptor is shown in Table 4 below. Summary printouts from the calculation models are included in Appendix A.

Receptor Location	Calculated Equipment Sound Level	Reading Borough Council Criteria	Excess
NSR1	35dBA	≤36dB	-

Table 4: Calculated cumulative equipment sound levels at 1m outside noise-sensitive windows

Calculated noise emissions comply with Reading Borough Council's planning consent criteria and no further noise control treatments are necessary.

It is important airflow generated noise from the discharge terminal does not increase the cumulative sound level at nearby noise-sensitive properties. Suitable airflow velocity is dependent on the profile of the terminal used and should be verified with the manufacturer accordingly.

6. CONCLUSION

A planning application is to be submitted for the installation of new mechanical services equipment for a proposed café/restaurant at 60 Christchurch Road, Reading.

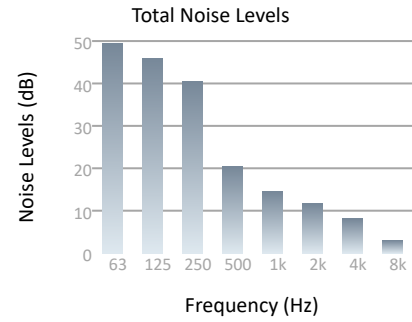
ACA Acoustics have undertaken an assessment of noise from the proposed equipment using manufacturer's published acoustic data. The calculated specific sound level for the new plant is at least 10dB below the lowest measured background sound level during operating times of the new equipment when assessed at 1m from the closest noise-sensitive windows of the receptor.

The author considers that the proposed new mechanical services equipment achieves Reading Borough Council's planning requirements and will not be detrimental to the amenity of nearby residential occupants.

Appendix A

Acoustic Calculations

Project Name	60 Christchurch Road, Reading
Project Reference	210317
Reference	NSR1
Description	Rear windows of closest residential flat
Noise Limit	36
dBA	35



Noise Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
KEF1 Exhaust	1	42	37	24	16	13	10	7	-1
KEF1 Casing Radiated	1	48	45	40	18	9	7	1	1

Calculation Sheet

KEF1 Exhaust to NSR1

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Noise Source									
Noise Source - KEF1 Exhaust									
Sound Power Levels		86.0	85.0	83.0	77.0	73.0	71.0	65.0	59.0
Silencer									
Silencer Type - Rectangular									
Silencer Reference - ATT1									
Width (m)	0.7								
Height (m)	0.7								
% Free Area (%)	50.0								
Face Velocity (m/s)	8.6								
		-8.0	-14.9	-25.4	-27.0	-24.1	-23.1	-18.1	-19.9
Bend Loss									
		-1.0	-2.0	-2.7	-1.9	-2.1	-2.3	-2.5	-2.0
End Reflection									
		-8.1	-4.0	-1.5	-0.5	-0.1	0.0	0.0	0.0
External Grille Directivity									
		-0.6	-1.5	-3.2	-5.3	-7.6	-9.9	-10.9	-10.9
Adiv - Geometrical Divergence									
		-29.1	-29.1	-29.1	-29.1	-29.1	-29.1	-29.1	-29.1
Aatm - Atmospheric Absorption									
		0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.9
Agr - Ground Attenuation									
		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation									
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver									
External Receiver - NSR1									
Sound Pressure, Lp:		42.3	36.6	24.1	16.2	13.0	9.5	7.1	-0.7

Calculation Sheet

KEF1 Casing Radiated to NSR1

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - KEF1 Casing Radiated								
Noise Levels	69.0	66.0	61.0	39.0	30.0	28.0	22.0	22.0
Noise Control Treatments								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dc - Directivity								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Adiv - Geometrical Divergence								
	-26.6	-26.6	-26.6	-26.6	-26.6	-26.6	-26.6	-26.6
Aatm - Atmospheric Absorption								
	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.7
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver								
External Receiver - NSR1								
Sound Pressure, Lp:	48.4	45.4	40.4	18.4	9.4	7.4	1.2	0.7