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Acoustic Memo

Date: 17th May 2024
Project: The Page Lounge – Kitchen Extraction System.
Client: The Page Lounge c/o Sadiq Muritala
Subject: Kitchen Extraction Noise Survey – Planning Conditions.
Document Ref.: PAG-002A-V001
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1. Introduction

The client has installed a kitchen extraction system on the rear roof of The Page Lounge in Gravesend, Kent. It is understood that Gravesend Council require the submission of a Noise Survey with respect to the planning condition provided. This acoustic memo details the methodology and results of this survey.

The aim of this assessment is to calculate and consider the noise impact of the kitchen extraction system on nearby residential dwellings. This will generally be achieved with the following objectives:

- Identify relevant receptors as per current Environment Agency Guidance and local policy.
- Undertake measurements, calculations, and assessments as per relevant guidance such as from British and International Standards to consider the impact and context of the noise within the surrounding area.
- Consider mitigation strategies to reduce noise impacts, where required.

James Gardner is an associate member of the Institute of Acoustics (aMIOA) and holds the Institute of Acoustics Diploma in Acoustic and Noise Control. He has also completed an MSc in Applied Acoustics from the University of Derby with distinction and an undergraduate degree at the University of Surrey in Music (2009). From 2010 James also operated professionally as a Sound Engineer in the live events and broadcast industry. He has developed significant experience in sound and acoustics for many applications.

2. Relevant Guidance and Criteria

2.1 Planning Condition

The relevant planning condition for the kitchen extract system is as follows:

Condition 5

Prior to the installation of any extract ventilation system and odour control equipment for the kitchen full details, including details/location of external ducting and noise attenuation measures, shall be submitted to and approved in writing by the Local Planning Authority. The approved equipment shall be maintained in accordance with the manufacturer's instructions.

Reason: In the interest of protecting the appearance of the Conservation Area and residential.

NOISE

A noise survey which should assess the worst-case scenario noise impact from the proposed extract and ventilation system, on nearby residential properties.

The survey must include details of an assessment of the whole system and any tonal elements associated it; a 1/3 octave band analysis may be necessary.

The survey must include details of the assessment of structural transmission with the use of anti-vibration mounts where necessary, linings to ductwork to prevent noise transmission, any inline silencers and provide details of where they have been installed.

The demonstration that the results of the noise survey have been incorporated in the design to ensure that the noise generated at the boundary of any noise sensitive property meets the requirements laid down in BS4142:2014 "Method for Rating and Assessing Industrial and Commercial Sound".

2.2 British Standard BS 4142:2014+A1:2019

BS 4142:2014 describes methods for assessing the likelihood of adverse comment arising as a result of commercial or industrial type noise. The methodology requires the determination of the 'noise rating level' (or $L_{Ar,Tr}$) for the noise source(s) being assessed, which is the noise of the plant plus corrections for acoustic characteristics, e.g. tonality, impulsivity, intermittency. The noise rating level is then compared against the prevailing 'background sound level' (or $L_{A90,T}$) at the noise-sensitive receptor considering the following guidance:

- Typically, the greater the difference, the greater the magnitude of the impact;
- 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; and
- The lower the rating 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. When 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.

(British Standards Institution, 2019).

3. Baseline Noise Survey

The Page Lounge is a restaurant and bar within Gravesend Town Centre. In the immediate area are other commercial properties, kitchens and restaurants and some residential flats on upper floors on Manor Rise. There are no hospitals, or schools identified within its immediate area. The premises is adjacent to Parrock Road and Manor Road and is also next to the main line railway connecting Gravesend to London. It is therefore impacted by road, rail and air noise which were observed to be dominant in the surrounding noise climate. There were other similar sources of noise visible from neighbouring properties including air handling and kitchen extraction units. At the time of attending none of these were seen to be in operation.

The measurement position was selected as practicable to ensure reliable results and without directly measuring other noise sources nearby, obstructing access, creating a hazard and to ensure its security. Remote access monitoring was also set up with GPS tracking to ensure the equipment was not tampered with or moved from site. The community background levels were measured in accordance with BS7445-1:2003 and BS4142:2014+A1:2019 at a position that is representative of the noise climate surrounding the receptors. This consisted of a rolling 24-hour unattended measurement under suitable weather conditions.

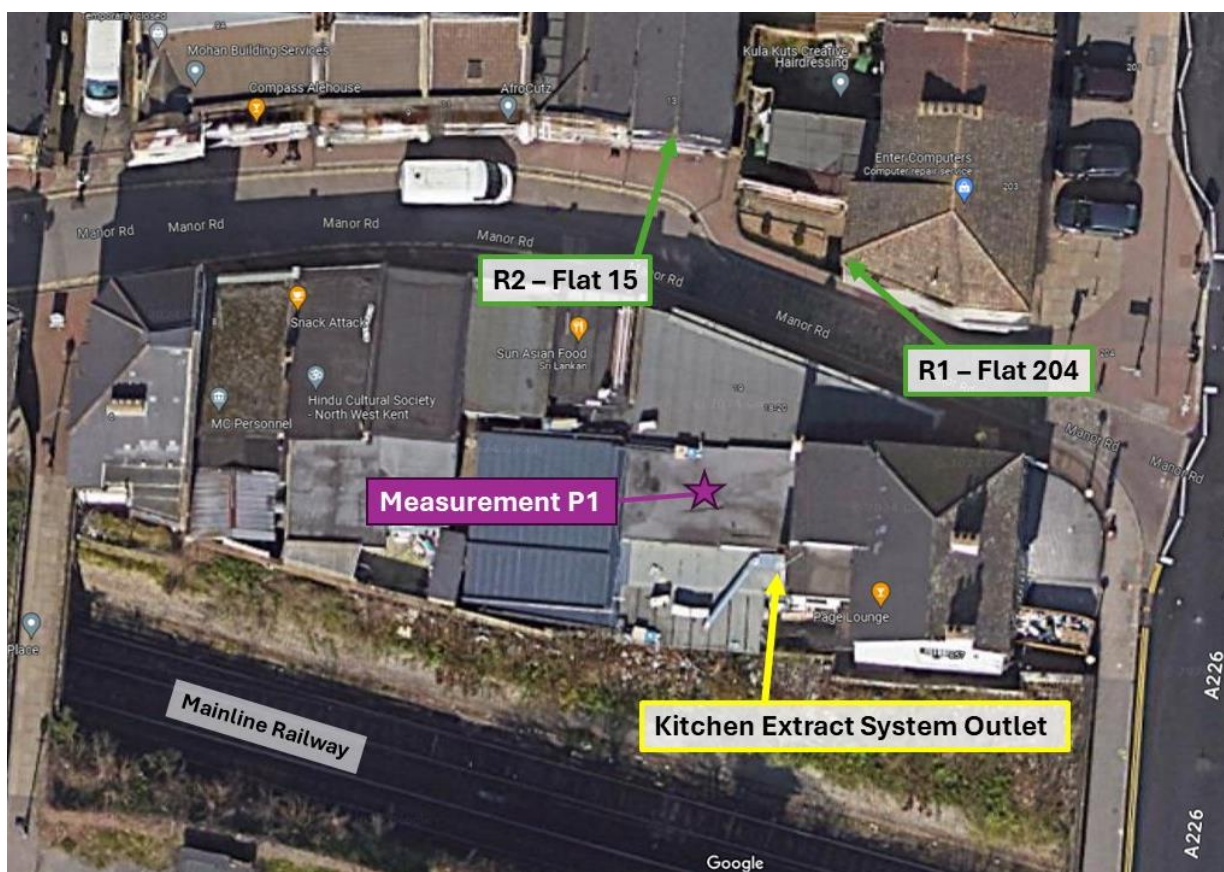


Figure 1- Map of The Page Lounge and the surrounding area.

The equipment consisting of a Svantek 307 Class 1 noise monitor and a Svantek 971a class 1 handheld meter were field calibrated before and after use with no significant drifts reported. The Svantek 307 was positioned 5m from nearest façade at a height of 1.5m above the flat roof surface. This was in line with the propagation path to the nearest receptors on Manor Road, as shown in the image (figure 2). The distance to these receptors and the source were measured with a laser. 100ms LAeq logging with a Fast response time was selected along with a contiguous 15 min interval for post processing to highlight any erroneous data.



Figure 2- Measurement position showing microphone, kitchen extraction system and nearest receptor windows (Flat.204).

BS4142 is not descriptive in the methods to be used to determine a representative figure. In the context of this data and its numerical range, the mode average was found to be representative. Relevant time periods were provided for the kitchen opening hours and the use of the extract system and the representative levels for this are included below in Table 1.

Table 1- Background noise level survey results.

	Residual Level (LAeq dB)	Representative Background Level LA90 dB
Day, 1 hour 07:00-18:00	56	51
Night, 15 min 23:00-07:00	53	40
Evening - Kitchen Opening Hours (18:00-23:00)	56	49

Further information including logging charts and meteorological conditions are included in Appendix A of this report.

4. BS4142 Noise Assessment

5.1 Kitchen Extraction System

Further information about the kitchen extraction system is included in Appendix C. It is understood that the system has been professionally installed, acoustically lined and fitted with suitable silencers. As the system is already installed, it is possible to measure the whole system in its full operation and validate it against BS4142 in situ. This will allow for a robust assessment outcome.

5.2 Assessment Results

Table 2- assessment results for kitchen extract system at nearest receptors.

BS4142 Assessment of Kitchen Extract System			
Parameter	dB(A)	Value	Description
Ambient Noise Level	57.0	LAeq	P1 Measurement including noise source (at 4.5m)
Residual Noise Level	56.0	LAeq	P1 Measurement noise source switched off
Background Noise Level (Evening 18:00-23:00)	49.0	LA90	P1 Measurement noise source switched off. Relevant time period for source operation.
Specific Noise Level (at 4.5m)	50	Ls	Ambient (-) Residual
Rating Level (at 4.5m)	52	LAr,Tr	Ls + 0dB K Corrections
On Time	100%		No % Corrections Applied Tr/To
<i>Correction Factors Total</i>		<i>2</i>	<i>Tone, Impulse, Intermittent, Other...</i>
Flat R1 Distance Correction 17m	40		Façade Incident (no gardens)
Flat R2 Distance Correction 21m	38		Façade Incident (no gardens)
Impact at Flat R1 Evening (18:00-23:00)	8		Low Impact
Impact at Flat R2 Evening (18:00-23:00)	10		Low Impact

5.3 Analysis and Discussion

Noise emissions from the whole kitchen extraction system were assessed and shown to provide a BS4142 low impact rating at the nearest residential receptors. The likelihood of an adverse comment from the noise emission from this system is therefore low.

For further consideration under the BS4142 methodology, a subjective character correction has been applied. This was perceived to be marginal as the sound was steady and broadband in nature. There was a subtle cyclic sound in the mid to upper frequencies only observable when very close to the source. At distance, the audibility of this was significantly reduced. At the receptors during the assessment the system was completely inaudible to the consultant. However, to ensure a worst case-scenario during the later evening hours, a +2dB penalty was applied. It was not seen to be necessary to undertake any further 1/3 octave or objective method of analysis as there was no perceptible tonality. Further penalties were not added, however a 100% reference on-time for the source further ensures a worst-case scenario.

It was noted on site that noise from the ducting was imperceptible, and the outlet was perceived dominant and secondary to the fan. In addition to this, there were no structural re-radiation noise issues noted or perceptible from the system as a result of its installation. At 5m the whole source was audible in the absence of very frequent transport noise, which was noted to fluctuate as dominant. Additional short measurements were therefore undertaken to quantify the specific source in the absence of these transport sounds (pausing the meter in the very limited gaps) to reduce uncertainty and provide further validation to the level calculated from the ambient using BS4142 methods.

It is additionally noted that the system was inaudible at the boundary of the building's roof (conveniently in line with the upper floor flats which were a further 10m+) and also at ground level.

The evening time-period was assessed as this is when the system will be operated. Food will not be served during night hours and the kitchen closes at 23:00. The extractor system will be switched off at night. Evening hours in this scenario therefore represents the worst-case scenario. Although the unit is not proposed to be used during the daytime (before 18:00), an assessment outcome during the day would be even less impactful due to elevated background levels. A low impact can further be also assured against all 15-minute integration periods during the evening hours (18:00-23:00) to ensure a very robust low impact rating under the prevailing time-period measured.

Context is relevant as must be considered under BS4142 assessment. It was noted given the existing noise climate, commercial nature of the area and use of the premises that the kitchen extraction system was not an unusual or distinguishable contribution to the immediate noise climate.

With this low impact assessment outcome, no mitigation is required. It is however recommended that the client performs regular servicing as per manufacturers specifications. This is to ensure that the noise emissions from the system does not increase in the future due to wear and tear or a reduced performance of the acoustically lined elements or fan, should they become clogged with grease over time.

6. Conclusion

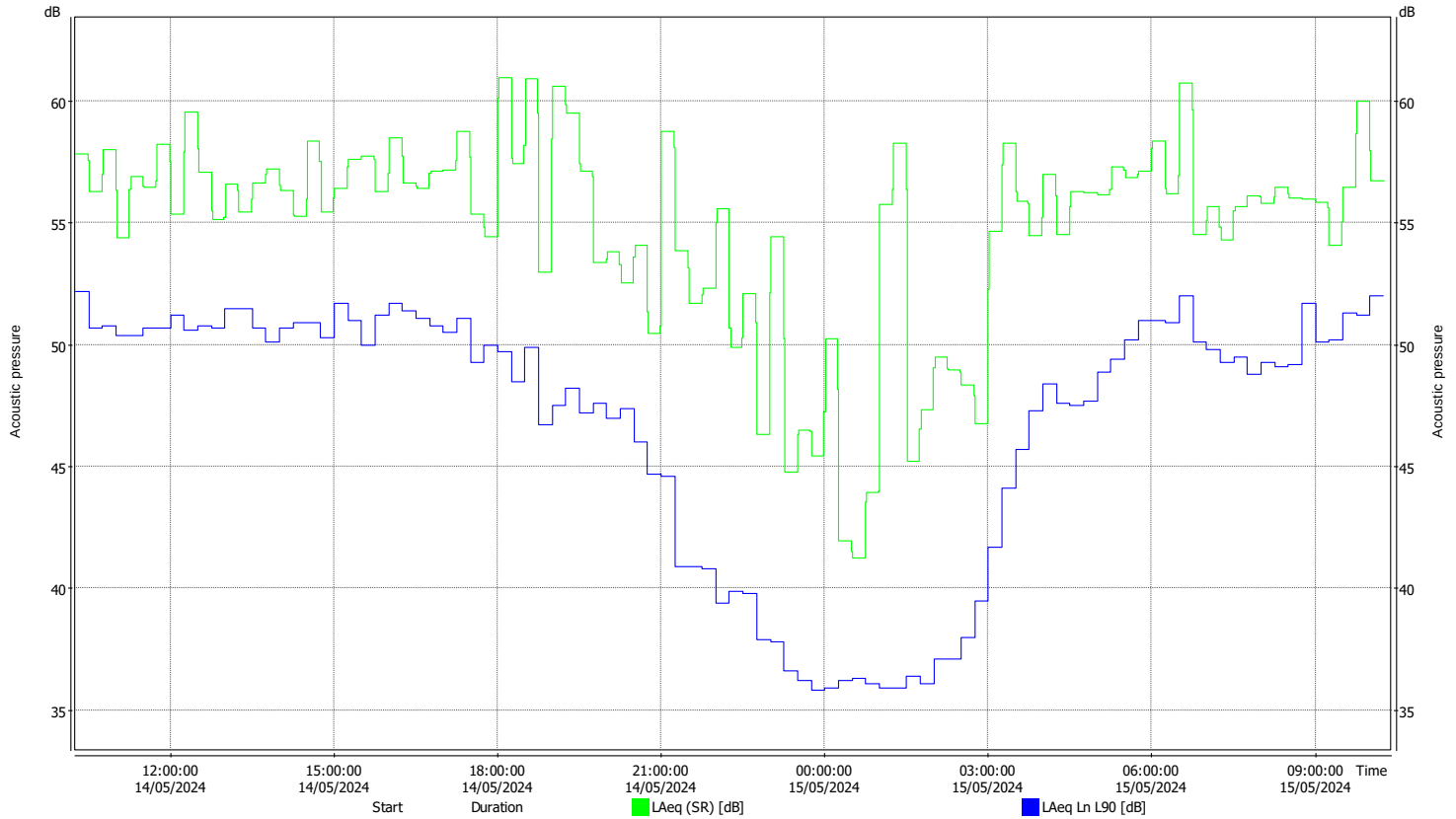
Noise emissions have been assessed from the kitchen extraction system installation based on the methodologies of British Standard BS4142:2014+A1:2019. Measured levels at the nearest receptors for the kitchen's hours of operation are anticipated to provide a low impact rating. At the nearest noise sensitive receptor this was calculated to -8dBA below the representative background level for a 100% on time and with penalties applied. With this assessment outcome it is anticipated that there would be no adverse comments relating to the whole systems noise emissions.

Appendix A

Baseline Logging Chart

Svantek 307 Class 1 with remote connection via SvanNET.

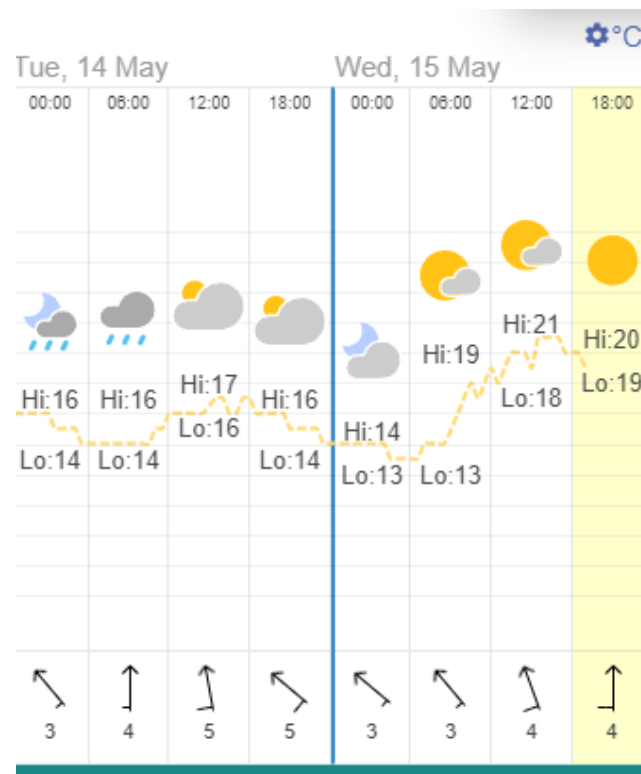
Logger results, logger step = 01:23.228



- Raw data and calibration certificates are available on request.

Appendix B

Meteorological Conditions & Observations



(Source: timeanddate.com and Custom Weather for Gravesend. Temp °C and Wind m/s)

- Measurement period was dry. (14th pm only and 15th daytime)
- No wind observed at measurement position.
- Cloud cover estimate 50%.
- 70-94% humidity recorded during 24-hour measurement period.

Appendix C

Source Information

Provided by Ventorn Engineered Ventilation Services:

Silent box fan unit AMF-500/1

- Variable direction discharge, backward curved centrifugal fan.
- High efficiency IE2 external rotors motor and IE3 for induction rotor motors. Highest quality Electric motors with thermal protection will guarantee the long life and trouble free operation due to its construction and air cool system.
- Free running High density HD backward curved Impeller is made of aluminium and dynamically balanced according to ISO10816 two plane CLASS 1.
- The double skin Acoustic panels with 25 mm flame-retardant mineral wool noise and temperature insulated will help to reduce the noise level, they are easily removable which make it easy to install in any direction as well as easy to clean and maintain.
- Aluminium frame and corners are highly shock-resistant.
- Speed controllable 0 to 100% only by High efficiency variable frequency drive, pre-programmed and fully protecting the fan against any sort of harm.
- Low sound level due to the 25mm thick acoustic panels, to absorb the noise to the highest level.
- Casing and all corners are made of corrosion resistance aluminium for longer life.
- Silent box fans can be used as extract and supply unit.



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Appendix D

Disclaimer

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