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Acoustic Memo

Date: 28th May 2024
Project: Newlyn House, Meopham, Kent, DA13 0YB– Residential AC Noise
Client: Mark Hickford
Document Ref.: NEW-001A-V001
Author: James Gardner (Director/ Acoustic Consultant)

1. Introduction

The client has installed 3 x outdoor Air Conditioning units (AC) for the purposes of comfort cooling at the rear, side and front of their residential property in Meopham, Kent. It is understood that Gravesham Council require the submission of a sound report with consideration to the noise impacts of this system on neighbouring residents. This acoustic memo details the methodology and results of this assessment.

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

- Identify relevant receptors as per current guidance and local policy.
- Undertake measurements, noise modelling, 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. Acoustic Criteria

2.1 Planning

The request for the assessment was made by Gravesham Borough Council as follows:

- Planning statement to support your application including a sound report and unit specifications.

A telephone call was made to the Planning Officer at Gravesham Council and it was agreed a BS4142 methodology should be followed for this assessment and that a low impact rating (when the rating level would not exceed the background level) would be acceptable.

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

Newlyn House is a semi-detached property in Meopham. In the immediate area are other residential properties and minor roads. There are no hospitals, or schools identified within its immediate area. The premises is situated on Norwood Lane and near the corner with Nursery Road. The noise climate mostly consists of intermittent road, and air traffic which were observed to be dominant in the surrounding noise climate.

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 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.

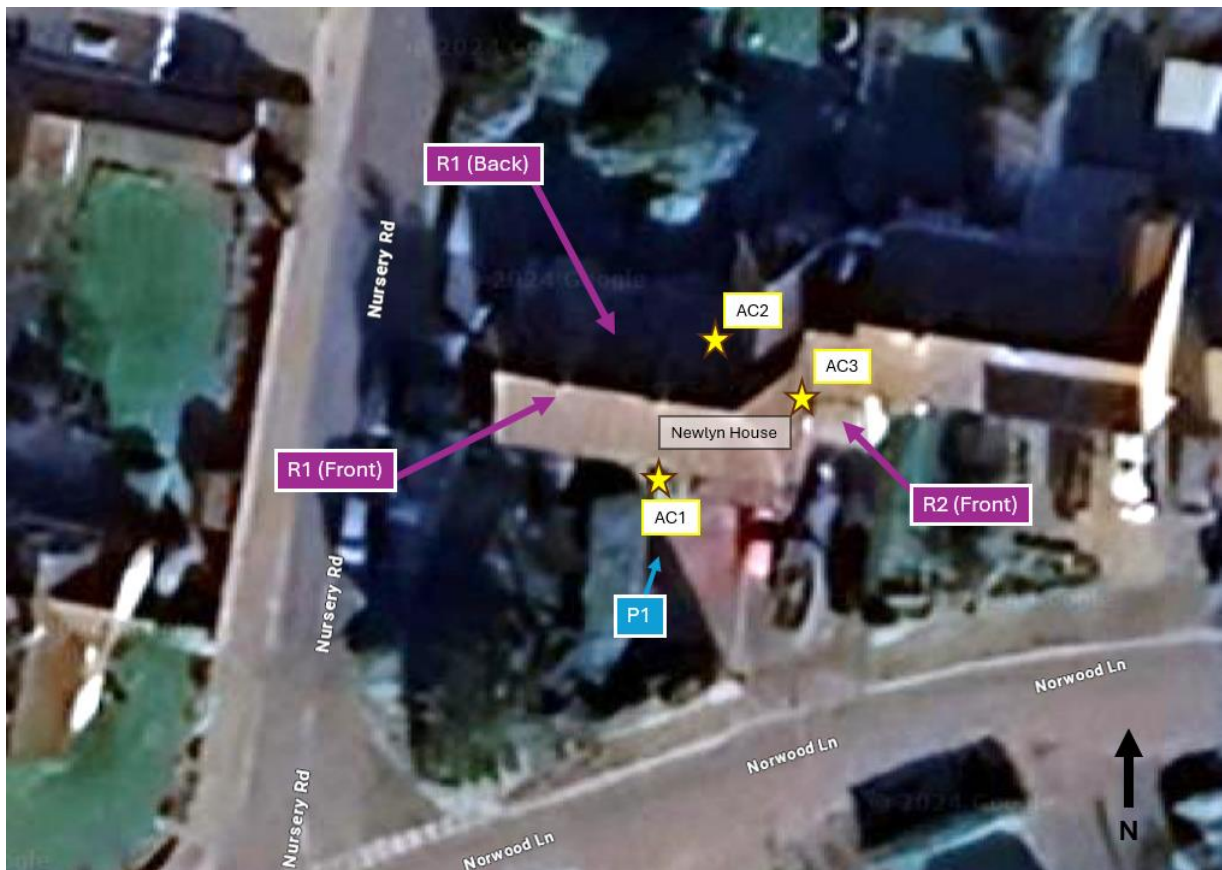


Figure 1- Map of Newlyn House, AC units and receptors.

The baseline measurement location (P1) is shown in figure 1 and 2. R1 and R2 indicates the nearest and most affected residential receptors identified alongside each AC noise source requiring assessment.

The equipment consisted of a Svantek 307 Class 1 noise monitor and this was field calibrated before and after use with no significant drifts reported. The Svantek 307 was positioned free field, in excess of 3.5m from nearest façade at a height of 1.5m above the ground and at a position representative of the nearest receptors. The distance to these receptors was also validated with a laser. A 100ms LAeq logging interval with a Fast response time was selected along with a contiguous 15 min interval for post processing to highlight any erroneous data.



Figure 2- Baseline survey measurement position.

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, multiple averages were taken and considered on balance for what was found to be representative. All time periods (07:00-23:00 day, 23:00-07:00 night) were of relevance for this assessment and the representative levels for this are included below in Table 1.

Table 1- Baseline noise level survey results.

Time Period	L90 [dBA]	Residual Level Leq [dBA]
Daytime 1 hour (07:00 - 18:00)	39	54
Night 15 min (23:00-07:00)	33	54

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

4. BS4142 Noise Assessment

5.1 AC Installation

Further information about the AC system is included in Appendix B. The system has already been installed but is understood to require relocation for visual amenity/ non-acoustic factors. Therefore, an in-situ measurement would not be considered representative, and it was recommended to follow a predictive methodology with industry standard noise modelling (SoundPlan v9) before relocating any units. This shall also inform the client if such new locations would also be viable for noise conditions.

As per figure 1:

AC1 has been assessed to be under the front window.

AC2 is under the kitchen window in the rear garden.

AC3 is shielded in the side alley of the property (2.5m above ground level).

5.2 Assessment Results

The manufacturers octave band data (Lw sound power) data for each of the units were inputted into SoundPlan V9 for calculation. Levels were calculated incident to the nearest window/façade of the residential receptors and in the nearest rear garden (R1) used for outdoor amenity.

Considerations are made for ground terrain, absorption, reflections, structures, and walls in the model, as existing or as identified in the client's drawings. Corrections were evaluated for subjective acoustic features and % on time, as determined for a reasonable worst-case scenario. The modelling assumes favourable conditions for propagation (downwind) additionally as a worst-case scenario.

The BS 4142 assessment is shown in Tables 2 and 3.

Table 2 - Assessment results for AC units impact Daytime (07:00-23:00) at nearest receptors R1 and R2.

Receptor	Worst Floor	Rating Level LAr, 1hr Day [dBA]	L90 Day [dBA]	Character Corrections	Impact	
R1 Back Window	1.FL	32	39	N/A	-7	Low
R1 Front Window	GF	31		N/A	-8	
R1 Garden	GF	23		N/A	-16	
R2 Front Dormer Window	1.FL	27		N/A	-12	

Table 3 - Assessment results for AC units impact Night-time (23:00-07:00) at nearest receptors R1 and R2.

Receptor	Worst Floor	Rating Level LAr, 15min Night [dBA]	L90 Night [dBA]	Character Corrections	Impact	
R1 Back	1.FL	29	33	N/A	-4	Low
R1 Front	GF	28		N/A	-5	
R1 Rear Garden	GF	20		N/A	-13	
R2 Front Dormer Window	1.FL	24		N/A	-9	

5.3 Analysis and Discussion

The assessment indicates a low impact rating as the cumulative source rating levels are predicted to be below the representative background for day and night-time at all receptors. Where the rating level does not exceed the background sound level, BS 4142 advises this is an indication of the specific sound source having a low impact, depending on the context.

Context was considered with respect of subjective acoustic corrections that were applied. The units were observed by the consultant in their current positions and under maximum load. They were found to be broadband (lacking any tonality), and no further impulsivity or intermittency was perceived even in close proximity. As the units are positioned in different locations, no complex phase interactions occasionally observed between multiple units (such as pulses or beats) would be anticipated.

With additional context to the very low source rating levels (all below 30 dB) the units are unlikely to be perceptible for residents. A 100% on time for day-time worst case and a 50% on time for night was considered reasonable as such units are typically only switched back on during sunrise.

AC units generally operate at lower levels with a 'night or silent mode', by reducing the fan speed, and it is recommended this feature be switched on for all units. Mitsubishi advises the silent mode will provide a further -3 dB attenuation to the above levels and so would be anticipated to further reduce the above BS4142 impact level for night hours.

With a robust BS4142 low impact and all these additional points considered, the cumulative noise levels from the units are not likely to attract adverse comment from neighbouring residents.

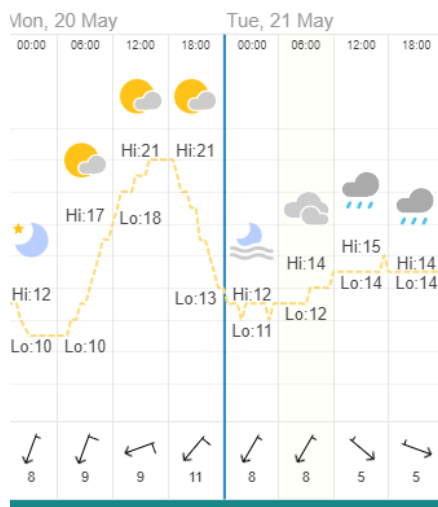
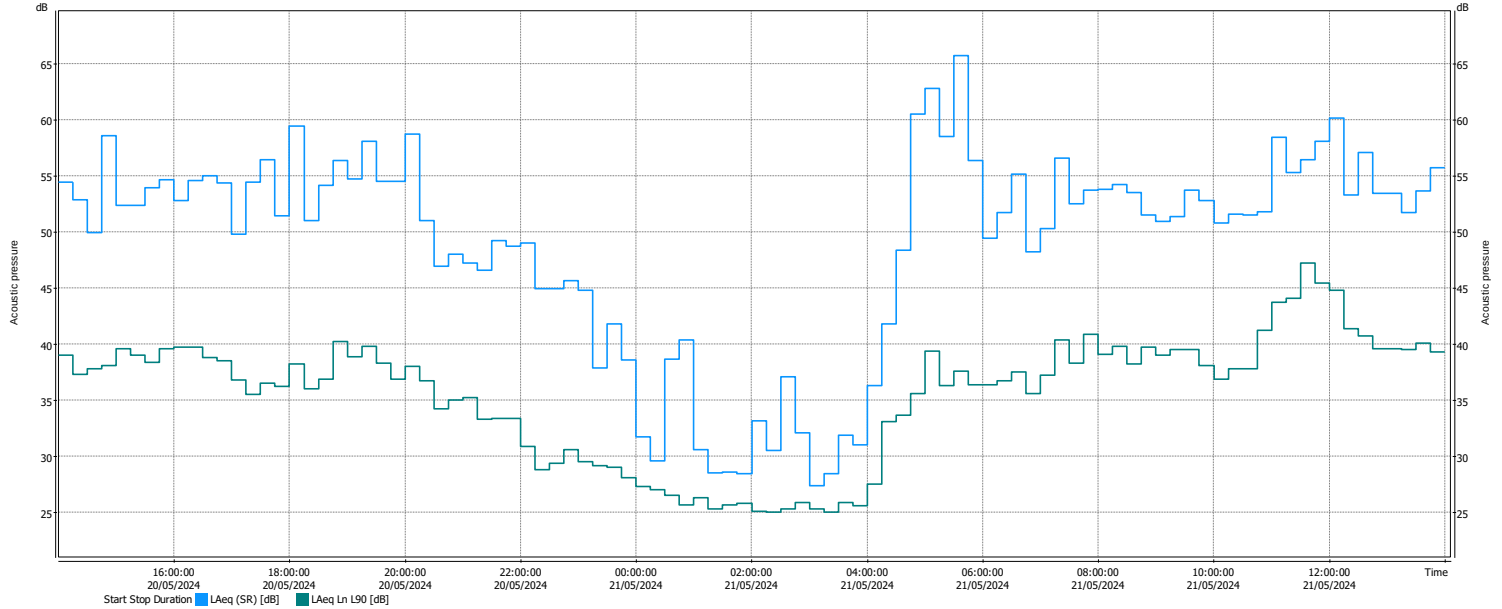
6. Conclusion

The outcome of this assessment shows that cumulative noise emissions from the 3 x AC units would not materially contribute to the ambient noise environment when compared to existing conditions. A BS4142 impact rating of low would apply at each of the neighbouring residential receptors. With consideration to the full context during day and night hours, there is a positive indication that the likelihood of adverse comment from the operation of the AC units would be low and compliant with the local authority requirements.

Appendix A - Noise Survey Overview

Svantek 307 Class 1 with remote connection via SvanNET. Calibration certificates are available on request.

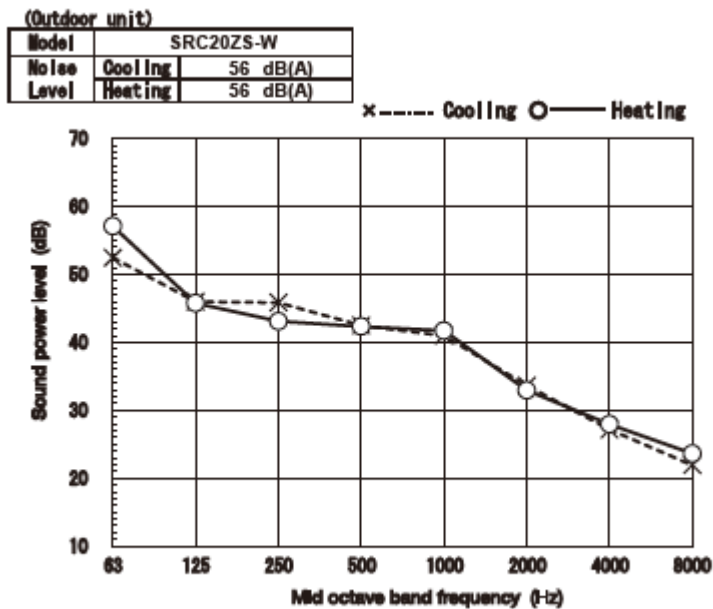
Logger results, zoom out - 57x (max envelope)



Survey Duration 20/05/2024 – 21/05/2024 (14:00-14:00). Winds m/s and Temp: C. Source: www.timeanddate.com past weather.

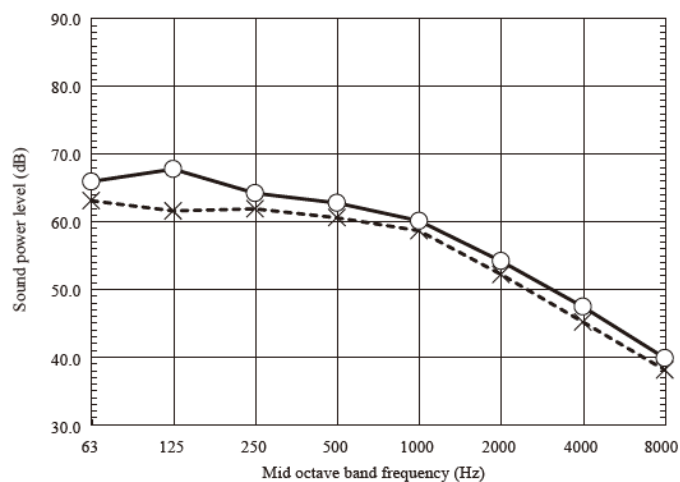
Appendix B - Manufacturers Specifications

Outdoor Model	SRC202S-W	SRC202S-WF	SCM502S-W
Outdoor Serial No.	286506524	368401927	388611465CE
Outdoor Location	B.O.H	F.O.H	R/H/SIDE HOUSE



Noise Level	Cooling	62 dB(A)	Condition	ISO15042 T1/H1
	Heating	64 dB(A)	Mode	Rated capacity value

x Cooling, ○ — Heating



Appendix C - Disclaimer

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