

Bloc [Consulting]

1 Lawrence Place, Waterloooville Noise Impact Assessment

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1 Lawrence Place, Waterloooville
Noise Impact Assessment

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The consultancy guidance provided in this report relates only to acoustic considerations, and no account has been taken by Bloc Consulting of considerations relating to other disciplines. It is the responsibility of the design team to consider any other considerations that may arise, including, but not limited to, structural or fire engineering.



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i Document History

Version	Title	Date	Created by	Authorised by
A	First Issue	10/11/2021	Andy Hiernaux BSc (Hons) PGDip MIOA Director	Andy Hiernaux BSc (Hons) PGDip MIOA Director
B	Updated issue following comments from Havant BC	23/11/2021	Andy Hiernaux BSc (Hons) PGDip MIOA Director	Andy Hiernaux BSc (Hons) PGDip MIOA Director

Bloc [Consulting]

1 Lawrence Place, Waterloooville
Noise Impact Assessment

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1 Introduction

Bloc Consulting has been appointed by Mr Nathan and Mrs Emma Sutton to undertake acoustic consultancy services at 1 Lawrence Place, Waterlooville, PO7 5FS.

Building services equipment has been installed on the roof of a single storey extension at the rear of the property and the Local Authority, Havant Borough Council (HBC) requires assessment of the noise emissions from the new units.

This report discusses the following acoustic aspects:

- The noise climate in the vicinity of the building, determined by an on-site survey
- Assessment of building services noise levels at the nearest unrelated sensitive properties

This version B of the report includes updates to reflect the comments received from the Environmental Health Officer (EHO), broadly relating to the following aspects of the assessment:

- The use of an 'absolute sound level assessment' as opposed to an assessment relative to background
- Confirmation that the third proposed unit has been omitted from this assessment by the Client
- Confirmation of aspects of the operation and assessment methodology

This version also includes consideration of updated information relating to the operation of and data for the units, obtained from the Client and the unit installer:

- Confirmation of the octave band noise emissions for the units
- Corrections to the assessment to account for:
 - o The units being used on cooling mode only, and not heating mode
 - o Management of the units for the use of one unit at a time only.

Note that a glossary of acoustic terms is available on [our website](#).

2 Local Authority Requirements

HBC's *Core Strategy*, 2011 includes the following policies relating to noise:

Policy CS16 High Quality Design, which states:

“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:

- 1. Responds to, draws inspiration from and respects local context and:
[...]
(e) The development does not cause unacceptable harm to the amenity of neighbours through [...] noise [...].”*

Policy DM10 Pollution, which states:

“Development that may cause [...] pollution through noise [...] will only be permitted where all of the following relevant criteria can be met:

- 1. The health and safety of existing and future users of the site, or nearby occupiers and residents is not put at risk.”*

This document refers to the most up to date versions of the relevant standards set out in Policy DM10, which are set out in section 3 of this document.

3 Relevant Standards and Guidance

In this case, the primary standards that have been considered in the preparation of this document are as follows:

- National Policy Statement for England (NPSE), 2010
- National Planning Policy Framework (NPPF), 2021
- British Standard (BS) 4142: 2014 *Methods for rating and assessing industrial and commercial sound*
- British Standard (BS) 7445: 2003 Part 1 *Description and measurement of environmental noise. Guide to quantities and procedures*

Note that the above list details the primary standards used and is not necessarily exhaustive.

3.1 Noise Policy Statement for England (NPSE)

The Noise Policy Statement for England was published in March 2010 and provides the overarching statement of noise policy for England applying to all forms of noise other than occupational noise, and setting out the long-term vision of Government noise policy which is to:

“Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.”

This vision is supported by the following aims:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;*
- mitigate and minimise adverse impacts on health and quality of life; and*
- where possible, contribute to the improvement of health and quality of life.”*

3.2 National Planning Policy Framework

The NPPF set out the Government’s planning policy for England. The NPPF states, with respect to noise that:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life [...].”

3.3 British Standard (BS) 4142: 2014+A1: 2019

BS 4142:2014 *Methods for rating and assessing industrial and commercial sound* (BS 4142) describes a method for assessing the likelihood of complaints from noise sources that are of an industrial nature (e.g. fans, pumps, chillers, air handling units etc.). The assessment methodology is based upon determining a ‘rating level’ for the equipment being assessed, which is the level of noise from the item or items of plant being assessed (expressed as a rating level $L_{A,T,r}$).

- The rating level is then compared with the underlying measured $L_{A90,T}$ background noise level in the absence of noise from the item or items of plant being assessed. A difference

of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context of the installation site (rural or urban, etc.).

- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- 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. 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.

BS 4142 states that a correction should be added for any plant which gives rise to noise features that may increase disturbance such as tonal, impulsive or intermittent characteristics. With respect to the acoustic feature correction, BS 4142 states that:

“Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level.”

3.3.1 Subclause 11(1) of BS 4142: 2014

Subclause 11(1) states that:

“Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

1) The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

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.”

This relates to the statement made in BS 4142: 1997 where:

“[...] background noise levels below about 30 dB and rating levels below about 35 dB are considered to be very low.”

3.4 BS 4142:2014+A1:2019 Technical Note, ANC, 2020

This technical note adds further detail to the assessment methodology relating to Subclause 11(1). It states that:

“BS 4142 does not indicate how the initial estimate of impact should be adjusted when background and rating levels are low, only that the absolute levels may be more important than the difference between the two values. It is likely that where the background and rating levels are low, the absolute levels might suggest a more acceptable outcome than would otherwise be suggested by the difference between the values. For example a situation might be considered acceptable where a rating level of 30dB is 10dB above a background sound level of 20dB, i.e. an initial estimate of a significant adverse impact is modified by the low rating and background sound levels.

The WG [Working Group] suggest that similar values would not be unreasonable in the context of BS 4142, but that the assessor should make a judgement and justify it where appropriate.”

4 Site Description

The site address, 1 Lawrence Place is in the jurisdiction of Havant Borough Council, Hampshire. The site is residential in nature, consisting of a single dwelling, and is bounded by Lawrence Place to the north, and other similar residential properties to the east, south, and west.

The area surrounding the site consists primarily of residential properties.

The local noise environment is dictated by the A3, London Road approximately 170 m to the east. This section of the A3 has been de-trunked meaning most of the traffic is local only.

Building services equipment is installed on the roof of a single storey extension to the rear (south) of the property. The nearest noise sensitive receptor is expected to be the neighbouring dwelling, 2 Lawrence Place, with its first-floor bedroom windows located approximately 7m from the building services equipment location. The impact on nearby residential properties on Newlands Avenue and River Street has also been considered.

A plan showing the site in its context with the surrounding area is presented in Figure 1.



Figure 1: Site context

5 Site Sound Survey

5.1 Unattended Measurements at Position A

Site sound surveying has been carried out by Acoustic Technician David Waidson of Bloc Consulting. The survey was long-term and unattended, carried out between Wednesday 3rd November 2021 and Friday 5th November 2021, at position A in the rear garden of 1 Lawrence Place. Photographs of the survey equipment at position A can be found in Appendix 4.

The site plan in Figure 2 details the measurement position(s) used in the survey.

This strategy was determined to obtain the lowest background sound level in the likely vicinity of the proposed plant installation, in the garden of the property. Road traffic on the A3, London Road was anticipated to be the major source of noise in the vicinity of the property.

Measurements were made in accordance with BS 7445.

Sound levels were measured using the equipment shown in Table 1. Calibration certificates for all equipment are included in Appendix 5.

Table 1: Equipment Used

Manufacturer	Equipment	Type Number	Serial Number
Svantek	Sound Level Meter	977A	92147
Svantek	Calibrator	SV33B	100012

Calibration checks were carried out both before and after the measurements with no significant variance observed (< 0.5 dB).

Noise was measured in broadband A-weighted indices.

The microphone was fitted with an environmental housing with windshield and attached to a tripod. The capsule height was approximately 1.5 m.

The unattended measurement position A in the garden of 1 Lawrence Place was a located in the free-field at least 3 m from the nearest reflecting surface.



Figure 2: Site survey plan

The weather conditions during the automated survey were dry, with variable cloud cover and temperatures between -1 and 11°C. This has been corroborated using the Wolfram Alpha service for historical weather in the area.

The Client confirmed that the condensing units were not in operation through the measurement period.

5.2 Summary Measurement Results

A summary of the representative background sound levels is shown in Table 2. These have been derived using histograms for the $L_{A90,5min}$ results, as shown in Appendix 1.

A result trace showing the background noise levels obtained through the whole measurement period is shown in the same appendix.

Table 2: Survey measured background sound levels summary, all values in $L_{A90,5mins}$ dB

Position	Period	
	Day, 07:00-19:00	Night, 23:00-07:00
A	27	23

6 Noise From External Building Services

The noise survey data have been used to assess the underlying background noise level in the vicinity of the property. These levels can be used to determine appropriate criteria according to the methodology given in BS 4142: 2014.

The nearest noise sensitive receptors (NSRs) identified by Bloc Consulting during the survey were surrounding residential properties on:

- Lawrence Place
- Newlands Avenue
- River Street

The external noise criteria in Table 3 are proposed in line with the guidance provided in BS 4142.

Table 3: External noise criteria, all values in dB

Identified noise sensitive receptor	Daytime 07:00 – 23:00		Night-time 23:00 – 07:00	
	Measured typical	Proposed rating level	Measured typical	Proposed rating level
	$L_{AF90,5min}$	$L_{Ar,T}$	$L_{AF90,5min}$	$L_{Ar,T}$
All residential properties	27	≤ 35	23	≤ 35

Note to table: Where the noise exhibits tonal, impulsive or intermittent characteristics, a reduction in the above limits is to be imposed in line with the guidance given in BS 4142:2014

The rating levels have been set considering a ‘floor’ of 35 dB, in line with the guidance in Subclause 11(1) of BS 4142 2014+A1: 2019 which is to include any penalties as per the same standard.

A rating level of this order is considered by Bloc Consulting to be ‘very low’. A rating level of 35 dB would equate to:

- A risk assessment level of ‘negligible’ as per ProPG when assessing the suitability of a site for residential development, with ‘no adverse potential effect without noise mitigation’, i.e., less than 40 dB $L_{Aeq,T}$ at night
- Assuming a loss through a façade with an open window of up to 15 dB, as stated in BS 8233: 2014, an internal noise level in the adjacent residential property of 20 dB at night, assuming that their bedroom window is open for ventilation. With the window closed, the noise level from the unit in a bedroom will be negligible and inaudible.

All supplied noise rating levels are cumulative and are therefore to be met by the summation of individual noise levels from all relevant M&E equipment working at duty load.

6.1 Installed Building Services Equipment

The following building services equipment are installed on the roof of a single storey extension at the rear of the property.

- Two Samsung AR09TXFCAWKNEU condenser units

Octave band sound pressure noise data at 1m has been received from Samsung. The noise data does not indicate tonality. The curves received have been provided in Appendix 2. These data have been used to obtain the octave band values relating to the single figure sound power levels quoted by the Manufacturer, for use in the assessments.

The Installer has also confirmed that the units are inverter controlled with small compressors, and so the noise output from this element is not significant. This aspect is included in the appended noise data.

The Client has confirmed the following operational aspects for the units:

- The units will be used in cooling mode only
- Due to the requirements of the household, only one unit will be used at a time, and this will be the intended ongoing management strategy.

This confirmation from the Client and the Installer represents a change from the assessment provided in version 1A of this report, which accounted for a 'worst case' assessment based on incomplete assumptions. These assumptions were that:

- The units could operate in heating mode, which emits a greater level of noise than cooling mode
- Two units could operate at any one time.

The Client has also confirmed that a third unit is not to form part of this assessment.

6.2 Assessment of Building Services Noise

Noise from the external condensing units has been assessed to the following locations:

- The upper floor of the residential property at number 2 Lawrence Place.
- The upper floor of nearby residential property on Rivers Street, which is also considered representative of the properties on Newlands Avenue

The named properties above are expected to be the only properties with line of sight to the units. Of the properties named, number 2 Lawrence Place was determined to be the 'worst case', potentially experiencing the greatest level of noise from the units. Calculation of the rating levels from the units are shown in Appendix 2.

The summary results of the assessment relating to the above receptors are shown in Table 4 and Table 5.

When in use, the unit is expected to exhibit intermittency, potentially switching on and off through the night. A penalty for this element has therefore been included as per BS 4142: 2014.

There is no indication of tonality from the unit sound level data, and so a penalty for this aspect has not been included in the assessment.

Table 4: Assessment to upper floor of 2 Lawrence Place

Description	Result, dB
Penalty for intermittency	+3
Calculated rating level, $L_{Ar,Tr}$	32
Representative background sound level, $L_{A90,5mins}$	23
Excess of calculated rating level over background sound level	9
Proposed rating level, $L_{Ar,Tr}$	≤ 35
Excess of calculated rating level over target rating level	-3

Table 5: Assessment to upper floor of nearest property on Rivers Street

Description	Result, dB
Penalty for intermittency	+3
Calculated rating level, $L_{Ar,Tr}$	28
Representative background sound level, $L_{A90,5mins}$	23
Excess of calculated rating level over background sound level	5
Proposed rating level, $L_{Ar,Tr}$	≤ 35
Excess of calculated rating level over target rating level	-7

The calculated noise emissions from the units at the nearest sensitive receptors are in excess of the measured background noise levels, and by a significant margin where the background noise levels are so low.

However, considering Subclause 11(1) of BS 4142, consideration is given to the absolute sound level from the units where the background sound level is very low, and:

- The noise emissions at both 2 Lawrence Place and Rivers Street from the units are expected to achieve the proposed rating level.

Additionally, the character of the noise from the units is relatively broadband and uniform. The resulting NR levels at 2 Lawrence Place and Rivers Street are 27 and 24 respectively.

7 Conclusions

Bloc Consulting has been appointed by Mr Nathan and Mrs Emma Sutton to provide a noise impact assessment in respect of building services equipment at the residential property at 1 Lawrence Place, Waterloooville.

This report has set out the details of and data from noise measurements carried out at the site.

The data have been used to determine the existing background noise climate and have been used as the basis of an assessment to assess noise emissions from external building services that have been installed to the rear of 1 Lawrence Place.

The local area is subject to 'very low' background noise levels during the day and the night. The target rating levels for the building services have been set considering the guidance from Subclause 11(1) of the current version of BS 4142: 2014+A1: 2019 which relates to situations of very low background sound levels and consideration of the absolute level of sound.

Noise from proposed building services has been assessed to the residential properties on Lawrence Place and River Street which are anticipated to be representative of the noise sensitive properties with line of sight to the units.

A penalty to account for the potential of intermittency of unit operation has been included in the assessment. The noise data received from the Manufacturer for the unit do not indicate the presence of tonality, and a penalty for this aspect has not been included in the assessment.

It is expected that noise from the units will meet the target rating level at all surrounding noise sensitive properties.

Even with windows open for ventilation at the neighbouring noise sensitive residential properties, internal noise levels in bedrooms from the equipment are expected to be negligible.

On this basis, the requirements of Havant Borough Council are considered to have been met, where the plant is:

- not expected to cause unacceptable harm to the amenity of neighbours through noise
- not expected to put the health and safety of existing and future users of the site, or nearby occupiers and residents at risk.

Appendix 1 Site Sound Survey Information

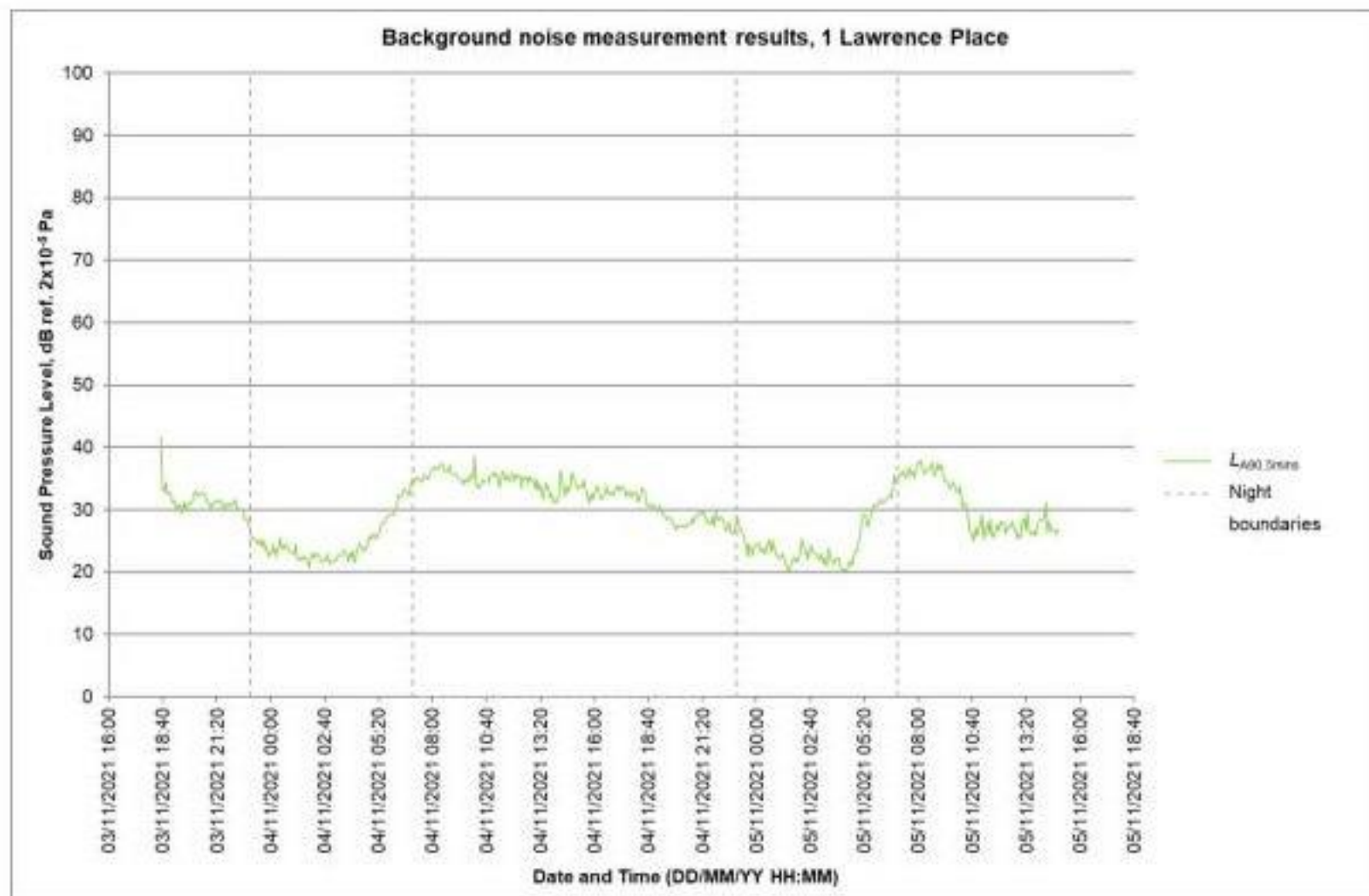


Figure 3: overall results trace for background sound levels at position A

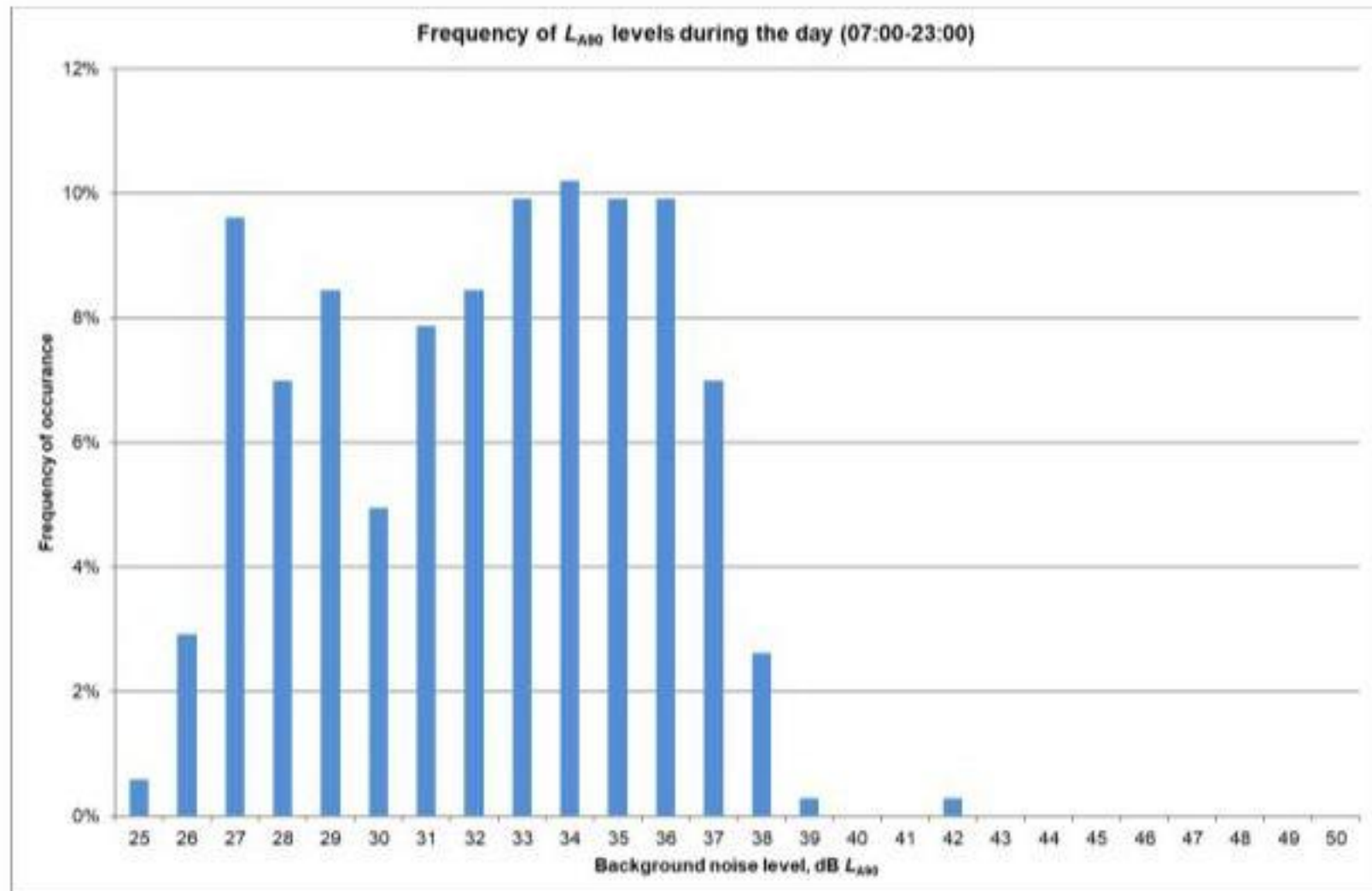


Figure 4: Histogram showing frequency of measured background sound levels during the day-time periods at position A

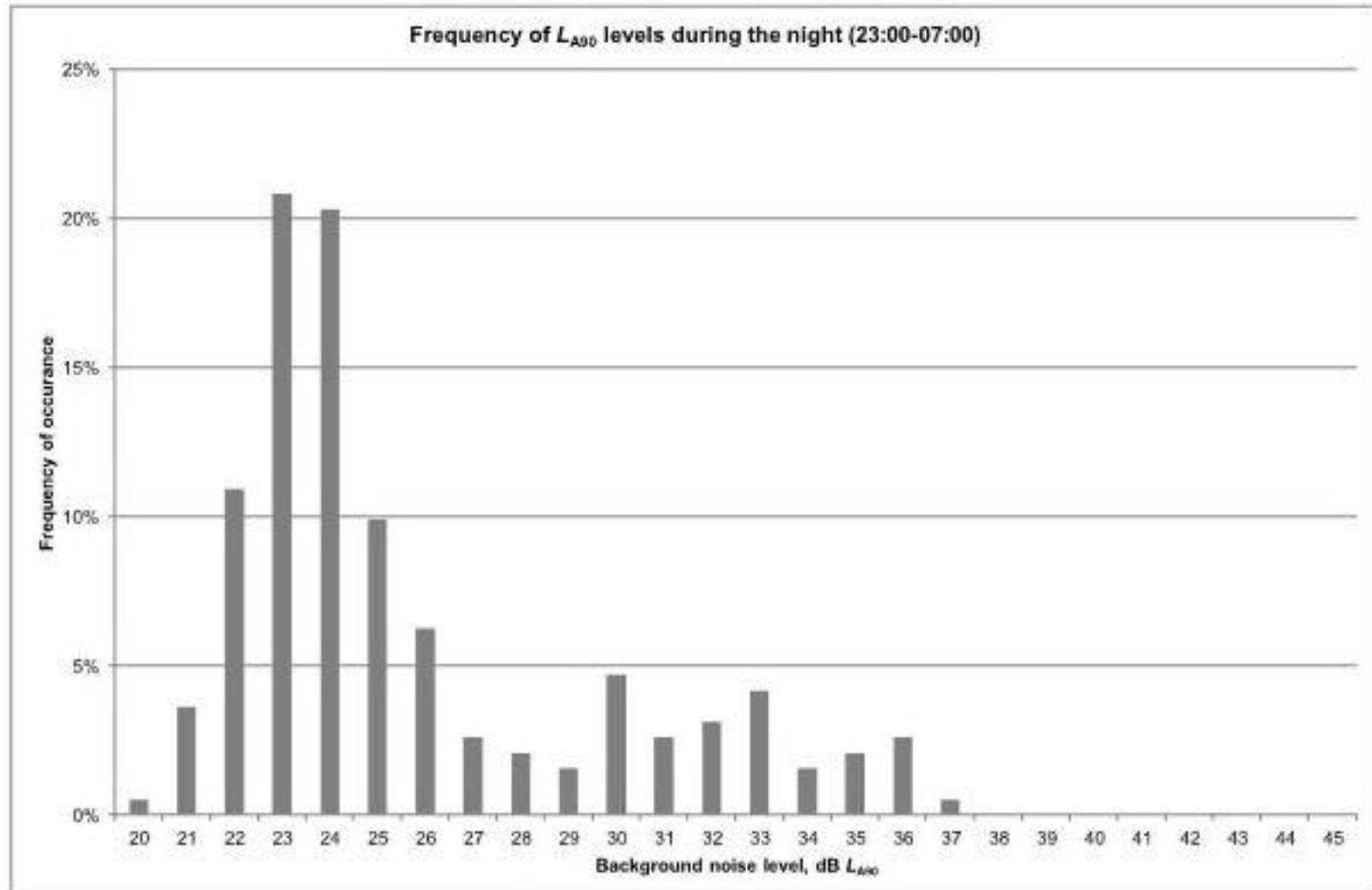


Figure 5: Histogram showing frequency of measured background sound levels during the night-time periods at position A

Appendix 2 Building Services Noise Data

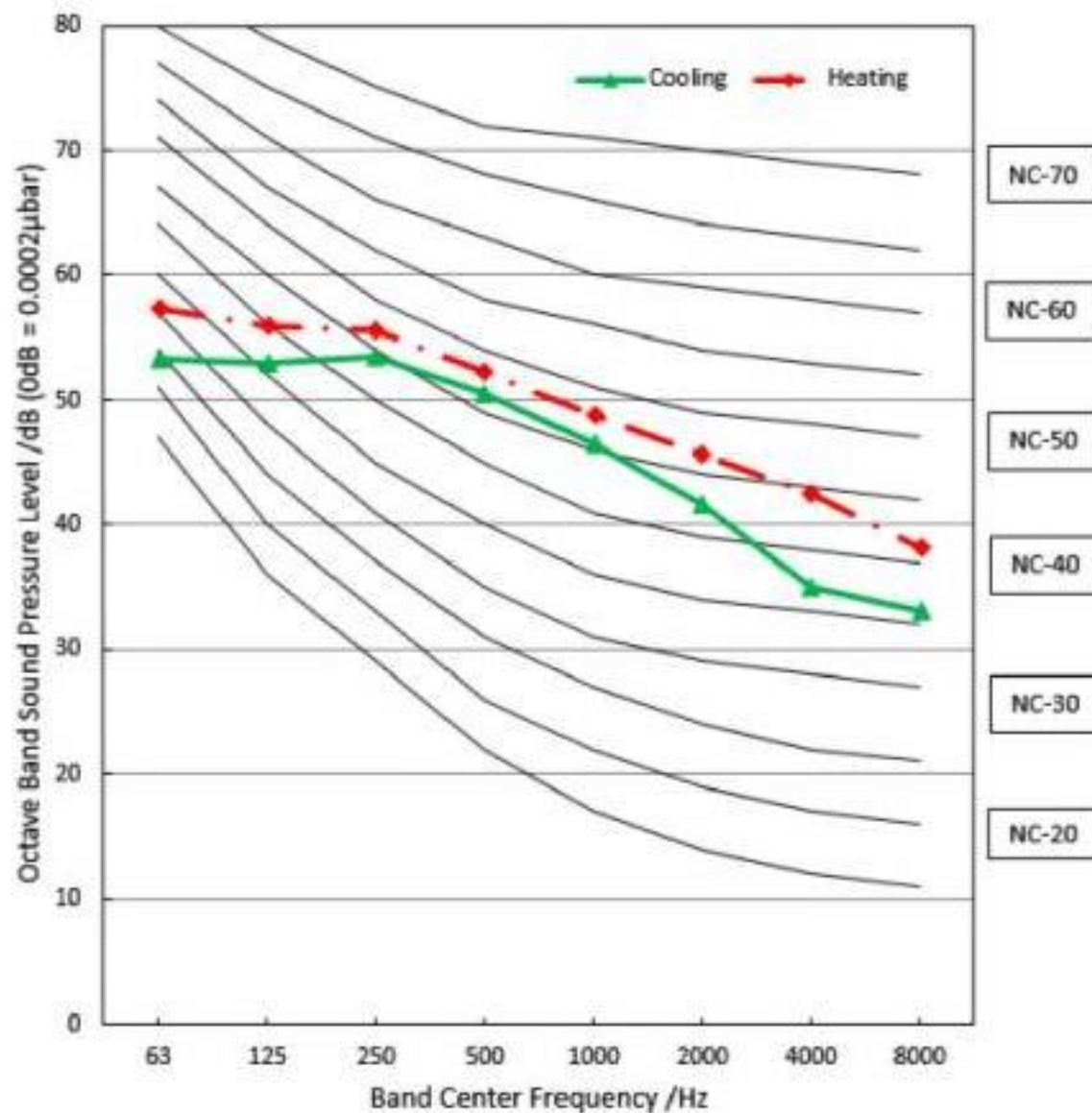


Figure 6: Noise emissions curves for heating and cooling modes, from Samsung

Samsung also confirmed the following in relation to the noise data:

The sound pressure levels relate to:

- Measurement 1m from the front face of the unit
- Measurement 0.5 x unit height from the ground plane
- Therefore considers one reflecting surface (the ground plane)

Appendix 3 Calculations of Noise from Building Services

Table 6: Assessment to upper floor window of 2 Lawrence Place

Description	dB per octave band centre frequency, Hz								dB
	63	125	250	500	1000	2000	4000	8000	
Samsung, AR09TXFCAWKNEU, Cooling (sound power levels)	60	60	61	58	55	49	42	41	60
ISO propagation losses over 7 m	-28	-28	-28	-28	-28	-28	-28	-28	
Correction for 1 reflective surfaces	3	3	3	3	3	3	3	3	
No correction for multiple units									
No barrier losses									
No individual unit enclosure									
Additional loss: Direction Loss	-6	-6	-6	-6	-6	-6	-6	-6	
No correction for unit tonality									
3 dB correction for unit intermittency	3	3	3	3	3	3	3	3	
Plant area not enclosed and open to atmosphere									
Resultant overall noise levels at 2 Lawrence Place	32	32	33	30	27	21	14	13	32
Quoted uncertainty based on Condenser unit type, ± dB	6	4	4	4	4	4	4	4	

Table 7: Assessment to upper floor window of nearest property on Rivers Street

Description	dB per octave band centre frequency, Hz								dB
	63	125	250	500	1000	2000	4000	8000	
Samsung, AR09TXFCAWKNEU, Cooling (sound power levels)	60	60	61	58	55	49	42	41	60
ISO propagation losses over 21 m	-37	-37	-37	-37	-37	-37	-37	-37	
Correction for 1 reflective surfaces	3	3	3	3	3	3	3	3	
No correction for multiple units									
No barrier losses									
No individual unit enclosure									
No correction for unit tonality									
3 dB correction for unit intermittency	3	3	3	3	3	3	3	3	
Plant area not enclosed and open to atmosphere									
Resultant overall noise levels at Rivers Street	29	29	30	27	24	18	11	10	28
Quoted uncertainty based on Condenser unit type, ± dB	6	4	4	4	4	4	4	4	

Appendix 4 Survey Photographs



Figure 7: Equipment in rear garden of 1 Lawrence Place



Figure 8: Equipment in rear garden of 1 Lawrence Place

Appendix 5 Survey Equipment Calibration Certificates



CERTIFICATE OF CALIBRATION



Date of Issue: 17 June 2020

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

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Acoustic Noise and Vibration Ltd trading as ANV Measurement Systems

Certificate Number: UCRT20/1504

Page 1 of 3 Pages

CUSTOMER Bloc Consulting
Parker House
44 Stafford Road
Wallington
SM6 9AA
Mr David Gnanaseharam

ORDER No 14015277 **Job No** UKAS20/06308

DATE OF RECEIPT 16 June 2020

PROCEDURE Calibration Engineer's Handbook, section 25: periodic testing of sound level meters to IEC 61672-3:2006 (BS EN 61672-3:2006) as modified by UKAS TPS 49 Edition 2: June 2009

IDENTIFICATION Sound level meter Svanter type SVAN 977A serial No 92147 connected via a preamplifier type SV 12L serial No 95185 to a half-inch microphone type ACO 7052E serial No 77721 fitted with a foam windshield type SA 22. Associated calibrator Svanter type SV 33B serial No 100012 with a half-inch housing.

CALIBRATED ON 17 June 2020

**PREVIOUS
CALIBRATION** None known

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Bloc [Consulting]

1 Lawrence Place, Waterlooville
Noise Impact Assessment

Laboratory Location

Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, GB-CM6 1HD
Phone 01371 871030



Certificate of Calibration

Certificate number: **U38321**

Test Object: **Sound Calibrator**

Producer: **Svantek**
Type: **SV33B**
Serial number: **100012**
Customer: **Bloc Consulting**
Address: **Parker House, 44 Stafford Road,
Wallington, Surrey. SM6 9AA.**
Contact Person: **David Waldson**
Order No:

Measurement Results	Level dB	Level Stability dB	Frequency Hz	Distortion %
Measurement 1	114.03	0.02	1000.00	0.41
Measurement 2	114.04	0.02	1000.00	0.41
Measurement 3	114.04	0.02	1000.00	0.41
Result (Average):	114.04	0.02	1000.00	0.41
Expanded Uncertainty:	0.1	0.02	1	0.1
Degree of Freedom:	>100	>100	>100	>100
Coverage Factor:	2	2	2	2

The stated level is relative to 20µPa. The level is traceable to National Standards. The stated level is valid at reference conditions. The following correction factors have been applied during the measurement

Pressure: 0 dB/kPa Temperature: 0 dB/°C Humidity: 0 dB/%RH Load volume: 0.00027 dB/mm³

Conditions	Pressure kPa	Temperature °C	Humidity %RH
Reference conditions	101.325	23	50
Measurement conditions	100.996 ± 0.042	22.8 ± 0.1	42.3 ± 1.2

The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by the coverage factor of k=2, providing a level of confidence of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level, the coverage factor is increased to maintain this confidence level. The uncertainty has been determined in accordance with UKAS requirements.

Records: K:\C A\Calibration\Nor-1504\Nor-1018 CalCal\2021\SVANSV33B_100012_M1.nmf

Preconditioning

The equipment was preconditioned for more than 4 hours in the specified calibration environment.

Method

Calibration has been performed as set out in the current version of CA Technical procedure TP01

Calibration Dates:

Received date:	22/06/2021	Reviewed date:	02/07/2021
Calibration date:	02/07/2021	Issued date:	02/07/2021

Technicians: (Electronic certificate)

Calibrated by: **Palanivel Masappan BEng (Hons), MSc**
Reviewed by: **Darren Batten**

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Appendix 6 Credentials

Bloc Consulting, a division of All Bloc Limited, has specialised in providing the UK Construction Industry with a range of acoustics services since 2019. Specialising in Building and Environmental Acoustics, all Bloc Consulting acousticians are members of the Institute of Acoustics.

Bloc Consulting has been accredited for on-site acoustic testing by Sound Insulation Testing and Measurement Association (SITMA) since 2019.

Bloc Consulting meets the relevant acoustic requirements typically required in the UK, including for sound insulation testing as defined in Approved Document E for the purposes of testing for Part E to the Building Regulations 2010 with amendments to 2015.

This report has been created and authorised by Andy Hiernaux, Director, who meets (for example) the BREEAM definition for a suitably qualified acoustician (SQA) as follows:

- Holds a BSc (Hons) degree in Audio Technology and a post-graduate Diploma in Acoustics and Noise Control from the Institute of Acoustics (IOA)
- Has been working as an Acoustic Consultant since 2006 (and within the last five years). This experience includes a practical understanding of factors affecting acoustics in relation to construction and the built environment; including, acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures.
- Holds MIOA grade Corporate Membership of the Institute of Acoustics.

This report has been read and reviewed by Andy Hiernaux and has been found to:

- Represent sound industry practice
- Be appropriate given the building being assessed and scope of works proposed
- Avoid invalid, biased and exaggerated recommendations.