

107 Vale Road Gravesend DA11 8DB

Noise Impact Assessment Report 1621.NIA.01

For

Frankham Projects
Irene House
7b Five Arches Business Park
Maidstone Road
Sidcup, Kent
DA14 5AE

03 September 2024

By
dBA Acoustics
Acoustic Consultancy
Railway Cottage 49 Arnold Road
Woking Surrey GU21 5JX
david@dbaacoustics.co.uk
www.dbaacoustics.co.uk
01483 771282

Table of contents

1.0	Introduction.....	1
2.0	Summary.....	2
3.0	Site	3
4.0	Survey.....	4
5.0	Results	5
6.0	Criteria	6
7.0	Assessment	8
8.0	Acoustic Specification.....	10
9.0	Conclusion	11

Appendix A – Environmental Noise Survey Methodology

Appendix B – Time History Graphs

Appendix C - Statistical Analysis of Prevailing Background Sound

Appendix D – Manufacturers Noise Data

Appendix E – Calculations

Appendix F - Acoustic Hardware Suppliers

Appendix G - Definition of Terms

Table 1. Author Qualifications.....	i
Table 2. Prevailing Background Sound Level	5
Table 3. Predicted Plant Noise Impact.....	9
Table 4. Enclosed ASHP Noise Emission Limit Acoustic Specification	10
Table 5. Automated Noise Monitoring Equipment Position 1	A
Table 6. Weather Conditions.....	A
Table 7. Calculations in accordance with BS8233:2014+A1:2019.....	E

Figure 1. Site Location – Map Data © Openstreetmap 2024.....	3
Figure 2. Noise Monitoring Position - Image Data © Google 2024	3
Figure 3. Proposed ASHP Location – Frankham Projects Drawing P-1327_1 10L Proposed Site Roof Plan.....	8
Figure 6. Noise Monitoring Position - Image Data © Google 2024	A
Figure 7. Time History Graph Position 1	B
Figure 8. Daytime Background Sound Statistical Analysis	C
Figure 9. Night-time Background Sound Statistical Analysis.....	C
Figure 10. Manufacturers Published Noise Data	D

Table 1. Author Qualifications

Report	Signed	Name and Position	Relevant Qualification
Undertaken and Prepared By		David Fernleigh Principal	MIOA
Checked By		David Fernleigh Principal	MIOA

This report has been prepared with all reasonable skill and care by dBA Acoustics for the Client named. Calculations and estimates made in this report are based on reasonable assumptions and good industry practice that, by their nature, involve uncertainties that could cause future on site results to differ materially from those predicted. dBA Acoustics does not guarantee or warrant any calculation or estimate made. The information contained herein is the property of, and confidential to, the Client. Any third-party information required and/or provided for the completion of this report should not be considered as verified by dBA Acoustics, unless otherwise stated.

1.0 INTRODUCTION

- 1.1 A new air source heat pump is proposed for installation in a residential redevelopment at 107 Vale Road Gravesend DA11 8DB.
- 1.2 The site is in a residential area and the adjacent properties are all residential.
- 1.3 dBA Acoustics have been commissioned to undertake a noise impact assessment in accordance with Local Authority requirements.
- 1.4 This report concerns the assessment and/or control of atmospheric noise and/or vibration affecting neighbouring noise sensitive property for the purposes of planning. Detailed mechanical, structural, H, S&E and conservation considerations are beyond the expertise of this practice and should be dealt with by the relevant professional service providers.
- 1.5 Where sound pressure levels are quoted, they are in decibels ref: 2×10^{-5} Pa. Where sound power levels are quoted, they are in decibels ref: 1×10^{-12} W, unless otherwise indicated.

2.0 SUMMARY

- 2.1 A 6day environmental noise survey has been undertaken that included a weekend period, the prevailing background noise climate has been determined.
- 2.2 A noise impact assessment has been undertaken in accordance with BS4142:2014+A1:2019 and the requirements of Gravesham Borough Council and the maximum allowable noise output of the installation determined.
- 2.3 Based on the results of the assessment a noise emission limit has been specified. Based on typical ASHP noise levels it is expected that a full acoustic enclosure will be required in order to meet the specified limit.
- 2.4 Due to the proximity of the ASHP to a bedroom of 107 Vale Road, the limit includes a consideration of noise impact to the development itself.
- 2.5 It will be necessary to ensure that the ASHP is vibration isolated from the enclosure.
- 2.6 Therefore, with the ASHP and acoustic mitigation meeting the specified noise limit, the proposals are predicted to be commensurate with the requirements of Gravesham Borough Council.
- 2.7 The proposals are subject to final approval by Gravesham Borough Council.

3.0 SITE

3.1 The plan below shows the location of the development site, as indicated in red outline:



Figure 1. Site Location – Map Data © Openstreetmap 2024

3.2 The image below shows the approximate location of the acoustic survey monitoring position:



Figure 2. Noise Monitoring Position - Image Data © Google 2024

4.0 SURVEY

- 4.1 An automated environmental noise survey was undertaken over a 6day period at the site.
- 4.2 The full methodology and results of the environmental noise survey are contained within Appendix A.

5.0 RESULTS

- 5.1 Time history graphs presenting the automated environmental survey measurements can be found within Appendix B. Full raw data is available upon request.
- 5.2 Graphs presenting the statistical analysis of the measured L_{A90} background sound levels can be found within Appendix C.
- 5.3 The following table provides a summary of the statistically most commonly occurring L_{A90} background sound levels measured over the survey period at the monitoring position.

Table 2. Prevailing Background Sound Level

Day	Statistically most common measured $L_{A90,15min}$	
	Daytime 16 hour (07:00 – 23:00)	Night-time 8 hour (23:00 - 07:00)
Wednesday	43	35
Thursday	46	37
Friday	43	40
Saturday	53	41
Sunday	49	34
Monday	40	34
Tuesday	42	n/a
Overall, as measured	40-42	36
Overall, excluding atypical	40	35

6.0 CRITERIA

6.1 The Local Authority is understood to be Gravesham Borough Council. The Environmental Health Department has been contacted and have recently confirmed their standard requirements in relation to noise emissions from new ASHPs plant affecting residential receptors, as follows:

“Generally, if the ASHPs do not fall under Permitted Development – the developer should check with planning on this, then a full BS4142 assessment will be required as per guidance for ASHP (CIEH/IOA guidance attached). Based on this, the rating level of the ASHP should not exceed 35dB at the façade of the neighbouring residential premises.”

6.2 In the assessment of commercial sound, BS4142: 2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound is a key guidance document. The standard sets out a methodology that considers the likely impact of a commercial or industrial noise source when measured and/or predicted against the acoustic environment. Corrections are given for operational duration and the presence of acoustic feature characteristics that could make the sound intrusive. Where the resulting noise level is calculated rather than measured corrections are also applied for mounting conditions, geometric propagation, screening and reflections.

6.3 The magnitude of the corrections that can be applied to the noise in question are dependent upon its severity/prominence. A penalty of between 0dB to +3dB may be applied for sound that is intermittent; 0dB to +6dB for sound that is tonal and 0dB to +9dB for sound that is impulsive. The maximum levels are applied where the acoustic feature is highly perceptible. The corrections are additive with the maximum correction being +15dB in any given case.

6.4 The standard states that generally, the greater the margin by which the specific sound emerges above the background sound level, the greater the magnitude of impact.

6.5 Guidance is given on the assessment of impact as follows:

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB or more 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 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.

- 6.6 In this instance the distance from the ASHP to the worst affected neighboring unscreened residential facade has been determined as approximately 7.5m.
- 6.7 In this instance the distance from the ASHP to the nearest proposed bedroom window of 107 Vale Road has been determined as approximately 3.5m.
- 6.8 It is noted that the advice from the Local Authority, based on the joint CIEH/IOA guidance mentioned, is based on an absolute Rating level of 35dB.

7.0 ASSESSMENT

- 7.1 The ASHP model is not yet known. Typical sound pressure levels range from say, 45dB to 55dB at 1m.
- 7.2 It is understood that the equipment will be for 24hr operation, accordingly the unit is assessed against both day and night-time requirements (see Appendix C for statistical analysis of prevailing background sound).
- 7.3 It is understood that the ASHP is proposed for location as shown in the excerpt below:

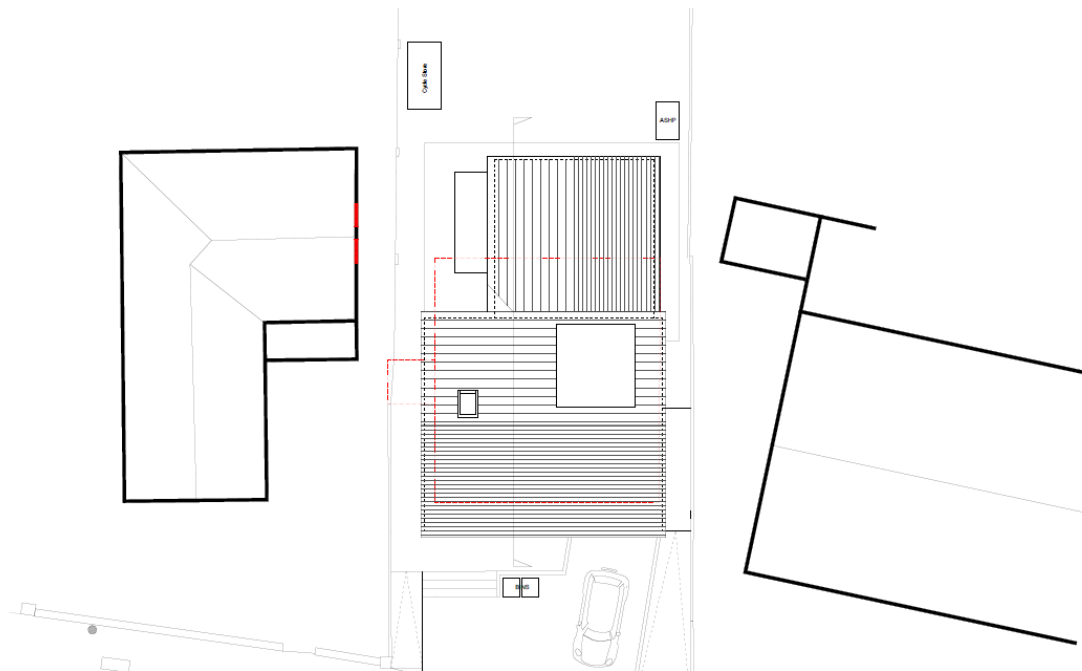


Figure 3. Proposed ASHP Location – Frankham Projects Drawing P-1327_110L Proposed Site Roof Plan

- 7.4 Preliminary calculations indicate that in the proposed location a significant noise reduction will be necessary. In this instance it is expected that a full acoustic enclosure will be required.

- 7.5 The following table provides the maximum sound pressure noise emission limit (maximum duty operation in forward or reverse cycle) with a BS4142:2014 assessment at the given receptor location with corrections applied for mounting conditions, distance loss, reflections and mitigation as appropriate, see Appendix E for details). As the noise emission output character is not yet known, corrections assuming tonality (+6dB) have also been applied.

Table 3. Predicted Plant Noise Impact

BS4142:2014 +A1:2019 Predicted Plant Noise Impact dBA (ref: 20µPa)			
Receptor	Daytime Neighbour	Night-time Neighbour	Night-time no.107 Bed
Limiting SPL at 1m from Unit	37	37	37
Residual Sound Level	49	42	42
Background Sound Level	40	35	35
Specific level at receptor	25	25	29
Acoustic Character Correction	6	6	6
Rating level	31	31	35
Background Sound Level	40	35	35
Comparison with Background Sound	9 dB below	4 dB below	Equivalent
Noise Impact	Low impact indicated	Low impact indicated	Low impact indicated
Uncertainty	Low	Low	Low

- 7.6 From table 8, above, with the proposed noise limit mitigation, the Rating level of the maximum noise output of the unit has been predicted to be lower (4dB below 35dB during the night) than the Local Authority requirement at the worst affected neighbouring façade.
- 7.7 Also, with the proposed noise limit mitigation, the Rating level of the maximum noise output of the unit has also been predicted to be no higher than Local Authority requirement and the night-time prevailing background sound level at the nearest bedroom window of the proposed development at 107 Vale Road.
- 7.8 The context is that of a quiet residential area. However, with the noise emissions meeting the 24hr requirement they will be well below the background within the daytime and evening when neighbours are more likely to be outside and in closer proximity to the ASHP. Given this context the noise impact is considered to be low.
- 7.9 The assessment is considered to have low uncertainty.
- 7.10 The acoustic specification for the proposed mitigation is given in the following section.

8.0 ACOUSTIC SPECIFICATION

- 8.1 This is a noise limit specification and applies to a single ASHP in the proposed location.
- 8.2 As has been previously mentioned it is expected that an ASHP will require full enclosure to meet this specification.
- 8.3 Noise emissions from the enclosed ASHP should not exceed the following levels:

Table 4. Enclosed ASHP Noise Emission Limit Acoustic Specification

Enclosed ASHP Noise Emission Limit dBA (ref: 20µPa)		
Plant	Operation times	Sound Pressure Level at 1m in any direction from enclosure with enclosed plant operating at any duty (Hemispherical)
ASHP	24hours	37

- 8.4 It should be noted that these limits are based on the required criteria and apply equally to the currently selected unit, any set back mode available, or any unit that might be reselected (if/as necessary).
- 8.5 The ASHP is proposed for installation close to neighbouring buildings. In accordance with best practice and as detailed in the joint CIEH/IOA guidance referenced by the Local Authority, it is recommended that the units are suitably vibration isolated with anti-vibration mounts.
- 8.6 To reduce structure borne noise affecting the acoustic enclosure, the anti-vibration mounts should be installed below the unit and within the enclosure. All services to and from vibration-isolated equipment should be flexibly connected such that there is no direct rigidly fixed connection to the treated equipment.

Please see suitable suppliers contact details in the appendix.

9.0 CONCLUSION

- 9.1 A 6day environmental noise survey has been undertaken that included a weekend period, the prevailing background noise climate has been determined.
- 9.2 A noise impact assessment has been undertaken in accordance with BS4142:2014+A1:2019 and the requirements of Gravesham Borough Council and the maximum allowable noise output of the installation determined.
- 9.3 Based on the results of the assessment a noise emission limit has been specified. Based on typical ASHP noise levels it is expected that a full acoustic enclosure will be required in order to meet the specified limit.
- 9.4 Due to the proximity of the ASHP to an overlooking bedroom of 107 Vale Road, the limit includes a consideration of noise impact to the development itself.
- 9.5 It will be necessary to ensure that the ASHP is vibration isolated from the enclosure.
- 9.6 Therefore, with the ASHP and acoustic mitigation meeting the specified noise limit, the proposals are predicted to be commensurate with the requirements of Gravesham Borough Council.
- 9.7 The proposals are subject to final approval by Gravesham Borough Council.

Report end

dBA Acoustics

APPENDIX A – ENVIRONMENTAL NOISE SURVEY METHODOLOGY

Environmental noise monitoring was undertaken for approximately 6 days commencing approximately 12:00 on Wednesday 21 August 2024. The prevailing L_{Aeq} , L_{Amax} and L_{A90} levels were logged at 15minute intervals throughout the survey period. The following sound level meter and calibrator were deployed:

Table 5. Automated Noise Monitoring Equipment Position 1

1	SLM	Preamplifier	Microphone	Calibrator
Manufacturer	Norsonic AS	Norsonic AS	Norsonic AS	Norsonic AS
Type	140	1209	1225	1255
Serial No.	1405947	15793	355507	125525261
Latest Calibration	15/07/2024			24/11/2023
Certificate No.	48322			U446049

The calibration of the sound level meter used complies with IEC 61672-3:2006 class 1.

At position 1 the sound level meter was installed above roof level the rear. The microphone was pole mounted and positioned in virtual free field conditions at a height of approximately 3.5m.

The monitoring position was approximately as shown in the aerial photo below:



Figure 4. Noise Monitoring Position - Image Data © Google 2024

A proprietary windshield and extension cable was deployed. The entire signal path was checked for calibration pre and post survey. The calibrated meter readings pre and post survey indicated no calibration shift greater than 0.2dB.

The following table details the weather conditions at the beginning and end of the survey period:

Table 6. Weather Conditions

Condition	Start	End
Wind Speed ms^{-1}	<1.8	<3.9
Wind Direction (from)	southeast	south
Precipitation or Fog	no	no
Wet Ground	no	no
Frozen Ground or Snow	no	no
Temperature $^{\circ}\text{C}$	19	22
Cloud Cover %	40	10

It is understood the weather over the Thursday and Friday included high winds, the weekend period was understood to be generally fine with no heavy rainfall or strong wind.

During the manned periods at the beginning and end of the automated survey the prevailing ambient sound was noted to be general road traffic noise (distant).

The conditions measured or noted above were deemed acceptable for obtaining suitably representative measurements with atypical events omitted, as/where necessary.

APPENDIX B – TIME HISTORY GRAPHS

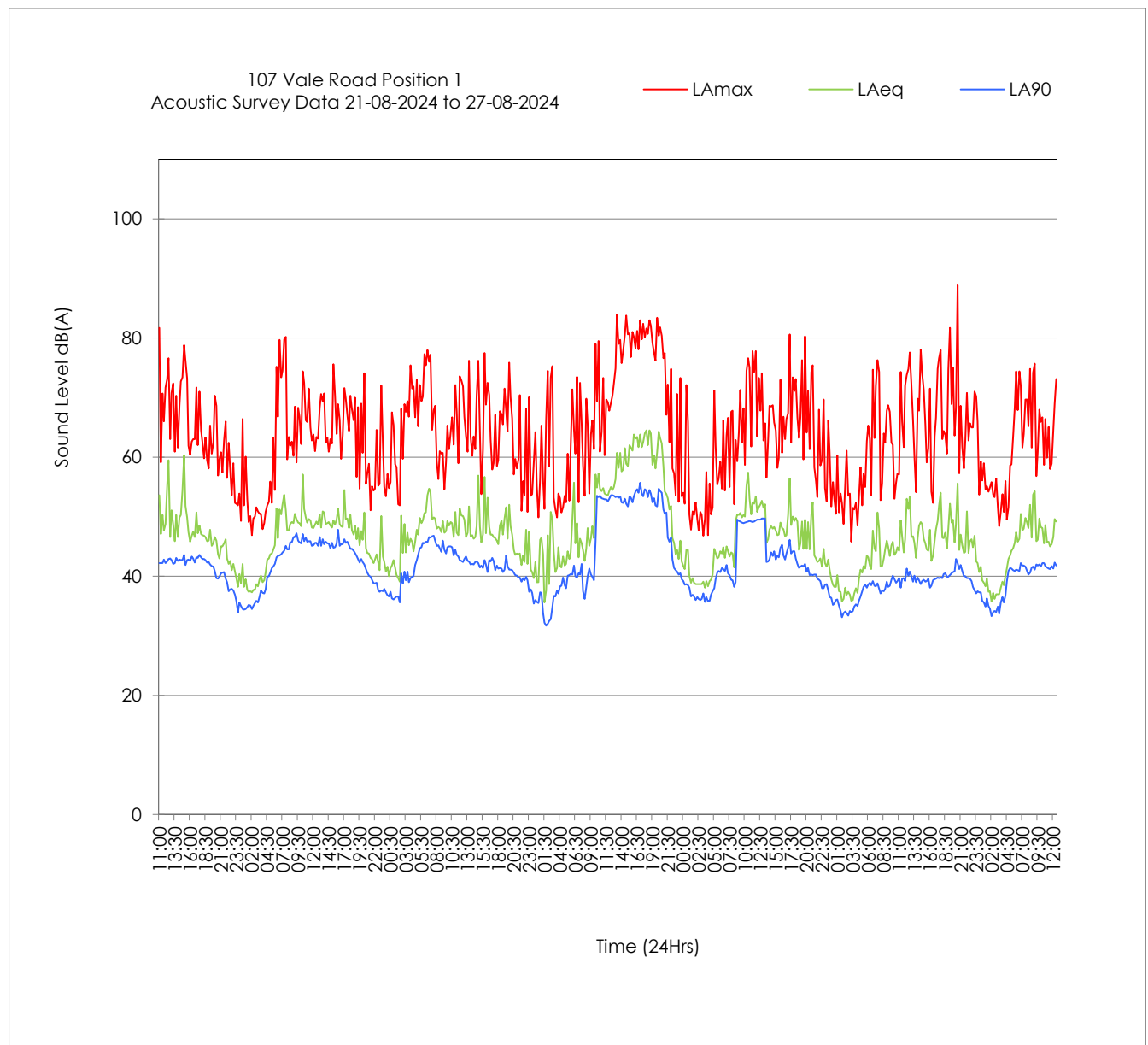


Figure 5. Time History Graph Position 1

APPENDIX C - STATISTICAL ANALYSIS OF PREVAILING BACKGROUND SOUND

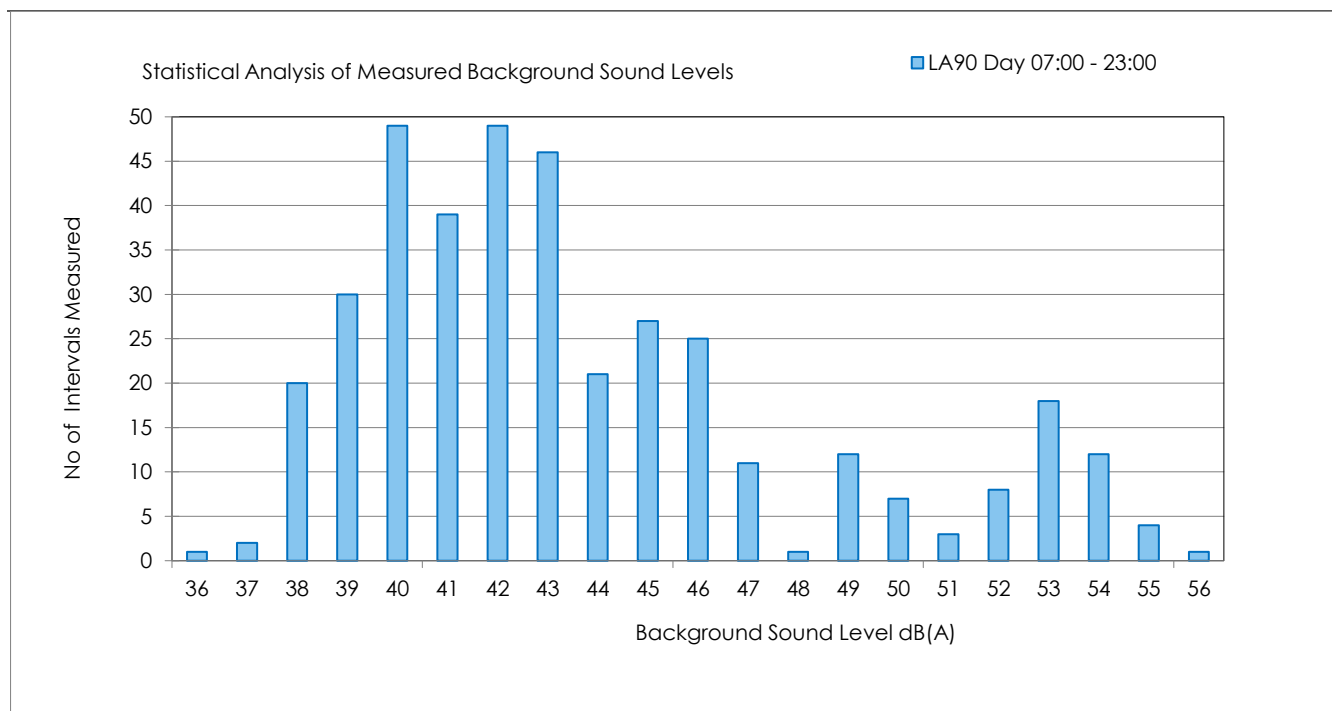


Figure 6. Daytime Background Sound Statistical Analysis

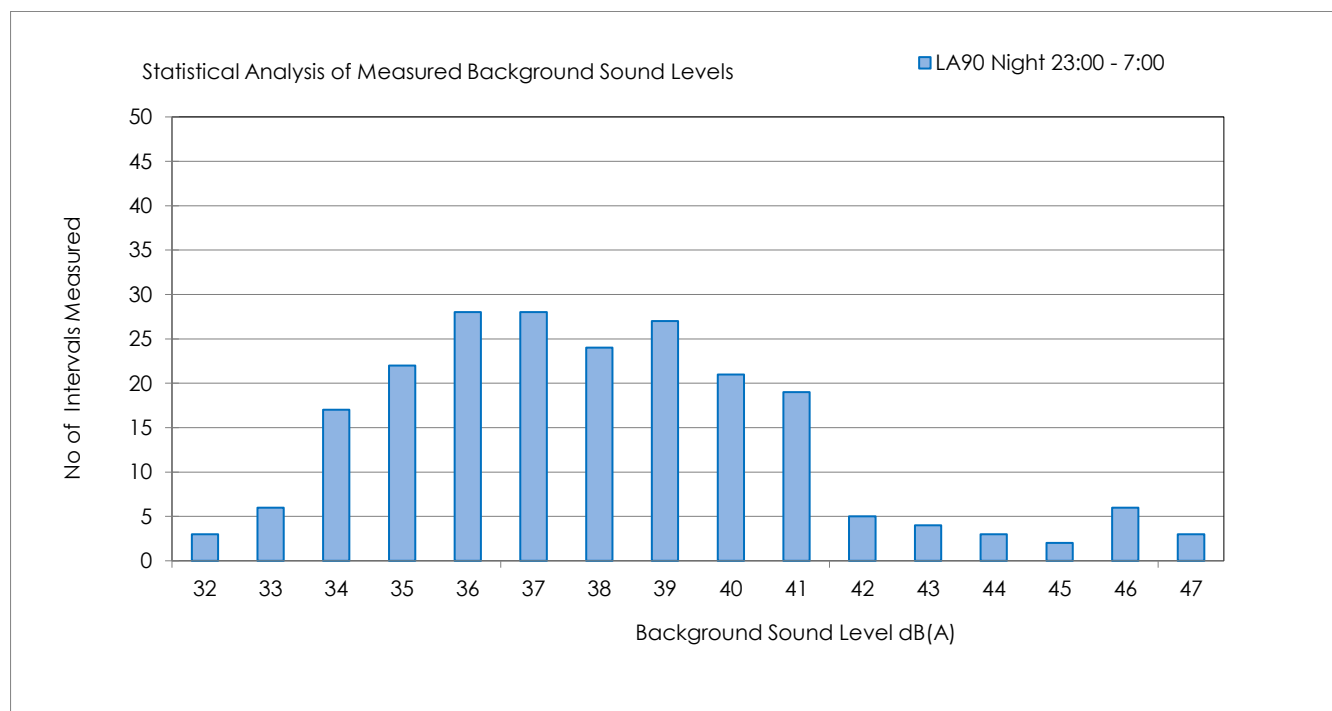


Figure 7. Night-time Background Sound Statistical Analysis

APPENDIX D – MANUFACTURERS NOISE DATA

N/A ASHP not yet selected

Figure 8. Manufacturers Published Noise Data

APPENDIX E – CALCULATIONS

Table 7. Calculations in accordance with BS8233:2014+A1:2019

1st floor overlooking unscreened neighbour			ground floor screened neighbour			1st floor bedroom 107 Vale Rd		
	Lp limit	37		Lp limit	37		Lp limit	37
	Q	3		Q	3		Q	3
7.5	Distance	-17.5012	5	Distance	-13.9794	3.5	Distance	-10.8814
	Screening			Screening	-5		Screening	0
	Reflection	3		Reflection	3		Reflection	0
	Specific	25.49877		Specific	24.0206		Specific	29.11864
	Character	6		Character	6		Character	6
	Rating	31.49877		Rating	30.0206		Rating	35.11864
	Background	35		Background	35		Background	35
	Excess	-3.50123		Excess	-4.9794		Excess	0.118639

APPENDIX F - ACOUSTIC HARDWARE SUPPLIERS

Absorbent Panels/Linings

Allaway Acoustics Ltd
1 Queens Road
Hertford
SG14 1EN
Tel: 01992 550825
www.allawayacoustics.co.uk

Environmental Equipment Corporation Ltd
Richmond House, Churchfield Road
Walton-on-Thames, Surrey
KT12 2TP
Tel: +44 (0) 1932 230940
Email: info@eecnoisecontrol.co.uk
Web: <http://eec.co.uk>

Acoustic Enclosures

Environmental Equipment Corporation Ltd
Richmond House, Churchfield Road
Walton-on-Thames, Surrey
KT12 2TP
Tel: +44 (0) 1932 230940
Email: info@eecnoisecontrol.co.uk
Web: <http://eec.co.uk>

Noise Solutions Ltd
Unit 5 Oriel Court
Omega Park
Alton
GU34 2YT
Tel: 01252 519881
www.noisesolutions.co.uk

Vibration Isolation hardware

Environmental Equipment Corporation Ltd
Richmond House, Churchfield Road
Walton-on-Thames, Surrey
KT12 2TP
Tel: +44 (0) 1932 230940
Email: info@eecnoisecontrol.co.uk
Web: <http://eec.co.uk>

Noise Solutions Ltd
Unit 5 Oriel Court
Omega Park
Alton
GU34 2YT
Tel: 01252 519881
www.noisesolutions.co.uk

Acoustic Screening

Graham Barrier Systems Ltd
The Stables
Codham Hall
Great Warley
Brentwood
Essex
CM13 3JT
<https://www.grammbarriers.com>
01323 872243

ETS Ltd (Green barrier)
Newton Brae
Foulden
Berwick Upon Tweed
TD15 1UL
http://etsluk.com/acoustic_green_barriers.html
01289 386664

APPENDIX G - DEFINITION OF TERMS

$L_{Aeq,T}$ is the equivalent continuous A-weighted sound pressure level defined in BS4142:2014 as the value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time.

L_{A90} is the background sound level as defined in BS4142:2014 as the A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T , measured using time weighting F and quoted to the nearest whole number of decibels.

L_{Amax} Defined in WHO as the maximum outdoor sound pressure level associated with an individual noise event.

Background Sound Level is the L_{A90} , see above.

BB93 is Building Bulletin 93 "Acoustic Design of Schools: Performance standards" and sets out the minimum performance standards for the acoustics of school buildings.

IANL as defined in BB93 is the indoor ambient noise level within teaching accommodation and is comprised of a 30minute L_{Aeq} .

Ambient Sound as defined by BS4142:2014 is the totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far.

Specific Sound as defined by BS4142:2014 is the sound source being assessed.

Residual Sound as defined by BS4142:2014 is the ambient sound remaining at the assessment location when the specific sound is suppressed to such a degree that it does not contribute to the ambient sound.

Rating Level as defined by BS4142:2014 is the specific sound level plus any adjustment for the characteristic features of the sound.

Tonal Characteristic as defined by BS4142:2014 Annex C: For a prominent, discrete tone to be identified as present, the time-averaged $L_{Zeq,T}$ sound pressure level in the one-third-octave band of interest is required to exceed the time-averaged $L_{Zeq,T}$ sound pressure levels of both adjacent one-third-octave bands by some constant level difference.

The level differences between adjacent one-third-octave bands that identify a tone are:

- 15 dB in the low-frequency one-third-octave bands (25 Hz to 125 Hz);
- 8 dB in the middle-frequency one-third-octave bands (160 Hz to 400 Hz); and
- 5 dB in the high-frequency one-third-octave bands (500 Hz to 10 000 Hz).

WHO refers to the World Health Organisation.