28 Charlotte Street London W1T 2NF

Noise Impact Assessment Report 1611.NIA.01

For

Mr Matteo Caraccio,

28 Charlotte Street,

London, W1T 2NF

06 August 2024

By
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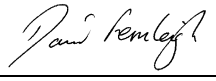
Table 1. Author Qualifications

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

1.0 INTRODUCTION

1.1 New air source heat pump plant is proposed for installation in the rear 28 Charlotte Street London W1T 2NF.

1.2 The site is in a mixed commercial and residential area and the adjacent properties are partly 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 5day 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.

2.3 Based on the results of the survey and proposed enclosure mitigation, the BS4142:2014+A1:2019 noise impact assessment undertaken predicts that the calculated Rating Level should be at least 10 dB below the prevailing background sound level. This level corresponds to LOAEL in terms of the guidance given in the London Borough of Camden's Local Plan (2017).

2.4 Therefore, with the ASHP and acoustic mitigation as specified, the proposals are predicted to be commensurate with the requirements of the London Borough of Camden.

2.5 The proposals are subject to final approval by the London Borough of Camden.

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 © Google 2024*

3.2 The image below shows the approximate location of the acoustic survey monitoring position and surrounding land uses:

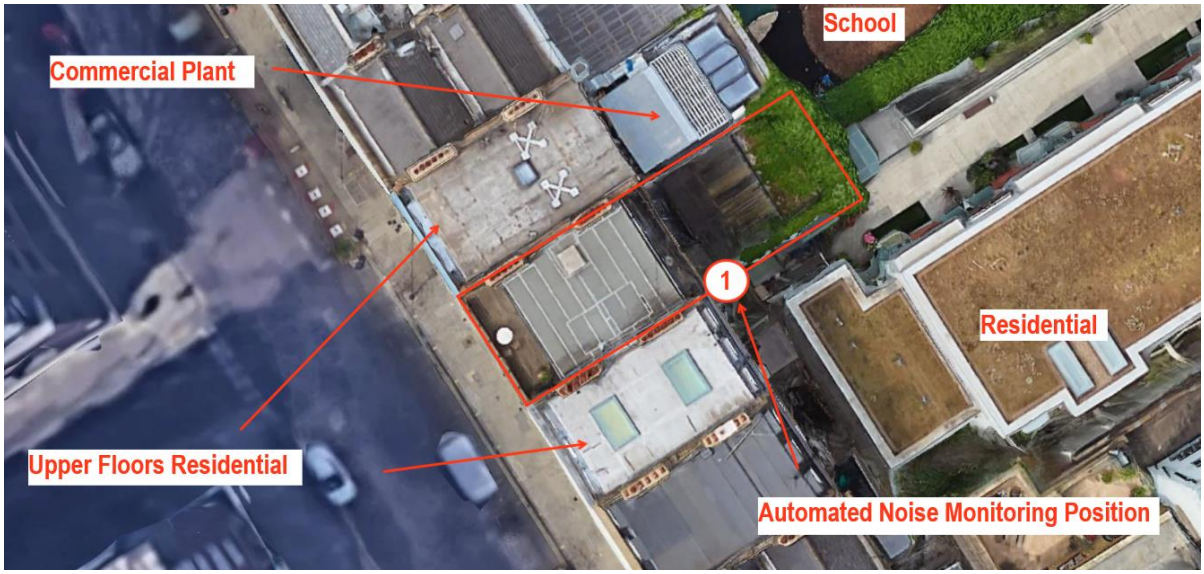


Figure 2. Noise Monitoring Position - Image Data © Google 2024

4.0 SURVEY

4.1 An automated environmental noise survey was undertaken over a 5day 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)
Thursday	46	38
Friday	45	38
Saturday	46	44
Sunday	44	34
Monday	44	37
Tuesday	43	-
Overall	44	37

6.0 CRITERIA

6.1 The Local Authority is understood to be the London Borough of Camden. Their standard requirements in relation to noise emissions from new items of building services plant affecting residential receptors are set out on pages 346 and 347 of the Local Plan adopted 2017, reproduced below:

> ***"Industrial and Commercial Noise Sources***
> *A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).*
>
> ***Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)***

Existing Noise sensitive receptor	***Assessment Location***	***Design Period***	***LOAEL (Green)***	***LOAEL to SOAEL (Amber)***	***SOAEL (Red)***
*Dwellings***	*Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)*	*Day*	*'Rating level' 10dB* below background*	*'Rating level' between 9dB below and 5dB above background*	*'Rating level' greater than 5dB above background*
*Dwellings***	*Outside bedroom window (façade)*	*Night*	*'Rating level' 10dB* below background and no events exceeding 57dBLAmax*	*'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB LAmax*	*'Rating level' greater than 5dB above background and/or events exceeding 88dBLAmax*

> **10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required."*

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 plant to the nearest residential facade has been determined at approximately 8m.

6.7 Based on the Local Authority Criteria of 10dB below background sound and the statistical analysis of the prevailing background sound the maximum allowable plant noise emissions incident at the receptor locations given above are presented in the following table:

Table 3. Plant Noise Emission Criteria

Day	Plant Noise Emission Criteria $L_{Aeq,T}$	
	Daytime 16 hour (07:00 – 23:00)	Night-time 8 hour (23:00 - 07:00)
Any	34	27

*should the plant present any distinguishable acoustic characteristics (e.g. tonality) the above criteria should be reduced by 5 dB in accordance with the requirements of the Local Authority.

7.0 ASSESSMENT

7.1 The proposed air conditioning external condenser is a Samsung EHS Mono R290 16kW, a copy of the manufacturer's published noise data is contained within Appendix D. The data indicates the maximum noise output as 51dB assuming spherical radiation.

7.2 It is understood that the equipment will potentially be for 24hr operation, accordingly the unit is assessed against both the prevailing day and night-time background sound (see Appendix C for statistical analysis).

7.3 The drawing excerpt below indicates the proposed location for the ASHP towards the north of the rear 1st floor roof:

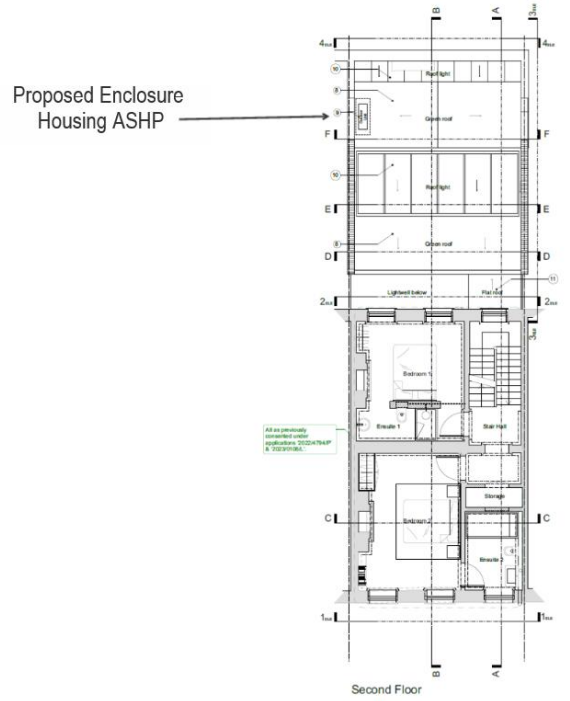


Figure 3. Proposed 2nd Floor Plan Excerpt – Studio Stassano drawing no. 2820) A02

7.4 The plant location is within the bounds of a significant masonry wall on three sides. The nearest and worst affected receptors are therefore considered to be located at the adjacent rear façade of nos. 26 and 30 Charlotte Street, the nearest of which is estimated at 8m distance from the plant.

7.5 The following table predicts the worst-case plant noise emissions (maximum duty operation predicted at the given receptor locations with corrections applied for mounting conditions, distance loss, reflections and mitigation as appropriate, see Appendix E for details). A 3dB acoustic character correction has also been assumed.

Table 4. Predicted Plant Noise Emissions

BS4142:2014 +A1:2019 Predicted Plant Noise Emissions with Mitigation dBA (ref: 20μPa)		
Receptor	Daytime	Night-time
Residual Sound Level	49	42
Background Sound Level	44	37
Limiting SPL at 1m from Enclosed Unit	40	32
Q Mounting Conditions	+6	+6
Reflections	+3	+3
Distance Loss (8m)	-18	-18
Specific level at receptor (façade)	31	24
Acoustic Character Correction	+3	+3
Rating level	34	27
Background Sound Level	44	37
Comparison with Background Sound	10 dB below	10 dB below
Noise Impact	**Low impact indicated**	**Low impact indicated**
Uncertainty	Low	Low

7.6 From table 8, above, it can be seen that with the proposed mitigation, the Rating level of the maximum noise output of the enclosed unit has been predicted to be approximately 10dB below the background sound level at the worst affected neighbouring facade.

7.7 The assessment is considered to have low uncertainty.

7.8 The acoustic specification for the proposed enclosure mitigation is given in the following section.

8.0 ACOUSTIC SPECIFICATION

8.1 The "off-the-shelf" type acoustic enclosures are generally expected to be capable of delivering a practical attenuation up to approximately 20dB so should be capable of providing adequate noise reduction in this context.

8.2 The following table specifies the maximum day and night-time plant noise emission limits for the enclosed plant assuming spherical radiation (for calculations please see appendix).

Table 5. Enclosure Acoustic Specification

Maximum Enclosure Noise Emission Limits		
Plant	Operation times	Sound Pressure Level at 1m in any direction from enclosed plant operating at any duty
Any	Daytime only (07:00 – 23:00)	40
Any	Night-time (23:00 – 07:00)	33

8.3 The above noise limits assume no tonal characteristic is present following the noise reduction effect of the mitigation, if tonal characteristics are present the above limits should be reduced by a further 5dB in accordance with the requirements of the Local Authority.

Please see suitable suppliers contact details in the appendix.

8.4 The unit is proposed for installation above the owner's habitable space and is indirectly structurally linked to adjacent property. As such, it is recommended that the unit is suitably vibration isolated.

8.5 To reduce the likelihood of structure borne noise from the enclosure unit, 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 are no direct rigidly fixed connections to the treated equipment.

Please see suitable suppliers contact details in the appendix.

9.0 CONCLUSION

9.1 A 5day 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.

9.3 Based on the results of the survey and proposed enclosure mitigation, the BS4142:2014+A1:2019 noise impact assessment undertaken predicts that the calculated Rating Level should be at least 10 dB below the prevailing background sound level. This level corresponds to LOAEL in terms of the guidance given in the London Borough of Camden's Local Plan (2017).

9.4 Therefore, with the ASHP and acoustic mitigation as specified, the proposals are predicted to be commensurate with the requirements of the London Borough of Camden.

9.5 The proposals are subject to final approval by the London Borough of Camden.

Report end
dBA Acoustics

APPENDIX A – ENVIRONMENTAL NOISE SURVEY METHODOLOGY

Environmental noise monitoring was undertaken for approximately 5 days commencing approximately 10:00 on Thursday 4 July 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 6. 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	08/07/2022			24/11/2023
Certificate No.	41442			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 at the boundary close to the rear façade at first floor level. The microphone was pole mounted and positioned 1m from the facade at a height of approximately 2.1m from 1st floor level.

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

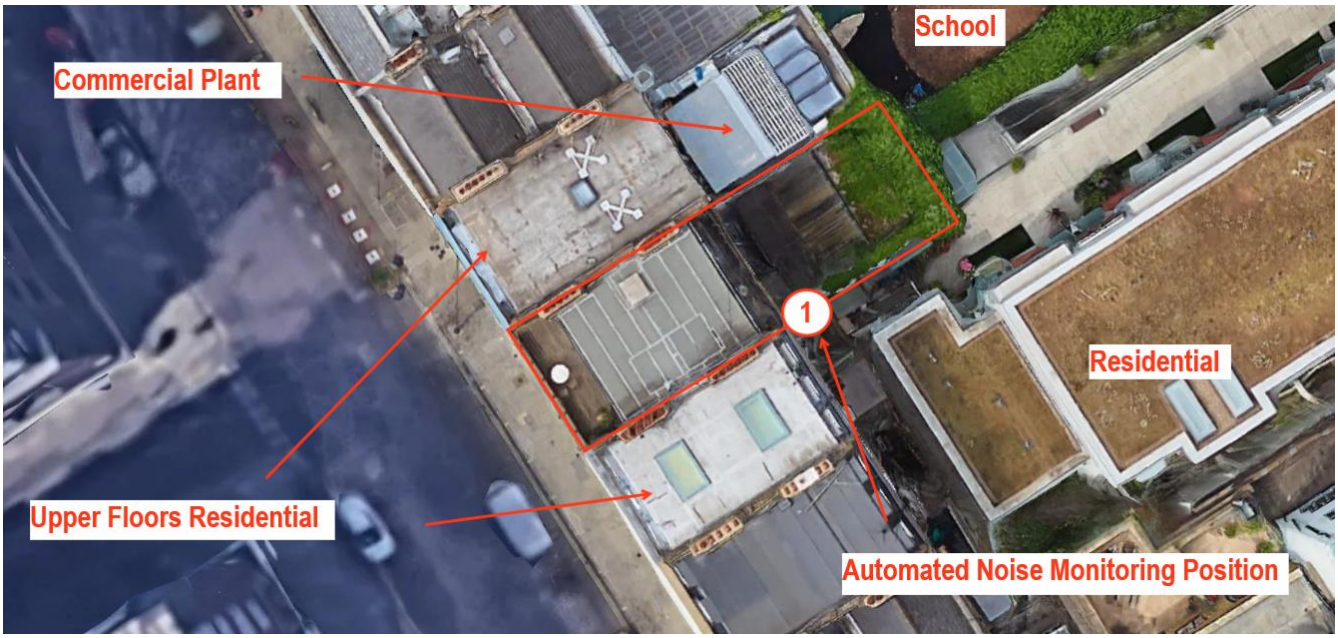


Figure 4. Noise Monitoring Position - Image Data © Google 2024

A proprietary windshield and extension cable was deployed. The entire signal path was checked for calibration pre and post survey. The field calibration meter readings pre and post survey indicated no calibration shift greater than 0.1dB.

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

Table 7. Weather Conditions

Condition	Start	End
Wind Speed ms^{-1}	<1.2	<0.5
Wind Direction (from)	north	south
Precipitation or Fog	no	light rain
Wet Ground	no	damp
Frozen Ground or Snow	no	no
Temperature ° C	19	19
Cloud Cover %	50	100

It is understood the weather over the weekend period was generally mixed but with no persistent and 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 with residual third-party plant noise.

The conditions measured or noted above were deemed acceptable for obtaining suitably representative measurements.

APPENDIX B – TIME HISTORY GRAPHS

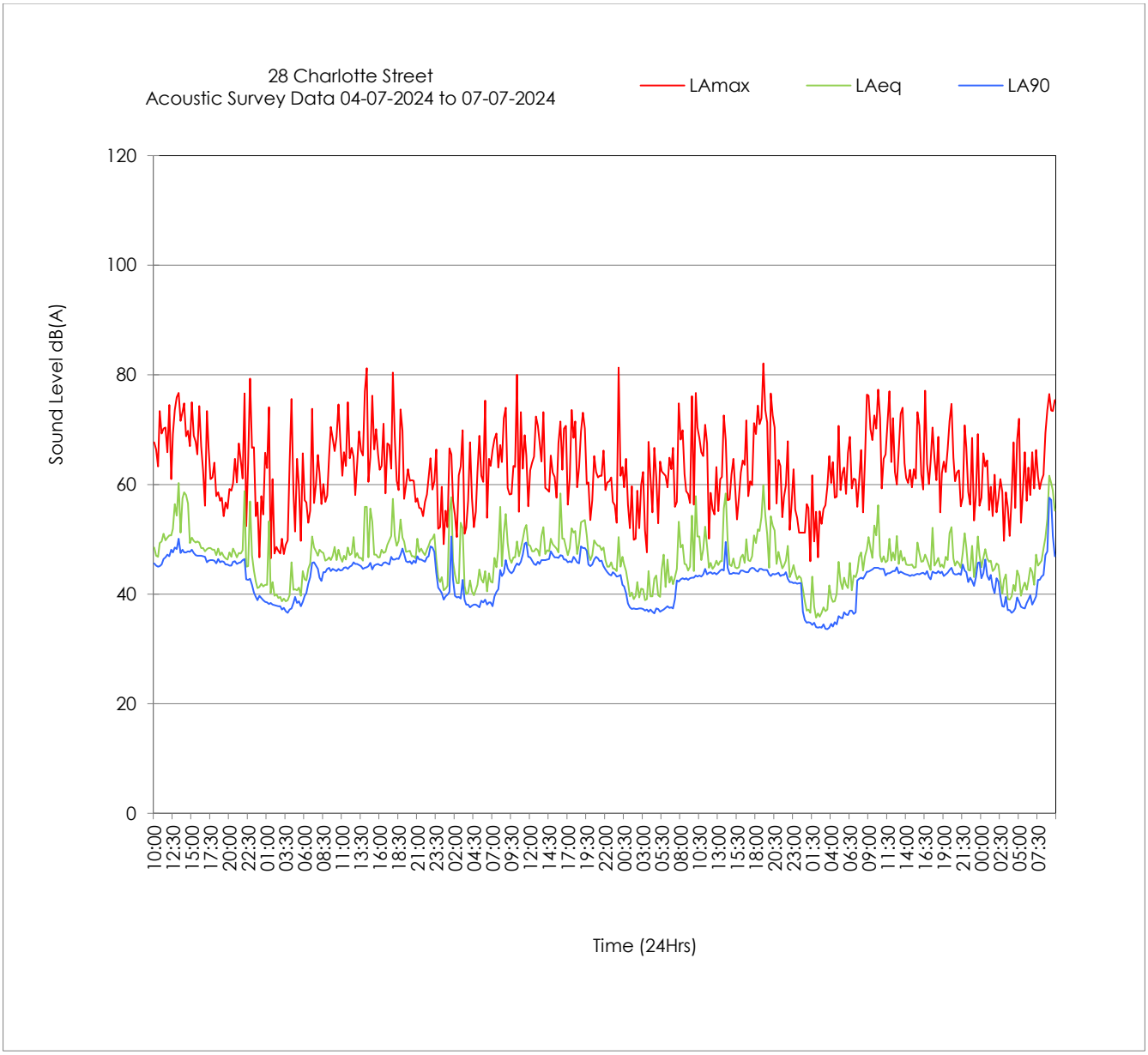


Figure 5. Time History Graph

APPENDIX C - STATISTICAL ANALYSIS OF PREVAILING BACKGROUND SOUND

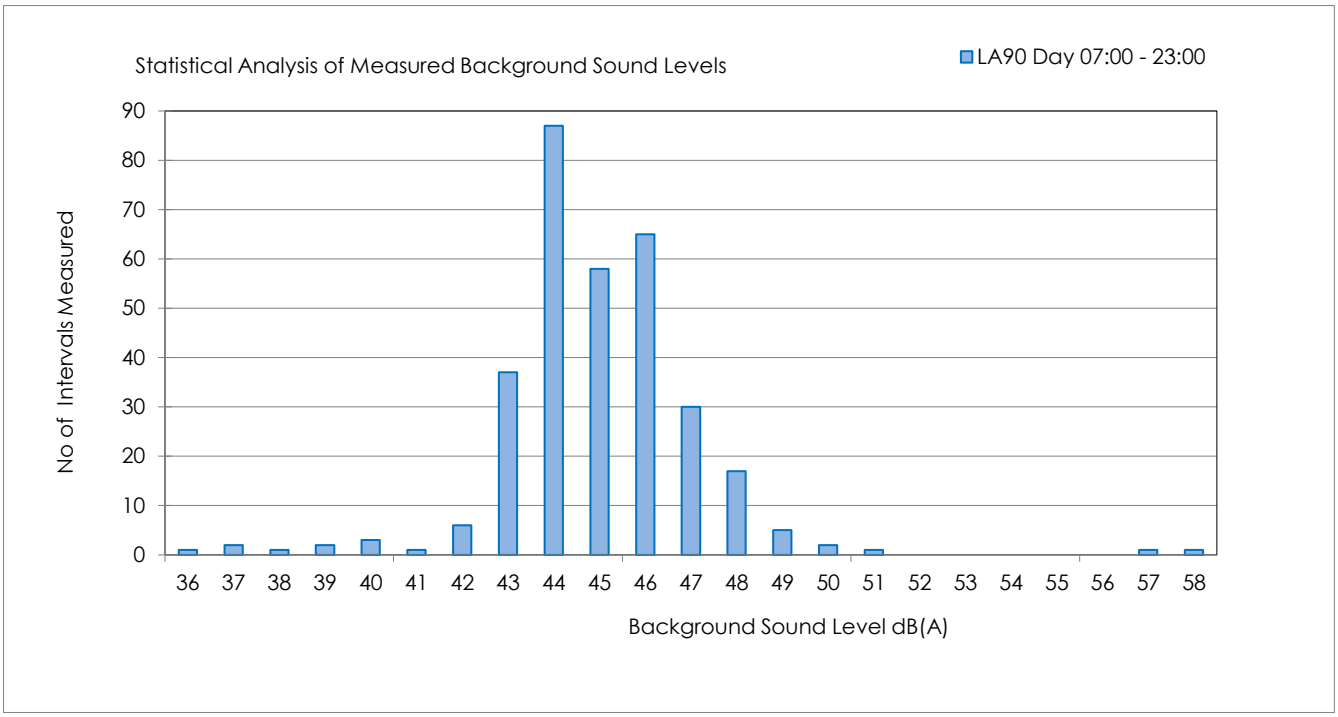


Figure 6. Daytime Background Sound Statistical Analysis

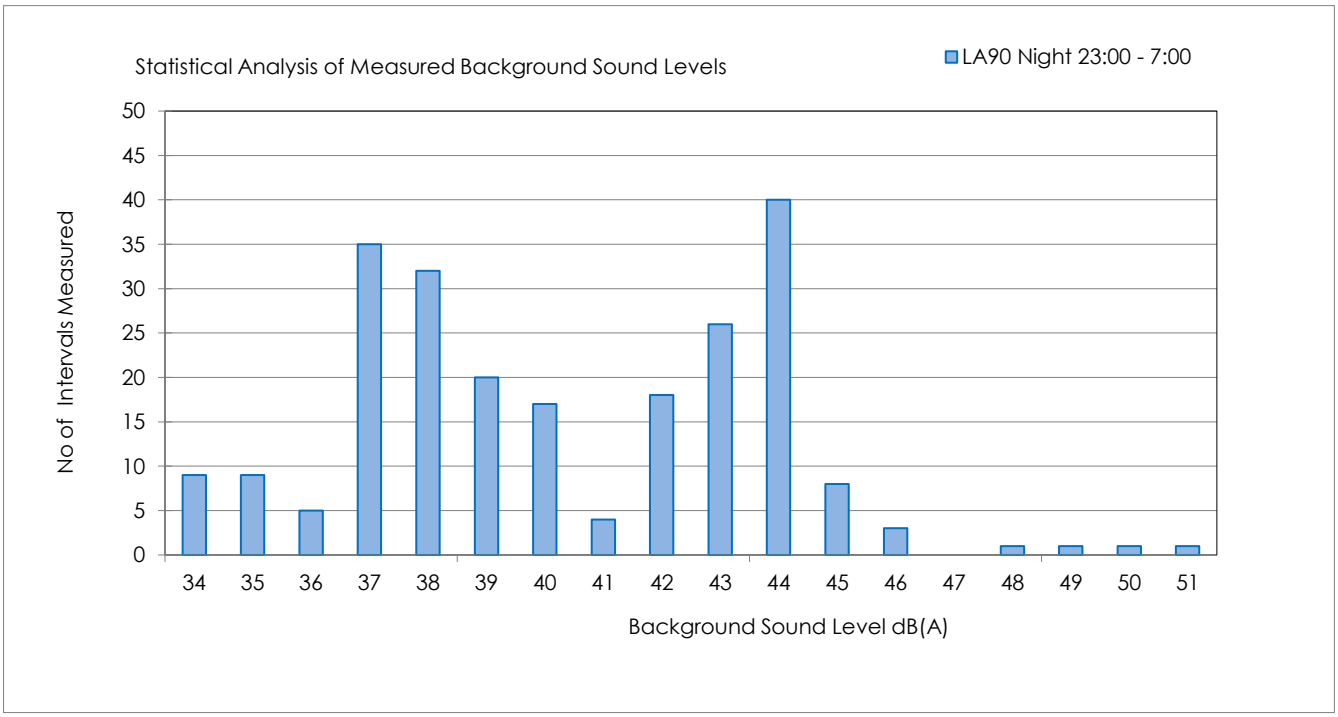


Figure 7. Night-time Background Sound Statistical Analysis

APPENDIX D – MANUFACTURERS NOISE DATA

Specifications

			AE160CXYDEK
Capacity			
Capacity*	**Heating (A7/W35)**	**kW**	16.0
	Cooling (A35/W18)	**kW**	14.0
Performance			
Leaving Water Temperature	**Heating**	**℃**	15~75
	Cooling	**℃**	5~25
Efficiency	**SCOP Class (35℃)**		A+++
	SCOP Class (55℃)		A++
Sound Pressure**	**Normal**	**dB(A)**	51
	Quiet Mode	**dB(A)**	35
Operating Temperature Range	**Heating**	**℃**	-25~35
	Cooling	**℃**	10~46
Electrical Data			
Power Supply		**Φ, V**	1Φ, 2Line, 220~240V, 50Hz
Refrigerant			
Refrigerant Type			R290 (GWP=3)
Water Pipe	**Inlet/Outlet**	**mm**	BSPP male 1"/BSPP male 1"
Dimensions			
Net Dimensions	**W x H x D**	**mm**	1270 x 1018 x 330

The available line-up, including capacities and models, may vary by region. Features and specifications are subject to change without notice.
* A2W Condition: (Heating) Water In/Out 30℃/35℃, Outdoor Air 7℃ [DB] /6℃ [WB]; (Cooling) Water In/Out 23℃/18℃, Outdoor Air 35℃ [DB].
** Sound pressure level is obtained in an anechoic room. Sound pressure level is a relative value, depending on the distance and acoustic environment. Sound pressure level may differ depending on operation conditions.

Figure 8. Manufacturers Published Noise Data – Samsung EHS Mono R290 16kW

APPENDIX E – CALCULATIONS

Table 8. BS8233:2014+A1:2019 Calculations - Unmitigated

		8m					8m	
BS4142:2014+A1:2019					BS4142:2014+A1:2019			
		Daytime					Night-time	
	Lp at 1m	51				Lp at 1m	51	
	Q	6				Q	6	
	Reflections	3				Reflections	3	
8	Distance	-18.1			8	Distance	-18.1	
	Screening	0				Screening	0	
	Reflections	0				Reflections	0	
	Specific	41.9				Specific	41.9	
	Character	3				Character	3	
	Rating	44.9				Rating	44.9	
	Background	44				Background	37	
	Exceedance	0.9				Exceedance	7.9	
	Just above Background					8 dB above Background		

Table 9. BS8233:2014+A1:2019 Calculations – With Enclosure Mitigation

		8m					8m	
BS4142:2014+A1:2019					BS4142:2014+A1:2019			
		Daytime					Night-time	
	Lp at 1m	40				Lp at 1m	33	
	Q	6				Q	6	
	Reflections	3				Reflections	3	
8	Distance	-18.1			8	Distance	-18.1	
	Screening	0				Screening	0	
	Reflections	0				Reflections	0	
	Specific	30.9				Specific	23.9	
	Character	3				Character	3	
	Rating	33.9				Rating	26.9	
	Background	44				Background	37	
	Exceedance	-10.1				Exceedance	-10.1	
	10dB below Background					10dB below Background		

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 LAeq.

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.