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AAD
applied
acoustic
design

1 SPRINGFIELD LODGE
37 ANLABY ROAD
TEDDINGTON
TW11 0PB

ENVIRONMENTAL NOISE SURVEY
and PLANT NOISE ASSESSMENT

Client: Genevieve Harper

Report Author:.....
Adam Freeman
Graduate Acoustic Engineer

Approved by:.....
Philip Wash
Director

THE GREEN BUSINESS CENTRE
THE CAUSEWAY
STAINES
MIDDLESEX
TW18 3AL

TELEPHONE: 01784 464404
FACSIMILE: 01784 465447
E MAIL: mail@aad.co.uk

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1.0 Introduction

1.1 An environmental noise level survey to determine the existing background noise levels has been undertaken at the rear of the property 1 Springfield Lodge, 37 Anlaby Road, Teddington, TW11 0PB.

1.2 Noise level limits have been assessed for the installation of two small condenser units to the rear of the property with regard to the planning policy requirements of the London Borough of Richmond upon Thames.

1.3 Noise levels from the condensers have been assessed and guidance regarding suitable noise control measures are provided where necessary.

1.4 This plant noise assessment report is intended to be used to support a retrospective planning application to the Local Authority.

2.0 Site Description

2.1 The site is a detached residential property approximately 3 to 4 metres from the nearest affected residential property (Rutland Lodge), separated by a timber fence approximately 1.6 metres high with the condenser units in question being approximately 9 metres from the nearest affected residential window.

2.2 The plant installation amounts to two single fan condensers that are mounted at the rear of no. 1 Springfield Lodge (refer to Appendix 1).

3.0 Site Noise Survey

3.1 Instrumentation: NTI XL2 (Class 1) sound level meter (Serial No. AZA-10121-E0-V). This instrument was powered by an external battery and stored in a weather proof case. The instrument was checked for calibration prior and subsequent to use with a Larson Davis type CAL 250 calibrator whereupon no calibration drift was recorded. The instrument was used in accordance with manufacturer's instructions.

3.2 Location: The noise monitor was located at a position to provide representative noise levels at the site boundary. The microphone was attached to the fence extending above the height of the fence. See Appendix 1 for the measurement location.

3.3 Periods: Noise level monitoring was continuous from approximately 10:45 hours on Thursday 15th July until approximately 10:15 hours on Monday 19th July 2021. The meter was configured to monitor noise levels continuously in fifteen-minute intervals. During the automated survey period the condenser plant was switched off.

3.4 Weather: The prevailing weather condition over the survey period was calm and mostly dry with some periods of light rain. Wind speed, although not recorded, was considered to be less than 5 m/s throughout the survey period, based upon conditions observed at the time of deployment and collection of the survey equipment and published local weather data.

3.5 Site Noise Characteristics: The background noise levels were characterised by distant road and air traffic and occasional birdsong. The data used for the assessment is considered to include a fair representation of the noise levels in the area.

3.6 Surveyor: Adam Freeman BSc (Hons) TechIoA

3.7 Results: Measured noise level data are shown graphically in Appendix 2. Typical background noise levels over the survey period are summarised below:

Table 1: Typical Background Noise Levels at the Rear of nos. 37 & Rutland Lodge

Period	Typical Background Noise Level, $L_{A90,15min}$
Daytime (07:00 – 23:00)	35 dB
Night time (23:00 – 07:00)	31 dB

3.8 Refer to Appendix 4 for glossary of terms

4.0 Plant Noise Criteria

4.1 The site falls into the jurisdiction of the London Borough of Richmond upon Thames. They have stated that a noise assessment must accompany the retrospective application for the condensers at no. 1 Springfield Lodge. The noise assessment is to be undertaken in accordance with BS4142 at the nearest and/or most affected noise-sensitive window. It is understood that the London Borough of Richmond upon Thames require new plant and machinery to be controlled such that the noise levels, measured or calculated 1m from the nearest noise sensitive window, shall not exceed a level 5 dB below the existing L_{A90} background noise level.

4.2 The two condensers separately serve the ground floor living areas and first floor bedrooms, as such they would not be expected to operate simultaneously. Based on the above, the criteria for the condenser plant are as follows:

Table 2: Condenser Noise Criteria at Nearest Noise Sensitive Window

Period	Noise Emission Criteria, $L_{A90,15min}$
Daytime (07:00 – 23:00)	30 dB
Night time (23:00 – 07:00	26 dB

5.0 Plant Noise Assessment

5.1 Noise arising from the condensers was measured onsite at a distance of 2m using a Class 1 sound level meter. This data shall be used to assess the noise impact at the nearest noise sensitive receiver, in accordance with the methodology set out in BS 4142:2014+A1:2019 *'Methods for rating and assessing industrial and commercial sound'*. The model numbers and measured noise data for each condenser are set out in the table below:

Table 3: Measured Plant Noise Data

System Plant Item	octave band centre frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
	Sound Pressure Level @ 2m, dB re 2 x 10^5 Pa								
LG Split Room Air Conditioner - PC24SQ U24 (S3UM24K22FA)									
Standard Cooling	49	42	40	42	39	33	29	23	43
LG Heat Pump – MU4R27 U40 (Z4UW27GFA0)									
Standard Cooling	38	39	41	41	36	30	26	21	41

5.2 Based on measured noise data and observations on site, mild tonality is present. In accordance with the BS 4142 Subjective Method for determining tonality, a feature correction of +3 dB has been applied which accords with a tonal character that is *neither tonal nor impulsive, though otherwise distinctive against the residual acoustic environment*.

5.3 BS 4142 assessment is as follows.

Table 4: BS 4142 Noise Assessment to Second Floor Window - Daytime

Item	Sound Pressure Level	Comments
LG Heat Pump – MU4R27 U40 (Z4UW27GFA0) Specific Sound Level, L_s	41 dB	
Distance Correction, 9m	-13 dB	
Screening Correction	0 dB	
Feature Correction	+3.0 dB	Mild steady hum
Plant Noise Rating Level at Receiver $L_{Ar,Tr}$	**31 dB**	
Typical Day Time Background Noise Level, L_{90}	35 dB	
Excess of Rating Level over Background	**-4 dB**	

Table 5: BS 4142 Noise Assessment to Second Floor Window – Night-time

Item	Sound Pressure Level	Comments
LG Split Room Air Conditioner - PC24SQ U24 (S3UM24K22FA) Specific Sound Level, L_s	43 dB	
Distance Correction, 9m	-13 dB	
Screening Correction	0 dB	
Feature Correction	+3.0 dB	Mild steady hum
Plant Noise Rating Level at Receiver $L_{Ar,Tr}$	**33 dB**	
Typical Night-Time Background Noise Level, L_{90}	31 dB	
Excess of Rating Level over Background	**2 dB**	

5.4 It can be seen from the above assessment that a BS 4142 noise rating criterion of better than -5 dB is calculated to not be achieved for both condenser units during the day and night-time periods. As such this assessment shows that the calculated noise emission from the condensers does not comply with the policy requirements of the London Borough of Richmond upon Thames.

5.5 In order to comply with the Local Authority planning requirements, it is advised that a proprietary acoustic enclosure be installed and that the **acoustic enclosure must provide a minimum 7 dB A-weighted noise attenuation**. The specification of the enclosure will be subject to detail design. See Appendix 3 for an example of a proprietary acoustic enclosure.

6.0 Conclusion

6.1 A noise assessment in accordance with BS 4142 has been completed to support a retrospective planning application for two wall-mounted condensers at 1 Spring Field Lodge, 37 Anlaby Road, Teddington, TW11 0PB.

6.2 Calculations have been performed, based upon measured data, in order to determine the likely plant noise level at the most affected noise-sensitive property.

6.3 Calculations demonstrate that the noise from the condensers will not be at least 5dB below the prevailing typical background noise levels and therefore is not in line with the policy requirements of the London Borough of Richmond upon Thames, as such, remedial action has been advised in the form of installing a suitable acoustic enclosure to meet the aforementioned policy requirements.

Appendix 1: Site Plan & Noise Survey Location

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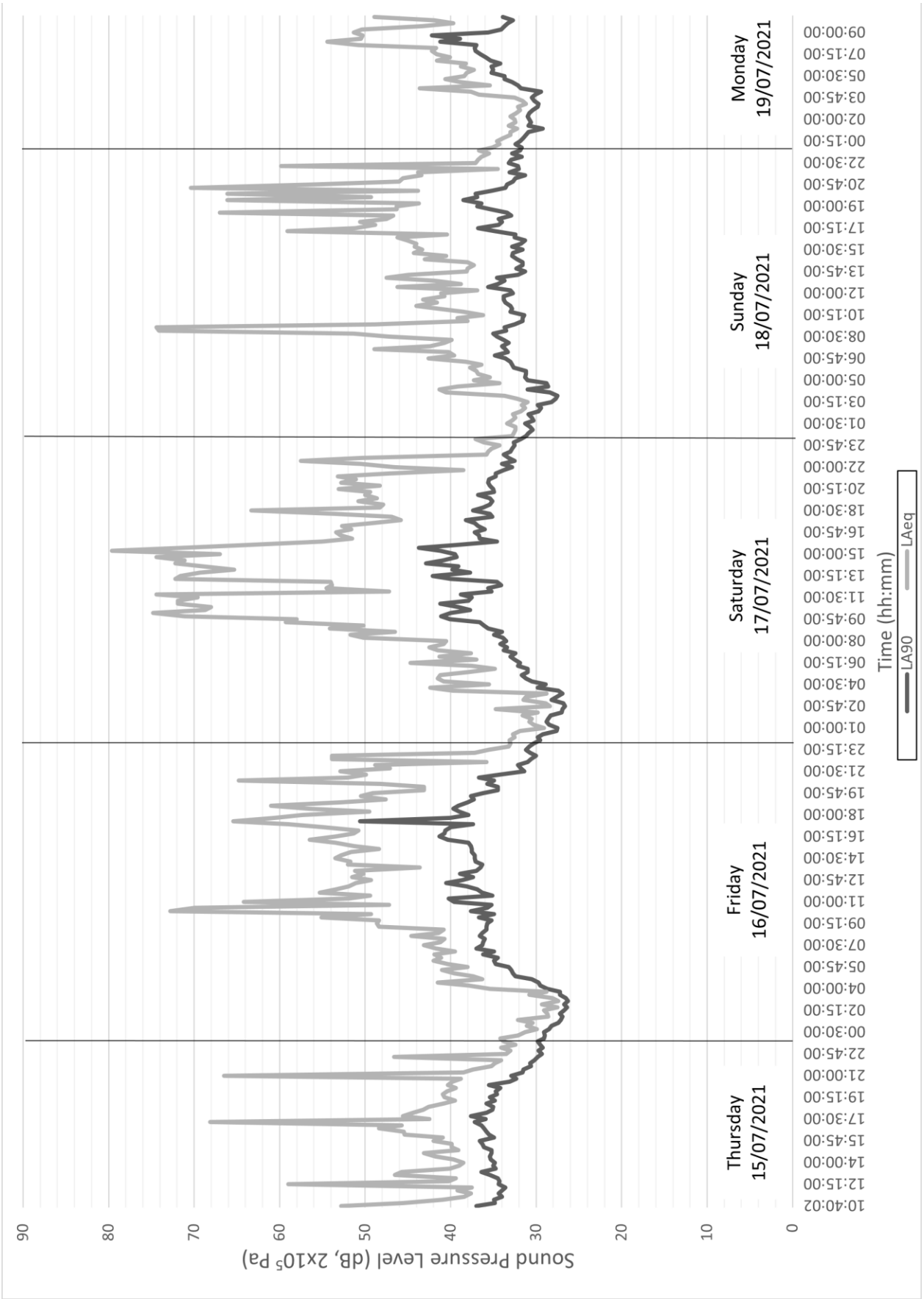
Appendix 2: Noise Survey Results



Appendix 3: Acoustic Enclosure Example (courtesy of Environ)

Appendix 4: Glossary of Terms

Term	Description	Explanation
	Noise	Unwanted sound. In the explanation given below the words 'sound' and 'noise' can often be used interchangeably, depending on context.
dB	The decibel scale	The decibel (or dB) scale is the scale on which sound pressure levels are commonly measured. It is a logarithmic scale and is used for convenience to compress the audible range of sound pressures into a manageable range, from 0 dB to 140 dB. The zero of the scale, 0 dB, corresponds to the threshold of hearing, 0.00002 Pa, and the upper limit, 140 dB, corresponds to 20 Pa, the threshold of pain.
	Sound pressure	Sound is a disturbance or fluctuation in air pressure, and sound pressure, measured in pascals (Pa), is used as a measure of the magnitude of the sound. The human ear can detect sound pressures in the range from 0.00002 Pa to 20 Pa. This is an enormously wide range and so for convenience sound pressures are commonly measured on a decibel (dB) scale.
Lp	Sound pressure level	Instantaneous value of Sound Pressure Level (Lp).
	Sound power	The sound energy radiated per unit time by a sound source, measured in watts (W)
L_W	Sound power level	Sound power measured on a decibel scale: $L_W = 10\log(W/W_0)$, where W_0 is the reference value of sound power, 10^{-12} W.
f	Frequency	The frequency of a musical note is what gives it its pitch. It is the number of cycles of the fluctuating sound pressure which occur each second, and is measured in cycles per second, or Hertz (Hz). The human ear can detect frequencies in the range 20 to 20 000 Hz. Most sounds and noises are a mixture of all frequencies, called broad-band noise.
	Octave bands Octave band spectra	In order investigate the frequency content of broad band sounds, called its frequency spectrum, measurements of sound pressure are carried out over a range of frequency bands. The most common method is to split the audio frequency range into 8 or 9 octave bands. An octave is a frequency range from one particular frequency to double that frequency.
	Free-field	A free field sound level measurement is one which is unaffected by the presence of any sound reflecting surfaces. In an outdoor situation this is usually taken to mean with no sound reflecting surfaces within 3 m. of the source.
	Facade correction Factor	The difference between the façade level and the free field level (in the absence of the façade) is called the façade correction factor.
A	A-weighting	One of the three frequency weightings (A, C and Z) used in sound level meters, and defined in BS EN ISO 61672-1; a very widely used method of producing a single figure measure of a broad band noise which takes into account, in an approximate way at least, the frequency response of the human hearing system. The idea is that sound levels measured in this way should give an indication of the loudness of the sound.
L_A (dBA)	A- weighted sound pressure level	The value of the sound pressure level, in decibels, measured using an A-weighting electronic circuit built into the sound level meter. The vast majority of noise measurements are carried out in this way.
$L_{Aeq,T}$	Equivalent continuous sound level	It represents a measure of the 'average' sound level over the measurement period. It corresponds to the steady level of sound which, over the same period of time, T, would contain the same amount of (A-weighted) sound energy as the time varying noise. Also known as the Average sound level.

		This is the most common method of measuring time varying noise, and within certain limits gives the best correlation with human response to noise, for example with annoyance.
$L_{AN,T}$	Statistical percentile noise levels	$L_{AN,T}$ is the noise level, usually A-weighted, which is exceeded for N% of the measurement period, T. The most commonly used values are $L_{A10,T}$ used for the measurement and assessment of traffic noise, and $L_{A90,T}$, commonly used as a measure of background noise. $L_{A1,T}$ and $L_{A99,T}$ are also occasionally used to give an indication of the highest and lowest noise levels occurring during the measurement time interval.
	Background noise	Ambient noise which remains at a given site when occasional and transient bursts of higher level ambient noise levels have subsided to typically low levels; it is the noise normally present for most of the time at a given site. It is usually described by the L_{A90} value.
$L_{A90,T}$	Background noise level	Defined in BS 4142 as the value of the A-weighted residual noise at the assessment position that is exceeded for 90 % of a given time interval, T, (i.e. $L_{A90,T)}$ measured using time weighting, F, and quoted to the nearest whole number of decibels. (Also see under residual noise). Background noise itself often varies with time and so the $L_{A90,T}$ is almost universally used as the best measure of the 'more or less always present' noise level which underlies short term variations from other sources of noise.
	Specific Noise Source	The noise source under consideration when assessing the likelihood of adverse impact using BS4142:2014.
	Specific Noise Level	The value of $L_{Aeq,T}$ at the assessment position produced by the specific noise source, ref. BS4142:2014.
$L_{ar,Tr}$	Rating Level	The specific noise level, corrected to account for any characteristic features of the noise, by adding a rating penalty for any tonal, impulsive or irregular qualities, ref. BS4142:2014.
T_r	Reference time interval	Specified interval over which the specific sound level is determined, ref. BS4142:2014.
	Residual Sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound, ref. BS4142:2014.
$L_r = L_{Aeq,T}$	Residual Sound Level	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T, ref. BS4142:2014.