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Consultants in Acoustics, Noise & Vibration

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Dr Williams's Library, London

Noise survey and plant noise egress limits

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Version	Date	Comments	Author	Reviewer
A	15 Aug 19		Omar Faez	Philip Owen

Summary

Sandy Brown has been commissioned to provide acoustic advice in relation to the proposed extension at Dr Williams's Library, London.

An environmental noise survey has been carried out to determine the existing sound levels in the area. The noise survey was performed between 15:45 on 1 August 2019 and 11:45 on 9 August 2019.

The representative background sound levels measured during the survey were $L_{A90,15mins}$ 53 dB during the daytime and $L_{A90,15mins}$ 51 dB at night.

Based on the requirements of the Local Authority and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed L_{Aeq} 43 dB during the daytime, and L_{Aeq} 41 dB during the night. These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, then the plant noise limits will need to be 5 dB lower than those set out above.

Contents

1 Introduction

Sandy Brown has been commissioned to provide acoustic advice in relation to the proposed extension at Dr Williams's Library.

As part of this, an environmental noise survey is required, the purpose of which is to establish the existing background sound levels in the vicinity of nearby noise sensitive premises and to set appropriate limits for noise egress from building services plant.

This report presents the survey method and results, and a discussion of acceptable limits for noise emissions from building services plant.

2 Site description

2.1 The site and its surrounding

Dr Williams's Library is situated in the London Borough of Camden

The building is adjacent to Gordon Square, approximalty 300 m south from Eustion Road.

Figure 1 highlights in red the location of the site.

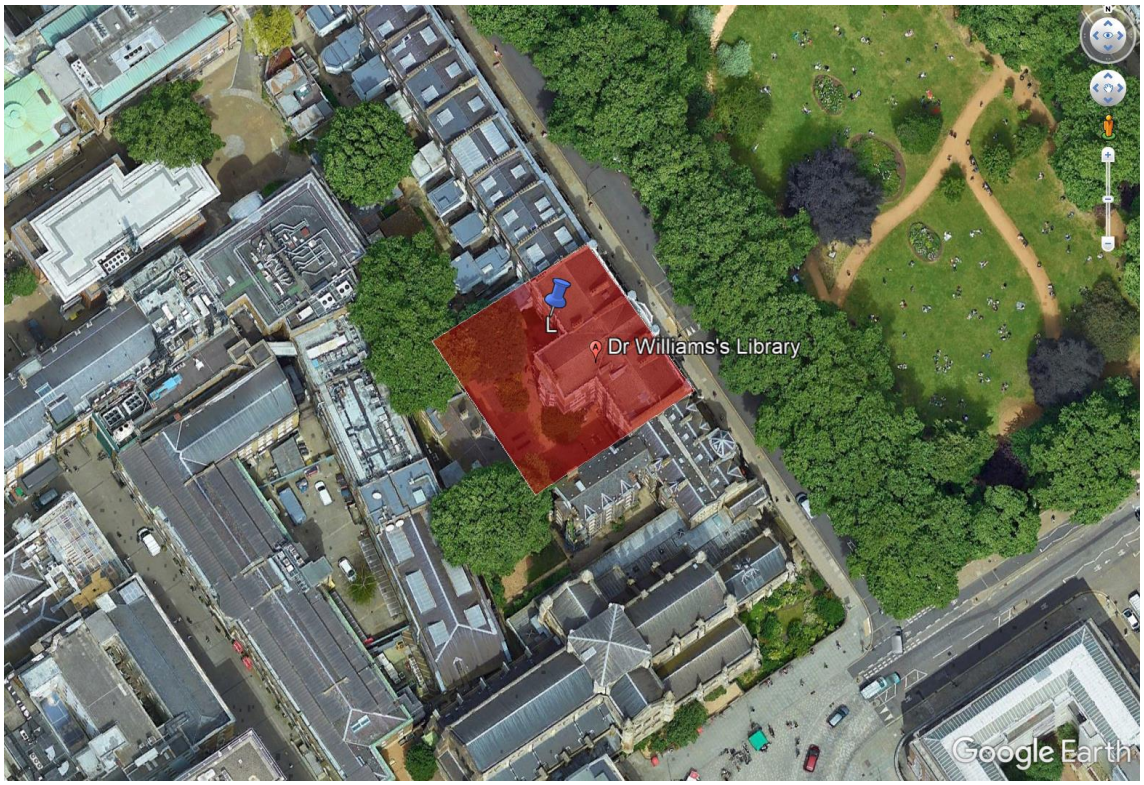


Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

Dr Williams's Libaray is surrounded by University College London buildings. To the north and west. Immediately to the south is the Cloisters building, which includes residential use properties. To the east is Gordon Square.

3 Development proposals

The proposed development comprises of the refurbishment, repair and rear extension to Dr William's Library which will include improvments to MEP services that will be operating 24 hours.

4 Noise survey method

The survey included unattended measurements.

4.1 Unattended measurements

Unattended noise monitoring was, undertaken at the site over 8 days.

Details of the equipment used, and the noise indices measured are provided in Appendix A.

The unattended measurements were taken over 15-minute periods between 15:45 on 1 August 2019 and 10:45 on 9 August 2019. The equipment was installed by Omar Faez and collected by Omar Faez and Jason Setiadi.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'L'. A photograph showing the measurement location is provided in Figure 2.

The microphone was position outside the window of the 4th floor staff office, with views of the courtyard. The microphone was approximately 1 m from the facade ie, facade level measurements where made.

This location was chosen to be reasonably representative of the background noise levels at the nearest noise sensitive receptors.

Figure 2 Photograph of the logger location

4.2 Weather conditions

Weather conditions during the survey are described in Appendix A.

5 Noise survey results

5.1 Observations

The dominant noise source observed during the survey was existing building services plant associated with the surrounding buildings.

Less significant noise sources included pedestrian activity in the courtyard.

5.2 Noise measurement results

5.2.1 Unattended measurement results

A graph showing the results of the unattended measurements is provided in Appendix B.

Day and night-time ambient noise levels measured during the unattended survey are presented in Table 1.

Measured minimum background sound levels are given in Table 2.

Table 1 Ambient noise levels measured during the unattended survey

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
1 August 2019	*	52
2 August 2019	54	53
3 August 2019	56	51
4 August 2019	54	52
5 August 2019	56	55
6 August 2019	55	51
Average	55	52

* Measurement not made over full period due to monitoring start and end time.

Table 2 Minimum background sound levels measured during the unattended survey

Date	Daytime (07:00 – 23:00) $L_{A90,15min}$ (dB)	Night (23:00 – 07:00) $L_{A90,15min}$ (dB)
1 August 2019	53*	50
2 August 2019	51	50
3 August 2019	50	50
4 August 2019	51	51
5 August 2019	52	50
6 August 2019	51	50
7 August 2019	51*	*

* Measurement not made over full period due to monitoring start and end time.

The lowest background sound levels measured during the survey were $L_{A90,15min}$ 50 dB during the daytime and $L_{A90,15min}$ 50 dB at night.

In line with BS 4142:2014, representative background sound levels have been determined using statistical analysis of the continuous measurements.

Daytime and night time statistical analysis of representative values for the site are given in Figure 3 and Figure 4.

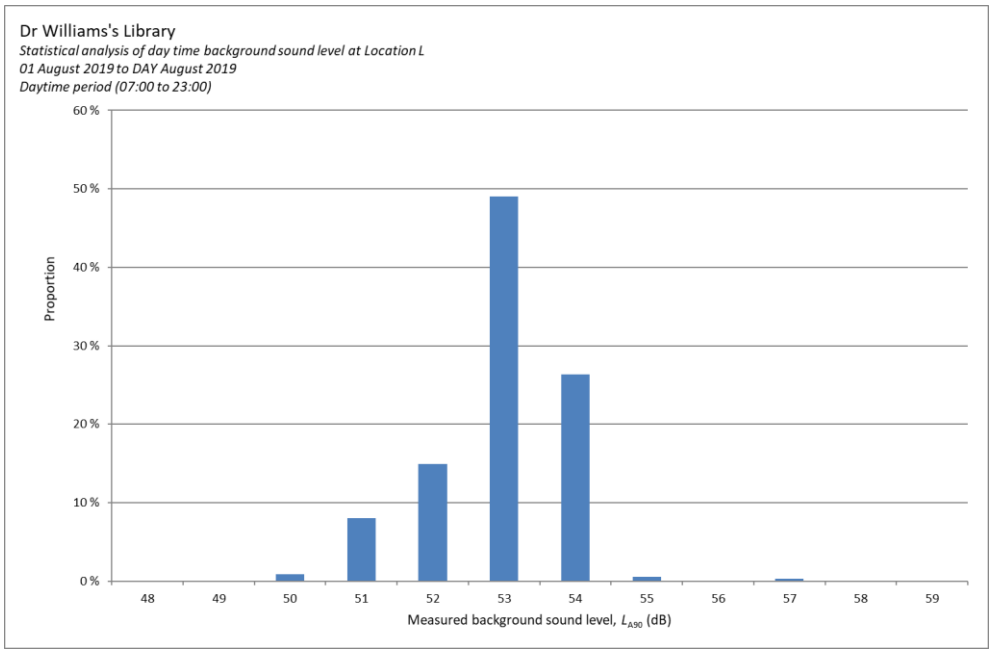


Figure 3 Statistical analysis showing measured background noise levels at location L (07:00-23:00)

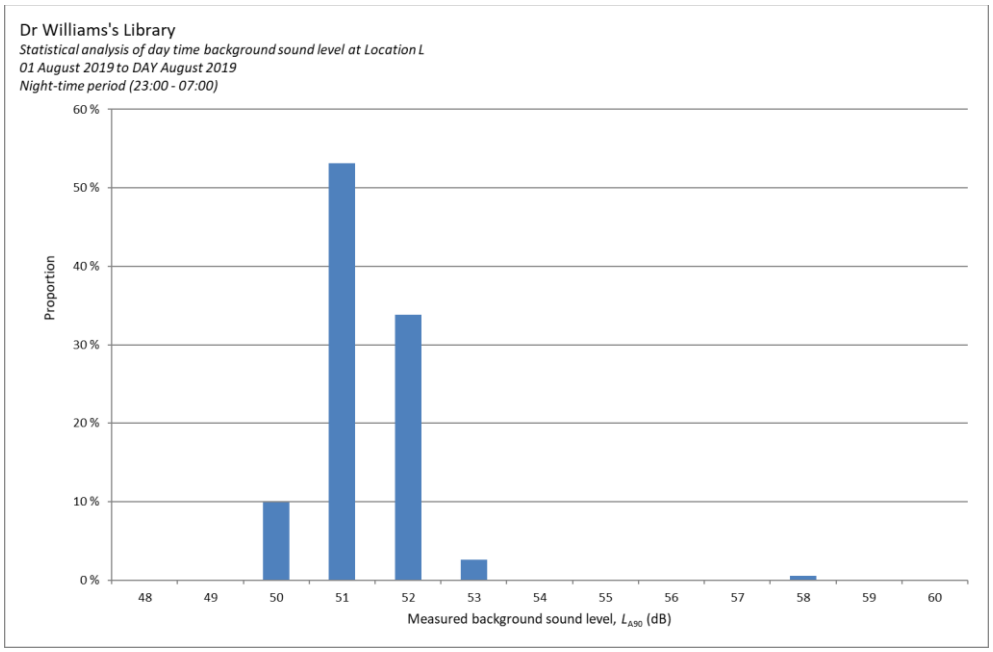


Figure 4 Statistical analysis showing measured background noise levels at location L (23:00-07:00)

From this analysis the representative background sound levels measured during the survey were $L_{A90,15min}$ 53 dB during the daytime and $L_{A90,15min}$ 51 dB at night.

6 Building services noise egress limits

6.1 Standard guidance

BS 4142:2014 *Methods for rating and assessing industrial and commercial sound* provides a method for assessing noise from items such as building services plant against the existing background sound levels at nearby noise sensitive premises.

BS 4142 suggests that if the noise level is 10 dB or more higher than the existing background sound level, it is likely to be an indication of a significant adverse impact. If the level is 5 dB above the existing background sound level, it is likely to be an indication of an adverse impact. If the level does not exceed the background level, it is an indication of having a low impact.

If the noise contains 'attention catching features' such as tones, bangs etc, a penalty, based on the type and impact of those features, is applied.

6.2 Local Authority criteria

The London Borough of Camden's general policy on the control of building services plant is contained within Development Policy 28. The relevant extract from DP28 is included below.

> *'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 (15 dB if tonal components are present) should be considered as the design criterion.'*

6.3 Basic limits

Based on the above criteria and the measurement results, the cumulative noise level from the operation of all new plant should not exceed the limits set out in Table 3.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. In this case these limits would apply to all building facades within the courtyard.

Table 3 Plant noise limits at 1 m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)
Daytime (07:00-23:00)	43
Night-time (23:00-07:00)	41

The limits set out in Table 3 do not include any results with attention catching features associated. If the building services plant contain attention catching features then the limits would need to be 5 dB lower than those stated.

6.4 Assessment

All building services plant will be designed to achieve the noise limits set out above, including any corrections for attention catching features. At this stage, no information is available in relation to the proposed plant. This will need to be assessed as the design progresses.

7 Conclusion

The representative background sound levels from the noise survey were $L_{A90,15min}$ 53 dB during the day, and $L_{A90,15min}$ 51 dB during the night.

Based on the requirements of the Local Authority, the relevant plant noise limits at the worst affected existing noise sensitive premises are L_{Aeq} 43 dB during the day, and L_{Aeq} 41 dB during the night.

These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, the limits will be more stringent than those set out above. If plant items contain tonal or attention catching features, then the plant noise limits will need to be 5 dB lower than those set out.

Appendix A

Survey details

Equipment

The unattended and attended noise measurements were taken using a NL-52 sound level meter

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
NL-52 F				
Sound level meter	NL-52/00242702	Rion	30 Jan 21	TCRT19/1091
Microphone	UC-59/06185	Rion	30 Jan 21	TCRT19/1091
Pre-amp	NH-25/32730	Rion	30 Jan 21	TCRT19/1091
Calibrator	CAL200/4499	Larson Davis	30 Jan 21	TCRT19/1090

Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meter used in this survey is available upon request.

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{ASmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a slow time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

Weather conditions

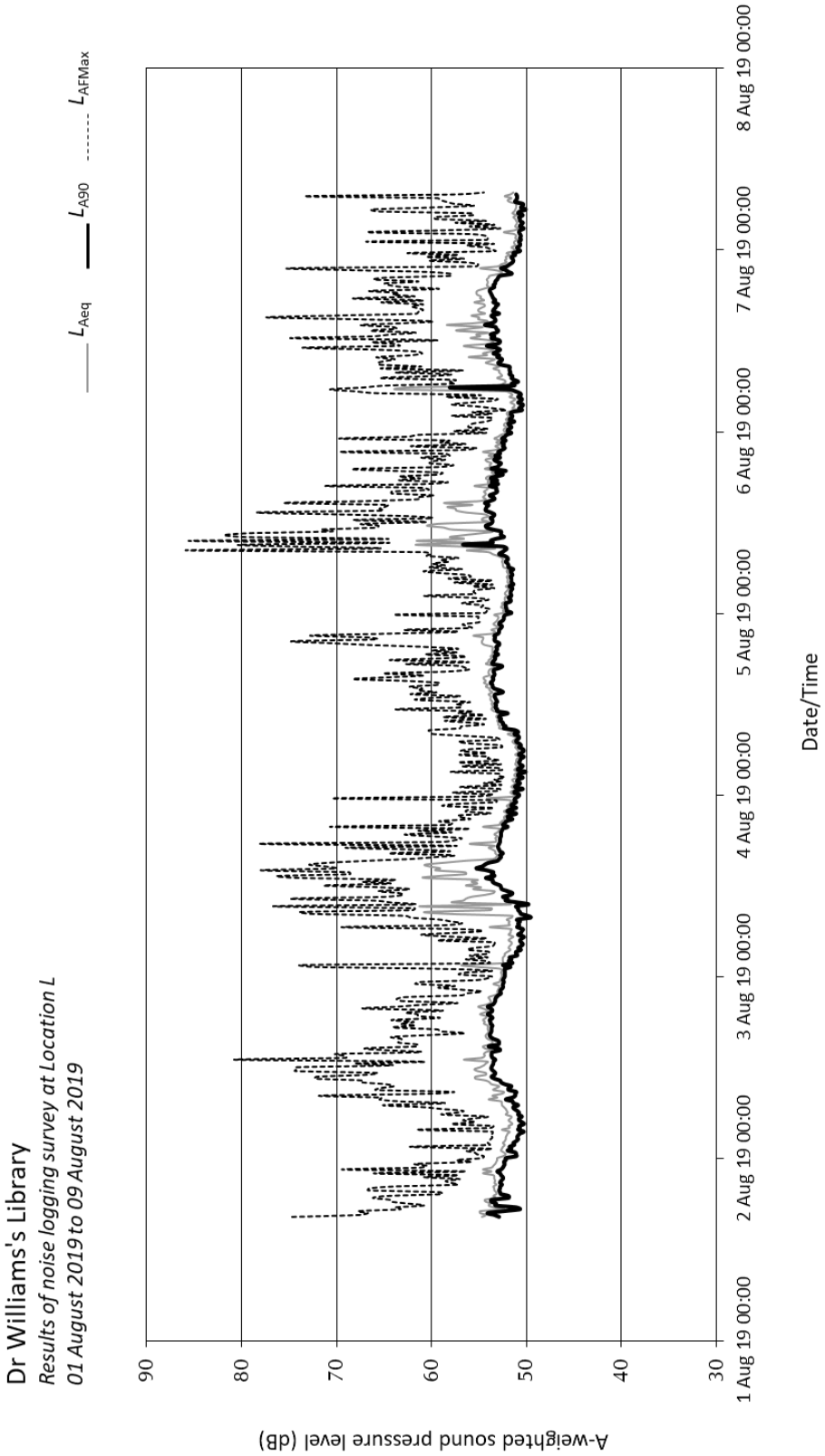
During the attended noise measurements, the weather was generally clear however some rain occurred. Wind speeds were measured at each position and varied between 2.2 m/s and 3.1 m/s.

During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 16-17°C at night and 17-28°C during the day, and the wind speed was less than 8 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location L


Dr Williams's Library
Results of noise logging survey at Location L
01 August 2019 to 09 August 2019
L_{Aeq}
L_{A90}
L_{AFMax}
A-weighted sound pressure level (dB)
90
80
70
60
50
40
30
1 Aug 19 00:00
2 Aug 19 00:00
3 Aug 19 00:00
4 Aug 19 00:00
5 Aug 19 00:00
6 Aug 19 00:00
7 Aug 19 00:00
8 Aug 19 00:00
Date/Time