

ACOUSTIC TECHNICAL NOTE



Reference:	11148.ATN02.EBF.0
Revision:	0
To:	Francis Sumner
From:	David Johnston
Date:	11 October 2022
Project:	Flat 14, 25 Shelton Street
Subject:	Analysis of night-time noise maxima

1.0 GENERAL

The premises at Flat 14, 25 Shelton Street is undergoing refurbishment. As part of the refurbishment, an air-source heat pump (ASHP) is proposed to provide heating and cooling to the flat.

The Local Authority, Camden Council, have queried the requirement for windows to be kept closed, particularly during the night, when the flat is experiencing over-heating.

RBA Acoustics have been commissioned to undertake a noise survey at the flat to establish the typical noise conditions over a weekend period, specifically with relation to night-time noise maxima.

This note provides the result of the survey and some industry context for the results. Based on the noise levels measured, and the nature of the noise, we consider it appropriate to expect residents to keep windows closed to mitigate sleep disturbance.

2.0 SURVEY

An environmental noise survey was conducted at the site over the weekend period from Friday 7 October to Monday 10 October 2022. A microphone was setup outside the fifth-floor bedroom window of Flat 14, at 1m from the façade. The results have been analysed in contiguous 5-minute periods of L_{Amax} , L_{Aeq} and L_{A90} parameters.

Graphs showing the measured noise levels are provided at the end of this report. A graph showing the night-time L_{Amax} levels in 5-minute periods is also provided for the 3 nights over which the survey took place.

Table 1 – Measured Levels

Measurement Period	Period-averaged L_{Aeq} [dB]	Range of $L_{AFmax,5min}$ [dB]
Daytime (07:00 – 23:00)	64	65 – 97
Night-time (23:00 – 07:00)	60	60 – 92 (78 'typical')*

*the 'typical' maximum noise level in this case is the 90th percentile of the 5-minute night-time maxima

3.0 RELEVANT GUIDANCE

A regulatory framework for assessing overheating in the context of ventilation and acoustics is a recent development. The publishing of Approved Document O (ADO) of the Building Regulations provides fixed internal noise limits, the exceedance of which is a positive indicator that windows are likely to be kept closed during sleeping hours. Those limits are:

- a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).
- b. 55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am).

The ANC and IOA publication *Acoustics Ventilation and Overheating* (AVOG) provides similar limits, although the magnitude of the exceedance is contextualised against the frequency of the exceedance. Although the AVOG is a useful document for assessing the impact of external noise during the overheating condition, it is only referenced in the Appendices to the Approved Document, which takes precedence in new projects.

In this instance, as we are dealing with a refurbishment, and one which began prior to the launch of ADO, it is appropriate also to consider the guidance within the AVOG.

As part of the AVOG Level 1 assessment, the numerical values associated with indication of risk categories are expressed as external noise levels. Setting these levels is based on achieving suitable internal noise levels during the overheating condition, assuming opening windows is the chosen mitigation strategy. At this stage, a partially open window is assumed to provide an outside to inside level difference of 13dB. More is included on this in the discussion section of this report.

Table 2 – Guidance for Level 1 Risk Assessment

Daytime Noise Levels ($L_{Aeq,T}$ * during 07:00-23:00)	Night-time Noise Levels ($L_{Aeq,8h}$ during 23:00-07:00)	Night-time Noise Levels (L_{Amax} during 23:00 – 07:00)	Risk Category	Recommendation
> 63 dB	> 55 dB	> 78 dB (not normally exceeded)	High Risk	A Level 2 assessment is recommended. Opening windows to mitigate the overheating situation is likely to result in adverse effects due to noise levels
54 – 62 dB	49 – 54 dB	59 – 78 dB	Medium / Low Risk	A Level 2 assessment is optional to give more confidence in the suitability of internal noise conditions.
≤ 53 dB	≤ 48 dB	≤ 58 dB (not normally exceeded more than 10 times a night)	Negligible Risk	Opening windows is suitable as a primary strategy for mitigating overheating is unlikely to result in adverse effects

*an appropriate averaging period should be adopted based on likely occupant activities and the control they have over the environment during waking hours.

4.0 ASSESSMENT

4.1 Assessment Against ADO / AVOG

The measured noise levels place the site in the 'High Risk' category according to the AVOG, as demonstrated in Table 3.

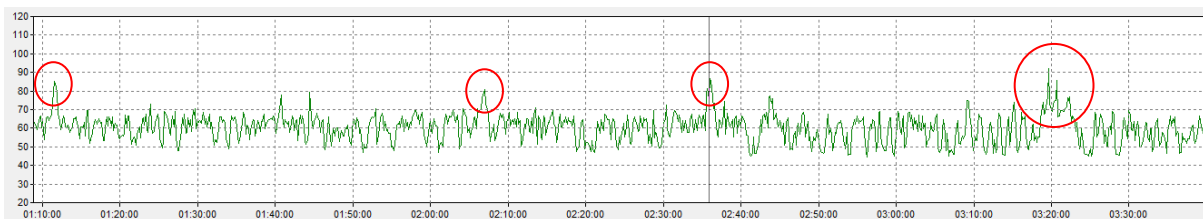
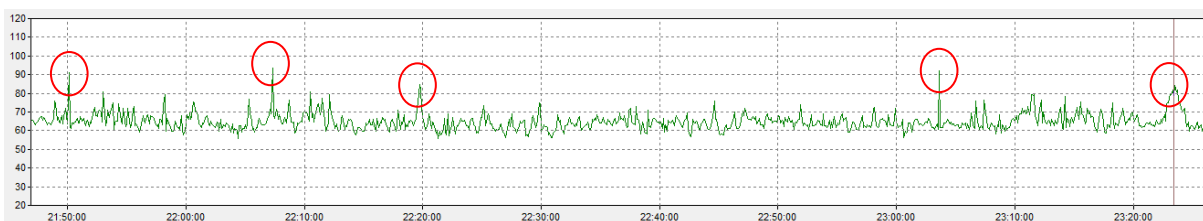
Table 3 – Guidance for Level 1 Risk Assessment

Parameter	Daytime Noise Levels ($L_{Aeq,T}$ during 07:00-23:00)	Night-time Noise Levels ($L_{Aeq,8h}$ during 23:00-07:00)	Night-time Noise Levels (L_{Amax} during 23:00 – 07:00)
Criteria	> 63 dB	> 55 dB	> 78 dB (not normally exceeded)
Measured	64	60	78 'typical level', exceeded upwards of 20 times over the survey period

The limits within ADO are generally more stringent than the guidance within AVOG. For example, if we assume the same 13dB reduction through a partially open window, the limiting external levels would be 53 dB $L_{Aeq,8h}$ (during 23:00 – 07:00) and 68 dB L_{Amax} not exceeded more than 10 times a night. These limiting levels are 3 and 10 dB respectively more stringent than the guidance levels within AVOG.

4.2 Analyses of Maxima

To provide some details of the maxima experienced at the flat, the images below show two periods on Friday night with noise maxima identified at levels above 78 dBA. The sources are due to car horns, motorbike revs, people shouting and singing and street cleaning machines.



4.3 Discussion

We consider the above results to provide compelling support for the assumption that windows will need to be kept closed overnight to reduce disturbance due to noise. The assessment is also conservative in some ways, as outlined below:

- The external levels measured are above the criteria. The more significant exceedance is of the criteria for noise maxima, rather than the period-averaged noise levels. This means that the noise events concerned are likely to be more impulsive and intrusive than steady state noise, like that experienced from a busy road.
- The assumed noise reduction of 13 dB through a partially opened window is generous when we consider that under overheating conditions windows are more likely to be thrown wide open. Reductions as little as 4 dB from outside to inside can occur depending on size and nature of window opening, leading to even higher internal noise levels.
- The weekend that was surveyed was in early October and with periods of rain on the Friday night, so it is fair to assume a reduced number of people on the streets. Despite this, the noise levels, especially the maxima, are still well above the recommended levels.

5.0 CONCLUSION

We have undertaken environmental noise monitoring outside Flat 14, 25 Shelton Street. The external noise levels have been compared with industry guidance to assess the suitability of openable windows as a mitigation strategy for overheating.

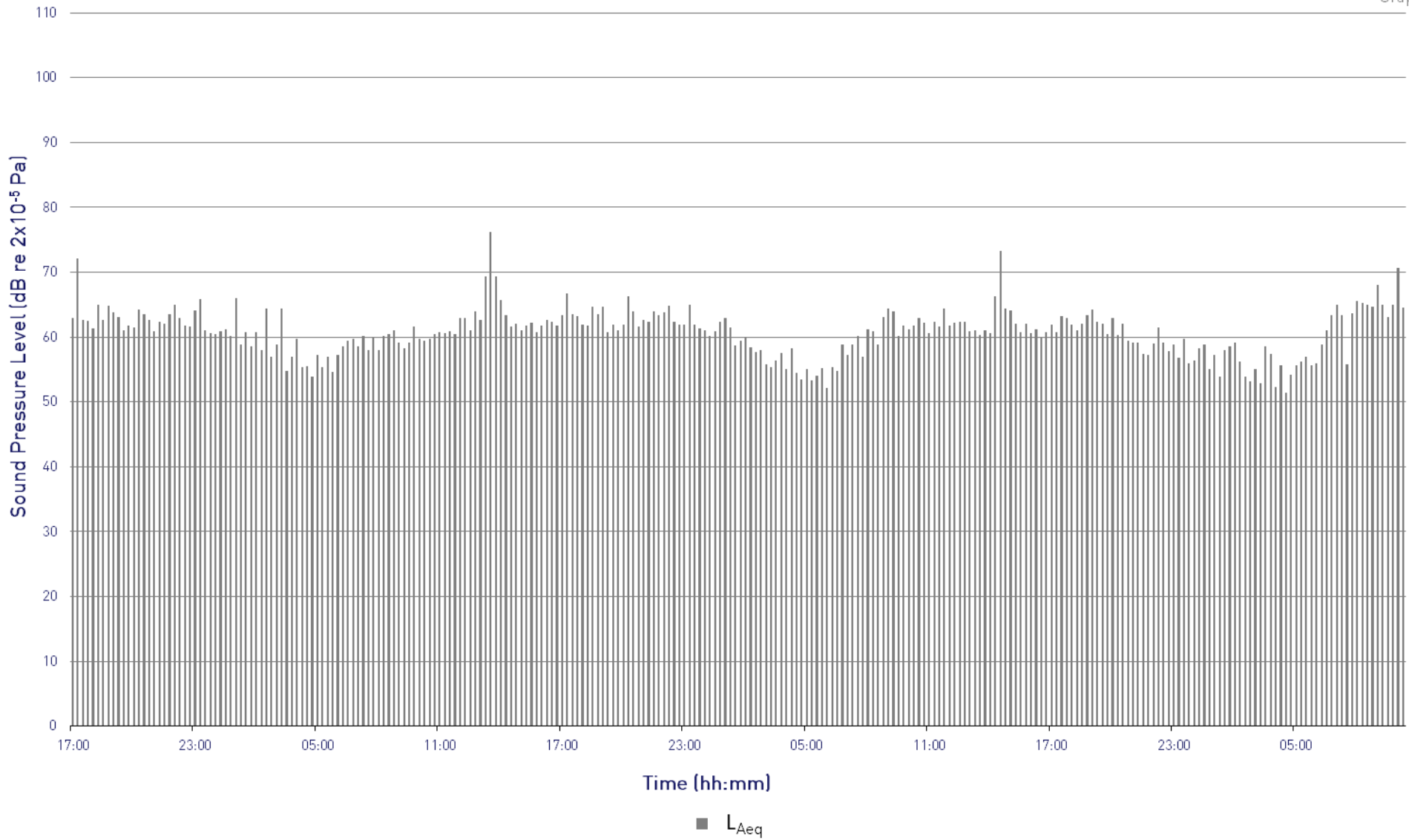
Both the period-averaged noise levels (day and night) and the night-time maxima are above the recommended levels, and we therefore agree that there is a need to keep windows closed in the night-time to reduce the possibility of adverse effects.

Flat 14, 25 Shelton Street
L_{Aeq} Time History
5th Floor Bedroom Window



Project: 11148

Graph 1

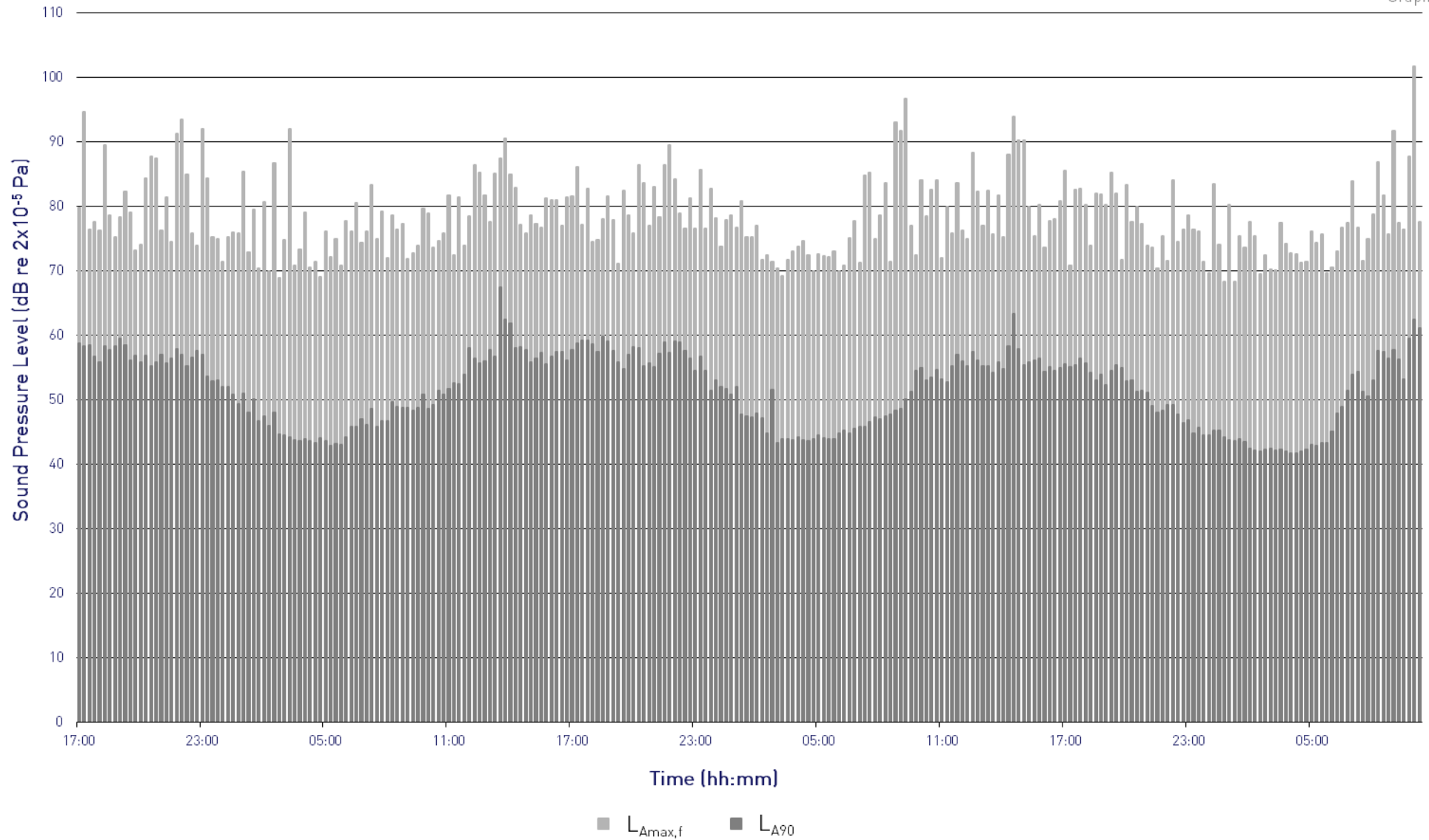


Flat 14, 25 Shelton Street
 $L_{Amax,f}$ and L_{A90} Time History
5th Floor Bedroom Window

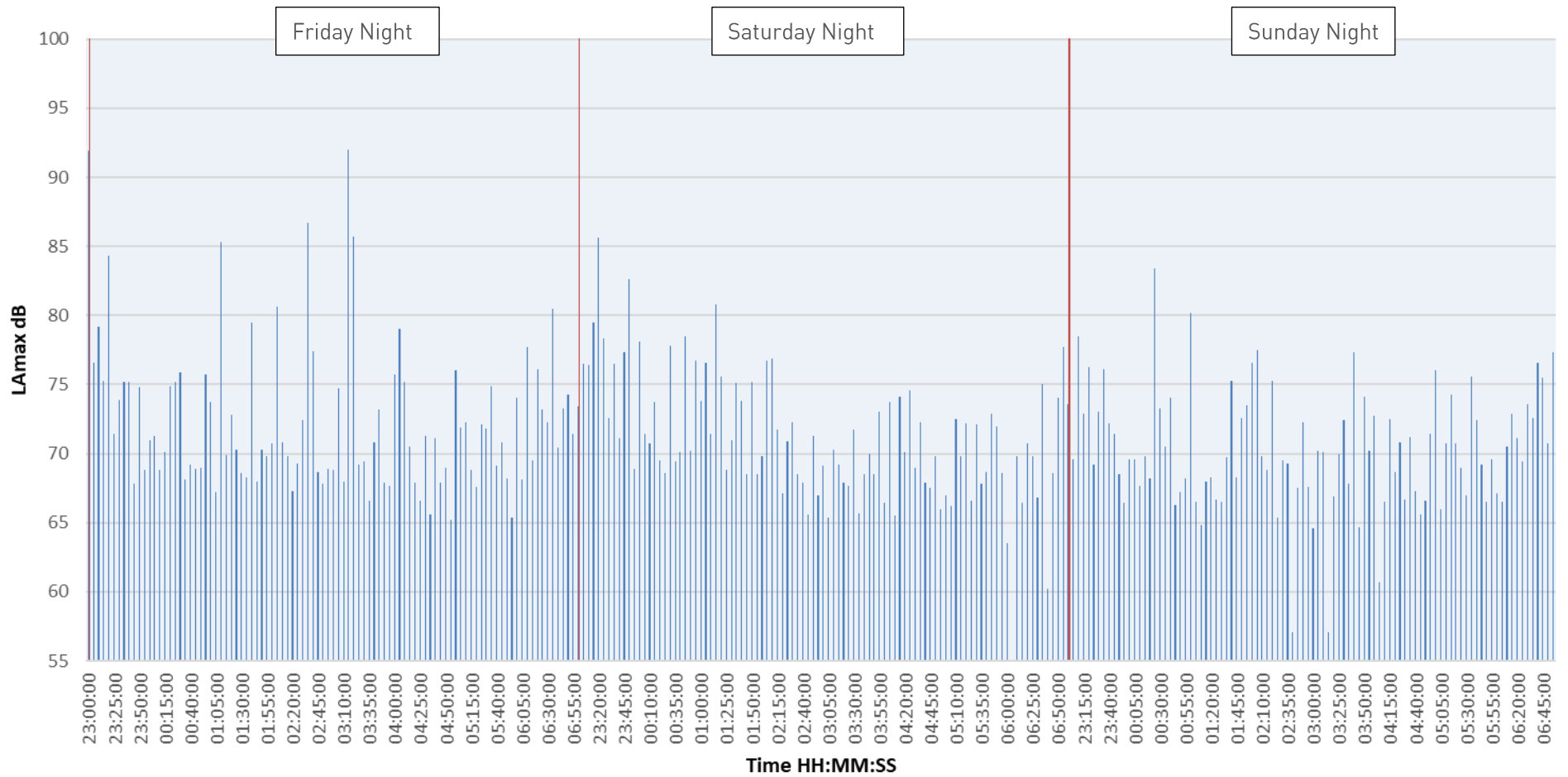


Project: 11148

Graph 2



L_{AMax} 5 Minute Time History (Night)
Friday - Monday





Flat 14, 25 Shelton Street
Monitoring location, 5th Floor Window
Project 11148

Figure 1
11 October 2022

