

20 Greyfriars Road, Reading

Noise Survey Report

On behalf of **McKay Securities Plc**



Project Ref: 40388/3001 | Rev: AA | Date: April 2017



Document Control Sheet

Project Name: 20 Greyfriars Road

Project Ref: 40388/3001

Report Title: Noise Survey Report

Doc Ref: Ac001

Date: April 2017

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Revision	Date	Description	Prepared	Reviewed	Approved

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1 Introduction

- 1.1.1 As part of a potential change of use from office to residential use, Peter Brett Associates LLP (PBA) has been instructed by McKay Securities to carry out an environmental noise survey at 20 Greyfriars Road in Reading, Berkshire.
- 1.1.2 The purpose of the survey is to establish baseline noise levels at the site, in particular those incident on the façades of the building. The idea is that these would then be used at the appropriate time to facilitate the necessary acoustic assessments associated with residential use.
- 1.1.3 This report sets out the methodology adopted and equipment used when carrying out the survey, along with the resultant noise levels measured at the site.
- 1.1.4 Whilst every effort has been made to ensure that this report is easy to understand, it is technical in nature. To assist the reader, an explanation of the terminology used in this report is contained in **Appendix A**.

2 Site Layout

2.1 Location

- 2.1.1 20 Greyfriars Road is located on the corner of Greyfriars Road and Garrard Street in Reading, Berkshire, RG1 1PE. The building is indicated on **Figure 2.1** below.

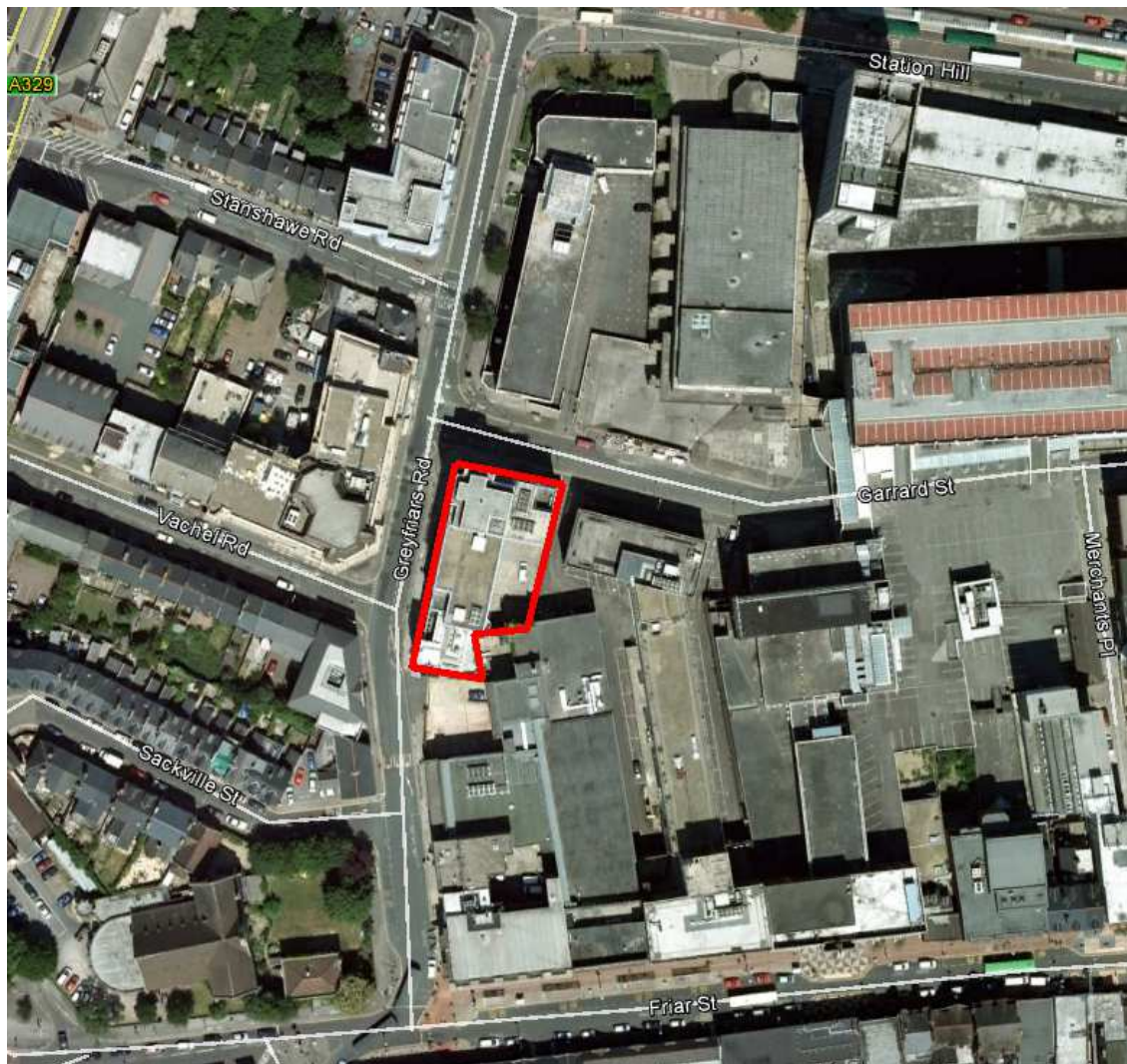


Figure 2.1 - Site Location (courtesy Google Earth)

2.2 Site Context

- 2.2.1 20 Greyfriars Road is a 5 storey office building. Buildings within the vicinity of 20 Greyfriars Road comprise a mix of commercial and residential uses.
- 2.2.2 The closest residential properties to the site are located on Vachel Road, which runs perpendicular to Greyfriars Road opposite the site.

2.3 Noise Climate

- 2.3.1 The principle environmental noise source within the vicinity of the site is traffic using roads within the vicinity of the site. Traffic on the A329 also contributed to the noise climate at the site, as this was visible by looking along Vachel Road.
- 2.3.2 It should be noted that a construction site is located on the opposite side of Garrard Street from 20 Greyfriars Road. There was no obvious activity taking place on the construction site at the commencement of the survey, however if activity took place during the survey this may have contributed to the noise climate, in particular measurements made on Garrard Street.
- 2.3.3 A supermarket delivery service yard is also located adjacent to the southern boundary of the Site.

3 Noise Survey

3.1 General

- 3.1.1 In order to quantify the existing sound climate at the site, and sensitivities within the vicinity, a sound survey was undertaken.
- 3.1.2 The survey was made for a period of 24 hours commencing at 11:00 on Monday 31st January 2017 using two unattended noise monitors.
- 3.1.3 An additional survey was undertaken for a period of 24 hours commencing at 15:00 on Thursday 23rd March 2017 using one unattended noise monitor to cover potential noise from the adjacent service yard.

3.2 Guidance and Standards

- 3.2.1 The survey instrumentation, methodology and reporting of results was carried out following guidance contained within British Standard 7445-1:2003 - *'Description and measurement of environmental noise - Part 1: Guide to quantities and procedures'*.

3.3 Measurement Positions

- 3.3.1 Measurements were made using three unattended noise monitors positioned as indicated on the following figure.

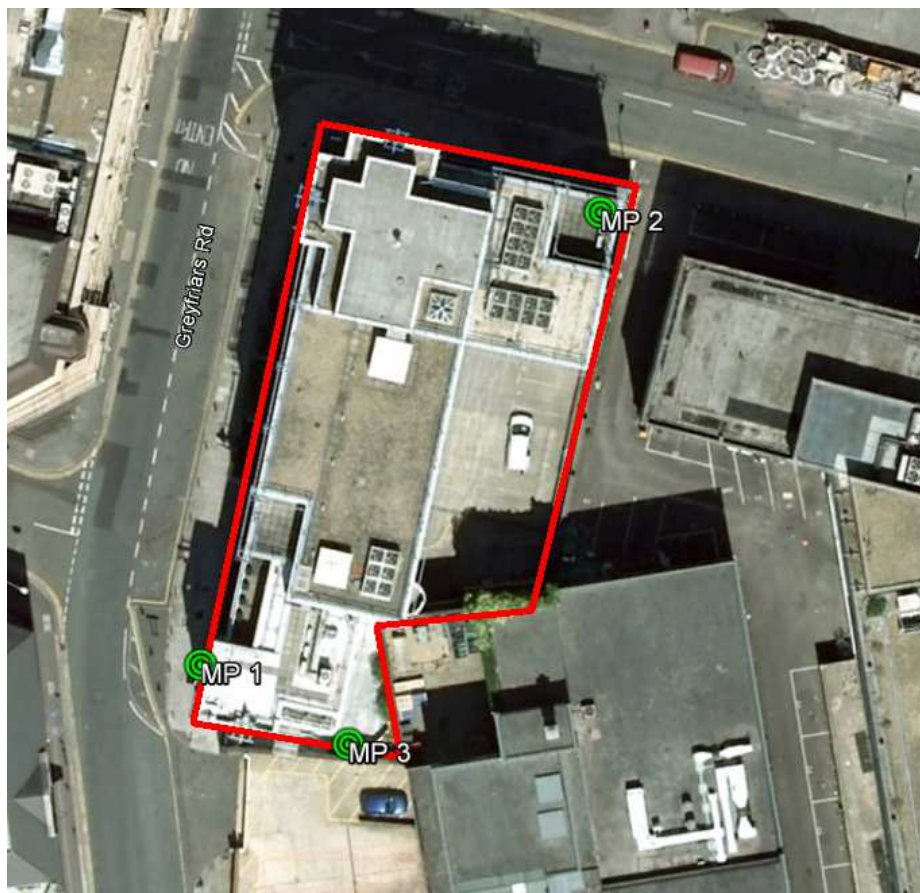


Figure 3.1 - Site figure indicating noise survey measurement positions (courtesy Google Earth)

3.3.2 Descriptions of the positions are given below, and photographs of the monitoring equipment are presented in the attached **Appendix B**.

- **MP1** - The sound level meter microphone was fixed to a pole extended to a distance of 1 m from the 1st floor façade facing Greysfriars Road. Measurements at this position were therefore made under façade incident conditions. The purpose of this position was to quantify noise incident on the building from road traffic sources and other sources, as well as the background noise levels at sensitivities within the vicinity of the site.
- **MP2** - The sound level meter microphone was fixed to a pole extended to a distance of 1m over the edge of the small section of 4th floor roof facing Garrard Street. Measurements at this position were therefore made under façade incident conditions. The purpose of this position was to quantify noise incident on the building from road traffic sources and other sources, as well as the background noise levels at sensitivities within the vicinity of the site.
- **MP3** – The sound level meter microphone was fixed to the end of a pole protruding 1 m from a first floor window that overlooked the service yard. Measurements at this position were therefore made under façade incident conditions. The purpose of this position was to quantify noise incident on the building from the service yard.

3.4 Instrumentation

The instrumentation used during the survey is presented in **Table 3.1** below.

Table 3.1 - Instrumentation used in the survey

Description	Manufacturer	Type	Serial Number	Latest Verification	Next Calibration
Sound Level Analyser	NTi Audio	XL2-TA	A2A-11096-E0	06.04.2016	06.04.2018
Sound Level Analyser	NTi Audio	XL2-TA	A2A-11051-E0	14.04.2016	14.04.2018
Acoustic Calibrator	NTi Audio	CAL200	12405	10.10.2016	10.10.2017

- 3.4.1 The sound level analyser microphones were fitted with weather-proof windshields throughout the duration of the noise survey.
- 3.4.2 The sound level analysers presented in the above table conform to the Type 1 specification as given in BS EN 61672-1:2003 - '*Electroacoustics - Sound level meters - Part 1: Specifications*'. The calibrator presented in the above table conforms to the Class 1 specification as specified in IEC 60942:2003 – '*Electroacoustics - Sound calibrators*'.
- 3.4.3 The measurement instrumentation, including sound level analyser, preamplifier and microphones has undergone traceable calibration by either the equipment manufacturer or a competent laboratory within the last two years.
- 3.4.4 The associated acoustic calibrator has undergone traceable calibration by either the equipment manufacturer or a competent laboratory within the last year. The calibration certificates for the above equipment can be provided on request.

- 3.4.5 The noise measurement equipment was calibrated before and after the survey to ensure a consistent and acceptable level of accuracy is maintained. No significant drift (greater than 0.2dB) was noted to have occurred.

3.5 Data Recorded

- 3.5.1 Noise data was recorded in all relevant indices, including L_{Aeq} , L_{A100} , L_{A90} , and $L_{Amax,F}$. Octave band data for each of the above indices was also recorded, the filters for which met the requirements of BS EN 61260:1996, Class 1.
- 3.5.2 Noise data was recorded over consecutive 15-minute periods during the unattended measurements. All indices and octave band spectra were recorded. Audio recordings were also made throughout the duration of the survey.

3.6 Meteorological Conditions

- 3.6.1 During the survey on 31st January 2017, temperatures were cold to mild, ranging between 8 °C – 12 °C during the day, and 6 °C – 8 °C during night. Wind speeds were generally low, being on average between 1 m/s and 5 m/s.
- 3.6.2 Some water was noted on the ground at the commencement of the survey due a rain shower earlier in the morning. Weather reports also note that there were periods of rain on the second day of the survey. As such, skies were predominantly heavily overcast throughout the survey.
- 3.6.3 During the survey on 23rd March 2017, temperatures were cold to mild, ranging between 10 °C – 12 °C during the day, and 6 °C – 7 °C during night. Wind speeds were generally low, being on average between 1 m/s and 6 m/s. The ground was dry at the start and end of the survey and no precipitation was noted from meteorological data providers. Skies ranged from clear to partially cloudy.

3.7 Results

- 3.7.1 The attached **Appendix C** presents the results of the noise survey in time-history format in terms of L_{Aeq} , L_{Amax} and L_{A90} for each of the measurement positions.
- 3.7.2 The following table presents a summary of the measured ambient (L_{Aeq}), transient (L_{AFmax}) and background (L_{A90}) noise levels at the site.

Table 3.2 - Measured and Calculated Noise Survey Results

Location	Day (07:00 – 23:00)		Night (23:00 – 07:00)			
	$L_{Aeq,T}$	L_{A90} (lowest)	$L_{Aeq,T}$	L_{A90} (lowest)	L_{AFmax} (average)	L_{AFmax} (10 th Highest)
MP1	70.7 dB	50.4 dB	60.6 dB	47.5 dB	75.9 dB	77.6 dB
MP2	67.2 dB	53.0 dB	53.8 dB	44.2 dB	66.9 dB	68.2 dB
MP3	63.4 dB	55.7 dB	62.3 dB	53.4 dB	77.1 dB	84.4 dB

4 Design Standards & Assessment Criteria

4.1 General

- 4.1.1 This section sets out recommendations for glazing and ventilation specifications in order to ensure that a suitable internal noise climate for residential use is achieved.
- 4.1.2 Appropriate guidance and standards are set out, following which the internal noise levels are determined for comparison with the appropriate criteria.
- 4.1.3 It must be noted that this is a preliminary assessment suitable for planning purposes to illustrate the feasibility of providing a suitable internal noise climate within the building to support residential use. In the absence of any internal layout details, the specifications set out assume that the most rigorous (lowest noise levels) standards will need to be achieved internally throughout the building – these being equivalent to a proposed bedroom use.

4.2 Guidance & Standards

Continuous Levels

- 4.2.1 Residential dwellings should be designed to achieve an appropriate level of insulation against external noise. In order to determine the appropriate level of sound insulation, suitable internal noise levels are presented in BS 8233¹. These are given in Table 4.1 below.

Table 4.1 - Indoor Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq, 16\text{hour}}$	-
Dining	Dining room/ area	40 dB $L_{Aeq, 16\text{hour}}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16\text{hour}}$	30 dB $L_{Aeq, 8\text{hour}}$

- 4.2.2 Note 7 to the above table states:

“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.”

As such, the aim would be for internal noise levels to meet the levels presented in the table. However, if incident noise levels exceed a level of 55 dB $L_{Aeq, 16\text{hour}}$ during the daytime, a 5 dB relaxation of the internal noise levels presented above will be acceptable.

Individual Events

- 4.2.3 Note 4 to the above tables states:

“Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the

¹ BS 8233:2014 - Guidance on sound insulation and noise reduction for buildings

character and number of events per night. Sporadic noise events could require separate values."

- 4.2.4 In the previous version of BS 8233, criteria took the form of 45dB $L_{Amax,F}$ not being regularly exceeded, which was subsequently quantified as not more than 10 times per night. As such, to assess the measures necessary to achieved this, using the 10th highest $L_{Amax,F,15min}$ measured at the site during the noise survey should form an appropriate basis.

4.3 Internal Noise Levels

- 4.3.1 External noise levels during the daytime were measured to be 70.7 and 67.2 dB $L_{Aeq,16h}$ at MP1 and MP2 respectively. During the night-time were measured to be 60.6 and 53.8 dB $L_{Aeq,8h}$ at MP1 and MP2 respectively.
- 4.3.2 Annex 6 of the now withdrawn PPG24 gives some typical noise reduction levels that are likely to be achieved in practice for different glazing configurations installed in the façade of a typical domestic dwelling, and exposed to various noise sources. For road traffic noise a typical thermal double glazed unit gives a noise reduction of 33 dBA from a façade incident noise level.
- 4.3.3 The existing glazing units achieve daytime levels of at most 37.7 dB $L_{Aeq,16h}$, and night-time levels of at most 27.6 dB $L_{Aeq,8h}$. These levels are within the range given in BS 8233 when considering the advice of Note 7 with respect to the daytime levels and therefore there would be no reason to prevent its development for residential purposes on acoustic grounds.
- 4.3.4 In addition, with the 10th highest L_{Amax} levels in the order of 78 dBA, a reduction of the order given by PPG24 for double glazing would mean internal levels would not be expected to regularly exceed 45 dB L_{Amax} .
- 4.3.5 Any additional glazing solutions (such as secondary glazing, or uprated thermal units) would improve on this performance. Any additional glazing would be installed to the interior of the building and would not therefore alter its external appearance.
- 4.3.6 For windows overlooking the service yard, it is proposed to retain the existing double glazing, and install a secondary glazed pane comprising a 10 mm pane with a cavity of 200 mm from the primary glazing, with acoustic absorption within the reveals.
- 4.3.7 Based on an informed review of available test data, **Table 4.2** presents the sound reduction indices expected to be achieved by the proposed glazing.

Table 4.2 – Sound Reduction Indices Expected to be Achieved

Glazing Type	Sound Reduction Index (dB) at Octave band with Centre Frequency (Hz)						
	125	250	500	1K	2K	4K	R'w
Secondary Glazed Windows to Service Yard	36	52	49	55	64	73	54

4.4 Ventilation

- 4.4.1 We understand that the existing façade will be retained, with the building remaining mechanically ventilated, were it to be changed to residential use. As such, no allowance has been taken for a reduction in façade sound insulation as a result of openings in the façade.

Any such openings to allow the introduction would need to ensure that the trickle vents or other ventilation openings were appropriately acoustically treated to ensure that the internal noise environment of the building is not compromised. The proposed scheme involves retention of the existing glazing system so that the internal noise environment of the building is not compromised.

5 Conclusions

- 5.1.1 As part of a potential change of use from office to residential use, Peter Brett Associates LLP (PBA) has been instructed by McKay Securities to carry out an environmental noise survey at 20 Greyfriars Road in Reading, Berkshire.
- 5.1.2 The purpose of the survey is to establish baseline noise levels at the site, in particular those incident on the façades of the building. The surveys have been undertaken to be used at the appropriate time to facilitate the necessary acoustic assessments associated with residential use.
- 5.1.3 Based on the noise measurements, ambient levels for facades fronting onto Greyfriars Road were found to be 71 dB $L_{Aeq,16hr}$ during the daytime, falling to 61 dB $L_{Aeq,8hr}$ during the night. Ambient levels at facades facing Garrard Street were found to be 67 dB $L_{Aeq,16hr}$ during the daytime, falling to 54 dB $L_{Aeq,8hr}$ during the night. Ambient levels at facades facing the service yard were found to be 63 dB $L_{Aeq,16hr}$ during the daytime, falling to 62 dB $L_{Aeq,8hr}$ during the night.
- 5.1.4 At the Greyfriars Road position, (MP1), lowest $L_{A90,15min}$ background noise levels were found to be 50 dB and 48 dB during the day and night-time respectively. At the Garrard Street position (MP2) these were found to be 53 dB and 44 dB during the day and night-time respectively. For the service yard (MP3), the lowest $L_{A90,15min}$ background noise levels were found to be 56 dB and 53 dB during the day and night-time respectively
- 5.1.5 For facades fronting onto Greyfriars Road, average and 10th highest L_{AFMax} noise levels measured during the night were found to be 76 dB and 78 dB respectively. At facades facing Garrard Street the average and 10th highest L_{AFMax} noise levels measured during the night were found to be 67 dB and 68dB respectively. Facades facing the service yard had an average and 10th highest L_{AFMax} noise level of 77 dB and 84dB respectively during the night.

Appendix A Glossary

Background Sound	In BS 4142 this is defined as the A weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of a given time interval, T ($L_{A90,T}$)
Daytime	For assessment of internal and external noise levels to the development, the daytime is extrapolated from BS 8233 as the period from 07:00 to 23:00 hours (as night-time is from 23:00 to 07:00 hours).
Decibel (dB)	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure levels the reference quantity is 20 uPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Evening	Defined in BS 5228-1 as the period from 19:00 to 23:00 hours.
$L_{A10,T}$	The A weighted noise level exceeded for 10% of the measurement period, T. It gives an indication of the upper limit of fluctuating noise such as that from road traffic. $L_{A10,18h}$ is the arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00 to 24:00 hours.
$L_{A90,T}$	The A weighted noise level exceeded for 90% of the measurement period, T. This is defined in BS 4142 as the 'background noise level'.
$L_{Aeq,T}$	The equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many noises and can be measured directly with an integrating sound level meter.
L_{Amax}	The highest A weighted noise level recorded during a noise event. The time weighting (slow or fast) should be stated.
Night-time	Defined in BS 8233 and BS 5228-1 as the period from 23:00 to 07:00 hours.

Appendix B Photographs of Noise Monitoring Equipment

Figure B1 – Photographs of MP1



Figure B2 – Photographs of MP2



Figure B3 – Photographs of MP3



Appendix C Time History Graphs

Figure C1 – MP1 Results Time-History

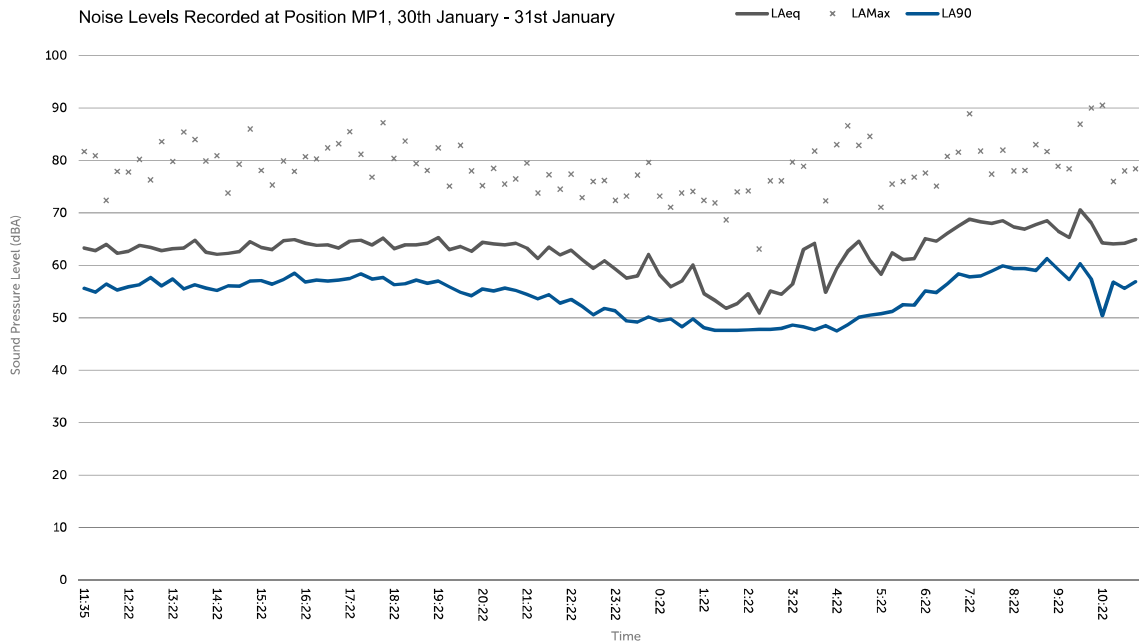


Figure C2 – MP2 Results Time-History

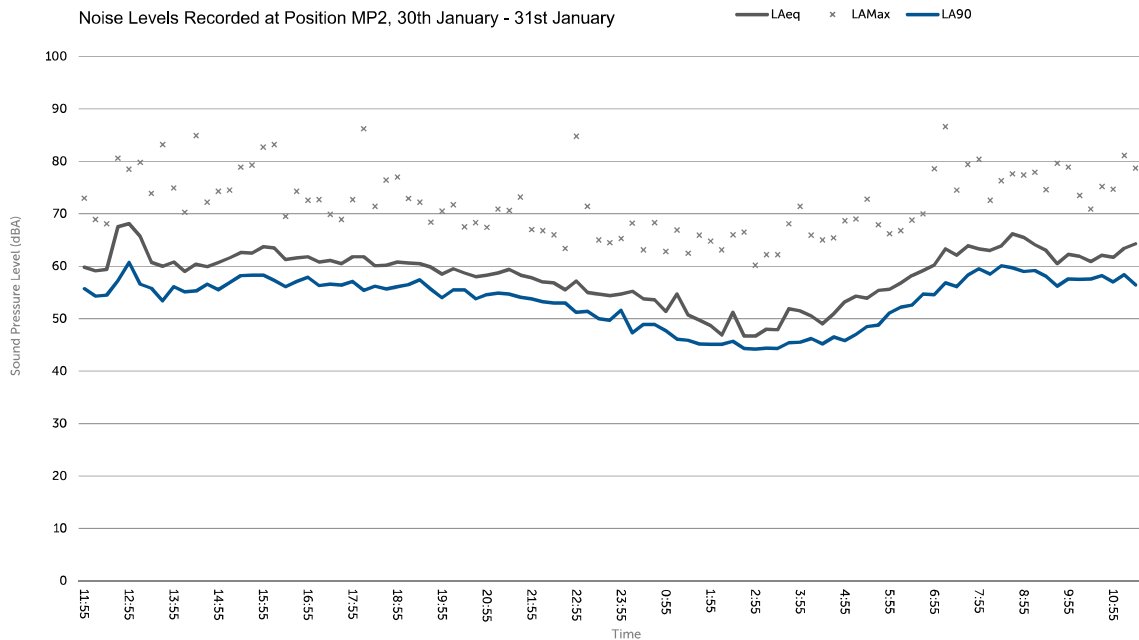


Figure C3 – MP3 Results Time-History

