

SHARPS REDMORE

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Report R3

Planning Condition 11
Bury Market & Flexihall

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This report has been prepared with all reasonable skill, care and diligence commensurate with an acoustic consultancy practice under the terms and brief agreed with our client at that time. Sharps Redmore provides no duty or responsibility whatsoever to any third party who relies upon its content, recommendations or conclusions.

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- A** **Survey Time History Charts**
- B** **Example Noise Management Plan**

1.0 Summary

- 1.1 This report presents an assessment of noise for the proposed Bury Market and Flexihall development as required by Planning Condition 11 (Application Ref: 69580). Advice regarding the noise management plan is included in Appendix B.
- 1.2 This assessment has been carried out based on the policy aims of the NPPF and to avoid an adverse noise impact.
- 1.3 Criteria have been proposed (Section 5.0) after a review of relevant standards and guidance relating to music and entertainment noise impact and are discussed in Section 4.0. The criteria include music noise limits external to noise-sensitive dwellings, as well as limits within dwellings which would be considered '*inaudible*' or '*virtually inaudible*'.
- 1.4 A noise survey was undertaken in January 2022 to determine the prevailing noise climate at the site. Representative background sound levels have been identified for this assessment during the anticipated periods where music or entertainment noise may be present. This includes the daytime period up to 2300 hours and the night-time period between 2300 hours and midnight. Details of the survey are included in Section 6.0, with time-history charts in Appendix A.
- 1.5 Sound propagation calculations have been undertaken using SoundPLAN modelling software, dimensions within the architect's drawings, and using sound insulation properties for the building envelope suggested within the design report.
- 1.6 Typical sound levels of 99 dBA L_{eq} for entertainment or amplified music within the Flexihall have been adopted, as shown in Table 7.1. These should be used as a reliable guide for appropriate internal sound limits, though the criteria proposed relate to receptors external to the development, and any compliance measurements should be taken at a position representative of these external locations. As such the internal sound limit spectrum may vary slightly depending on the acoustic performance of the completed building.
- 1.7 Calculations show, within the parameters adopted within this assessment, that entertainment noise/amplified music from the proposed Flexihall would:
 - Achieve the proposed criteria within dwellings during all assessed periods (i.e. ≤ 47 dB $L_{Aeq,T}$ and 41 dB $L_{Aeq,T}$ in the 63 Hz and 125 Hz octave bands respectively);
 - Achieve the proposed criteria external to dwellings during all assessed periods (i.e. ≤ 70 dB $L_{Aeq,T}$ in the both the 63 Hz and 125 Hz octave bands);
 - Be no greater than 5 dB (in terms of L_{Aeq}) above the measured background sound level (L_{A90}) during the daytime until 2300 hours.
- 1.8 Between 2300 hours and midnight, MNL could marginally exceed the measured background sound level on nights other than Friday or Saturday, or particularly quiet periods. However, measured background sound levels are within 2 dB of predicted music noise levels, unlikely to be a noticeable difference. It is anticipated that events at the Flexihall extending into this period would be managed in sympathy with the proposed criteria. Importantly, the criteria within dwellings would still be achieved during this period.
- 1.9 Based on the findings of this assessment, noise due to amplified music within the Flexihall would not cause adverse impact in accordance with the policy aims of the NPPF.

2.0 Introduction

- 2.1 Sharps Redmore has been appointed to provide acoustic advice for the Bury Market and Flexihall development. This report seeks to provide sufficient information for the discharge of Planning Condition 11 which relates to the noise impact from the development.
- 2.2 The site is situated in the centre of the market town of Bury amongst the existing market north of the *A58 Angouleme Way*. The Bus Station is located directly to the west of the proposed site. The surrounding land use is mixed predominantly with retail /commercial, leisure and some residential. As such the site experiences reasonable high noise levels from road traffic and the bus station.
- 2.3 The development comprises the redevelopment of Bury Market, involving demolition of some existing buildings and roof canopies, and the construction of a new flexible hall space. The Flexihall building will also include offices, meetings rooms and hospitality facilities.
- 2.4 It is understood that the Flexihall itself is intended as a multi-purpose performance space and amplified music is the focus of this assessment, specifically the control of noise escape to nearby noise-sensitive dwellings.

Figure 2.1 Location plan



- 2.5 Entertainment events, where amplified music may be present, are considered for the periods up to 2300 hours, and also between 2300 hours to midnight within this assessment.

3.0 Planning History

3.1 A planning application for the development was submitted in May 2023 (ref: 69580) with the proposal described as follows:

1. *Demolition of buildings and erection of flexible events hall with associated servicing, parking and landscaping;*
2. *New canopy structure to cover existing outdoor market;*
3. *Temporary permission sought for area of Bury Market car park to be utilised for site cabins for the duration of the build*

3.2 Planning permission was approved on the 31st August 2023 with the following condition relating to noise:

11. *No development other than demolition shall commence unless or until a scheme of noise mitigation measures, including a noise management plan has been submitted to and approved in writing by the Local Planning Authority. The approved details shall be implemented prior to first occupation of the building hereby approved and the noise management plan shall be adhered to while the building is in use.*

Reason. To reduce nuisance from noise to the occupiers of the nearby dwelling pursuant to Policy EN7/2 - Noise Pollution of the Bury Unitary Development Plan.

4.0 Standards, Guidance, Policy & Legislation

- 4.1 Planning Condition 11 does not stipulate specific criteria for the development to achieve, but refers to Bury's Unitary Development Plan (published in August 1997) and Policy EN7/2 which states:

EN7/2 - Noise Pollution

In seeking to limit noise pollution the Council will not permit:

- development which could lead to an unacceptable noise nuisance to nearby occupiers and/or amenity users;
- development close to a permanent source of noise.

Justification

Noise is an environmental problem which can cause damage to people's health as well as the amenity of an area. This policy seeks to control the location of development in relation to noise pollution in order to reduce the impact of this form of pollution. Proposals for noisy developments likely to generate an unacceptable noise nuisance will not be permitted. Similarly, proposals for development close to permanent noise sources, such as motorways will not be permitted where it would lead to unacceptable noise nuisance for the occupiers or users of the proposed development. In certain cases, there may be opportunities to prescribe forms of screening, mounding and landscaping to reduce the impact of noise, which will benefit the quality of life for people living and working close to areas where there is noise generation or a noise pollution problem. For proposals involving recreational pursuits which generate noise or nuisance, see Recreation and Tourism Policy RT3/5. Guidance on noise pollution is provided in PPG24 "Planning and Noise".

- 4.2 The National Planning Policy Framework (NPPF) revised in 2021, sets out the Government's economic, environmental and social planning policies for England and "these policies articulate the Government's vision of sustainable development." In relation to noise, paragraph 185 states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

- 4.3 The overarching aim should therefore be to avoid significant adverse impacts and to minimise impacts which are above the lowest observable adverse effect level, so far as reasonably possible.
- 4.4 The Government's Planning Practice Guidance 2014 considers that it is not expected that noise is considered in isolation, separately from economic, social and other environmental dimensions of the proposed development.
- 4.5 The NPPF reinforces the March 2010 DEFRA publication, "Noise Policy Statement for England" (NPSE), which states three policy aims, as follows:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.”*

4.6 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

“... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.”

4.7 It is therefore clear that the fact a noise can be heard is not reason to refuse planning permission and regard must be had to the significance of the impact and the mitigation measures available to reduce the noise.

4.8 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:

- i. The effect may be determined by reference to guideline noise values. For example, British Standard (BS) 8233:2014 and World Health Organisation (WHO) “Guidelines for Community Noise” contain such guidelines;
- ii. The Noise Council Code of Practice for environmental noise control at concerts, Noise Act 1996 and the Institute of Acoustics good practice guide on the control of noise from pubs and clubs, all provide guidance and suggested criteria;
- iii. Another method is described within BS 4142:2014 to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the relatively newly revised standard is intended to assess are sound from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements. In terms of music noise it is not considered that this standard is appropriate or relevant to the type of noise being considered.

Guideline Noise Values

4.9 There are a number of guidance documents that contain recommended guideline noise values. These are discussed below.

4.10 British Standard 8233:2014 is principally intended to assist in the design of new dwellings; however, the Standard does state that it may be used in the assessment of noise from new sources being brought to existing dwellings.

4.11 The WHO advice is the most useful, comprehensive, and pertinent advice in this case, because it is not specific to the circumstances of the assessment. Instead, it provides guidance on acceptable limits in, for example, schools, dwellings and offices from noise occurring within the community.

4.12 The WHO guideline values are appropriate to what are termed “critical health effects”. This means that the limits are at the lowest noise level that would result in any psychological or

physiological effect. They are, as defined by NPSE, set at the Lowest Observed Adverse Effect Level (LOAEL), but do not define the level above which effects are significant (the SOAEL). Compliance with the LOAEL should, therefore, be seen as a robust aim.

- 4.13 The National Physical Laboratory document “*Health Effect based noise assessment methods; a review and feasibility study*”, (September 1998) contains an “interpretation” of the WHO guidelines (then in draft form) for the DETR. The summary of this section of the NPL report states:

“In essence, the WHO guidelines represent a consensus view of international expert opinion on the lowest threshold noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached” (paragraph 5.4).

- 4.14 The World Health Organisation/BS 8233 guideline noise values are summarised in Table 4.1:

Table 4.1 WHO / BS 8233:2014 guideline noise values

Document	Sound level	Guidance
World Health Organisation “Community Noise 2000”	$L_{Aeq,T} = 55$ dB	Serious annoyance, daytime and evening. (Continuous noise, outdoor living areas)
	$L_{Aeq,T} = 50$ dB	Moderate annoyance, daytime and evening. (Continuous noise, outdoor living areas).
	$L_{Aeq,T} = 35$ dB	Moderate annoyance, daytime and evening. (Continuous noise, dwellings, indoors)
	$L_{Aeq,T} = 30$ dB	Sleep disturbance, night-time (indoors)
	$L_{Amax} = 60$ dB	Sleep disturbance, windows open at night. (Noise peaks outside bedrooms, external level).
	$L_{Amax} = 45$ dB	Sleep disturbance at night (Noise peaks inside bedrooms, internal level)
BS 8233:2014 “Sound Insulation and noise reduction for buildings”	$L_{Aeq,T} = 55$ dB	Upper limit for external steady noise. (gardens and patios).
	$L_{Aeq,T} = 50$ dB	Desirable limit for external steady noise. (gardens and patios).
	$L_{Aeq,16\text{ hours}} = 35$ dB	Resting, living room day. (Internal – steady noise)
	$L_{Aeq,16\text{ hours}} = 40$ dB	Dining, dining room day. (Internal – steady noise)
	$L_{Aeq,16\text{ hour}} = 35$ dB	Sleeping, bedroom day (Internal – steady noise)
	$L_{Aeq,8\text{ hours}} = 30$ dB	Sleeping, bedroom night (Internal – steady noise)

- 4.15 For $L_{Aeq,T}$ criteria the time base (T) given in the documents is 16 hours for daytime values and eight hours for night-time values.

- 4.16 The Institute of Acoustics (IoA) produced a *Good Practice Guide on the Control of Noise from Pubs and Clubs* in March 2003. Whilst not directly applicable to this venue, it is a useful guide, but did not contain objective noise criteria. To address this, a working group produced a draft annex on criteria and measurement criteria which was published in the IoA Bulletin (Volume 28, No. 6, 2003). It proposed that, for premises where music might occur more than once a week or continue past 2300 hours the L_{Aeq} of the entertainment noise should not exceed the representative background noise level (BNL) L_{A90} (without entertainment noise). This criterion is an internal criterion. The document advises that the zero exceedance guidance given in the criterion would equate to differences of approximately 5 dB outside a partially open window. Less regular events have similar criteria but allow entertainment noise to be 5 dB higher for all parameters.
- 4.17 The Noise Act 1996 (which applies to licensed premises) created the notion of a 'permitted level' for night time noise between 2300 and 0700 hours. The permitted level is exceeded when the measured level is greater than or equal to 34 dB $L_{Aeq,5-mins}$ within a complainant's premises, and the noise exceeds the 'underlying level' by at least 10 dBA. In this instance, it is not expected that the underlying level (which is an internal level, measured with windows closed) would be greater than 24 dBA, so the 34 dBA lower threshold is the applicable target. This would equate to 44 dBA externally (assuming a conservative reduction of 10 dB through a partially open window). The Noise Act 1996 requires the assessment to be undertaken with windows and doors closed, so the internal limit would equate to at least 55 dB L_{Aeq} outside the premises.
- 4.18 Table 4.2 below presents the recommended music noise levels from the Noise Council Guide "Code of Practice on Environmental Noise Control at Concerts (1995)". Levels are measured 1 metre from any noise sensitive premises.

Table 4.2 Guideline Music Noise Levels (MNL)

Concert days per year	Venue Category	Guideline
1 to 3	Urban Stadia or Arenas	Music Noise Level (MNL) should not exceed 75 dBA
1 to 3	Other Urban or Rural Venues	MNL should not exceed 65 dBA
4 to 12	All Venues	MNL not to exceed Background Noise Level (BNL) by more than 15 dBA in a 15-minute period
More than 12 and up to 30	Indoor Venues	MNL not to exceed BNL by more than 5 dBA in a 15-minute period

- 4.19 Note 1 to Guideline 3.4 of the document provides helpful guidance for low frequency music noise stating *"A level up to 70 dB in either the 63 Hz or 125 Hz octave frequency band is satisfactory..."*.
- 4.20 Further to the above, the guidance states:
- "For events continuing or held between the hours of 12.00 and 09.00 the music noise should not be audible within noise-sensitive premises with windows open in a typical manner for ventilation."*
- 4.21 The document also contains guidance that the background noise level (BNL) can be determined from the arithmetic average L_{90} over the last four hours of the event.

- 4.22 Although the venue may be used for more than 30 events a year, there is no guidance for events occurring more frequently than 30 times per year.
- 4.23 Criteria commonly adopted for the assessment of entertainment noise are based on the Moorhouse curve¹. Music noise levels which are no greater than 47 dB and 41 dB L_{eq} in the 63 Hz and 125 Hz octave bands respectively would be considered to be '*inaudible*' or '*virtually inaudible*' within habitable rooms in dwellings.
- 4.24 Criteria are proposed on the basis of the above guidance and noise levels in the next Section.

¹ Moorhouse et al (2005) *Proposed criteria for the assessment of low frequency noise disturbance*, Defra (updated in 2008 and 2011)

5.0 Assessment Criteria

5.1 The following objective criteria are proposed for noise egress due to amplified music from within the Flexihall:

- i. The free-field music noise level ($L_{Aeq,T}$) must not exceed the background noise level ($L_{A90,T}$) by more than 5 dBA in a 15-minute period when measured at 1 metre from the façade of nearby noise-sensitive dwellings during the daytime period (0900 – 2300 hours);
- ii. The free-field music noise level ($L_{Aeq,T}$) must not exceed the background noise level ($L_{A90,T}$) in a 15-minute period when measured at 1 metre from the façade of nearby noise-sensitive dwellings during the night-time period (2300 – 0000 hours);
- iii. The free-field music noise level when measured at 1 metre from the façade of nearby noise-sensitive dwellings must not exceed 70 dB L_{eq} in the 63 Hz and 125 Hz octave frequency bands when measured over a 15-minute period.;
- iv. Within dwellings, music noise levels must not exceed 47 dB L_{eq} or 41 dB L_{eq} in the 63 Hz and 125 Hz octave frequency bands respectively when measured over a five-minute period.

6.0 Acoustic Survey

- 6.1 Sharps Redmore carried out an environmental survey to determine the current acoustic climate at the site and at nearby noise-sensitive locations. The results of the survey will be used to determine suitable sound insulation requirements for the building envelope, and to assess noise egress to nearby noise-sensitive locations.
- 6.2 The survey was undertaken between the 13th and 18th January 2022 such that sufficient data was obtained to represent the daytime and night-time periods, weekdays and weekends, and days which were or were not market days.
- 6.3 Equipment details are shown in Table 6.1 below. Sound level meters are laboratory calibrated to national standards, and field-calibrated before and after the survey. No significant calibration drift was observed. Calibration certificates are available on request.

Table 6.1 Measurement equipment

Equipment	Description	Serial Number
Norsonic 118	Class 1 sound level meter	31657
Norsonic 1225	Microphone	285495
Norsonic 1206	Preamplifier	30946
Norsonic 1251	Calibrator	31229
Norsonic 140	Class 1 sound level meter	1404434
Norsonic 1225	Microphone	168158
Norsonic 1206	Preamplifier	30747
Norsonic 1251	Calibrator	33001

- 6.4 Multiple parameters were recorded, including the following:
- equivalent sound pressure level ($L_{eq,T}$)
 - maximum sound pressure level (L_{Fmax})
 - background sound pressure level ($L_{90,T}$)
 - the tenth percentile sound pressure level ($L_{10,T}$)
- 6.5 Measurements are recorded in one-third-octave frequency bands, which are adjusted in each frequency band by an 'A' weighting, before summing logarithmically to obtain a single-figure A-weighted value, denoted by the 'A' subscript. The A-weighting represents a normal human's response to sound pressure levels.
- The A-weighted equivalent sound pressure level ($L_{Aeq,T}$) represents an 'average' continuous sound level over a given period T .
 - The A-weighted maximum sound pressure level (L_{AFmax}) is the highest sound pressure level measured with a 'fast' time constant, which is a rise and fall time of 125 milliseconds.
 - The background sound level ($L_{A90,T}$) is the level which is exceeded by 90% of measurements over a given period. As the name suggests this represents a background level of sound without the influence of significant transient sound events.

- 6.6 The A-weighted tenth percentile sound pressure level ($L_{A10,T}$) is commonly used to represent traffic noise.
- 6.7 A single sound level meter was left unattended to record measurements over the six-day survey period in 5-minute measurement periods.
- 6.8 The measurement location was chosen to be representative of the closest-noise sensitive flats on Murray Road, whilst being sufficiently safe and secure to leave monitoring equipment unattended. The meter was positioned on the roof of the Market Office building equivalent to first-floor level at the flats. The measurement position is shown in Figure 6.1 and Figure 6.2.

Figure 6.1 Unattended survey position

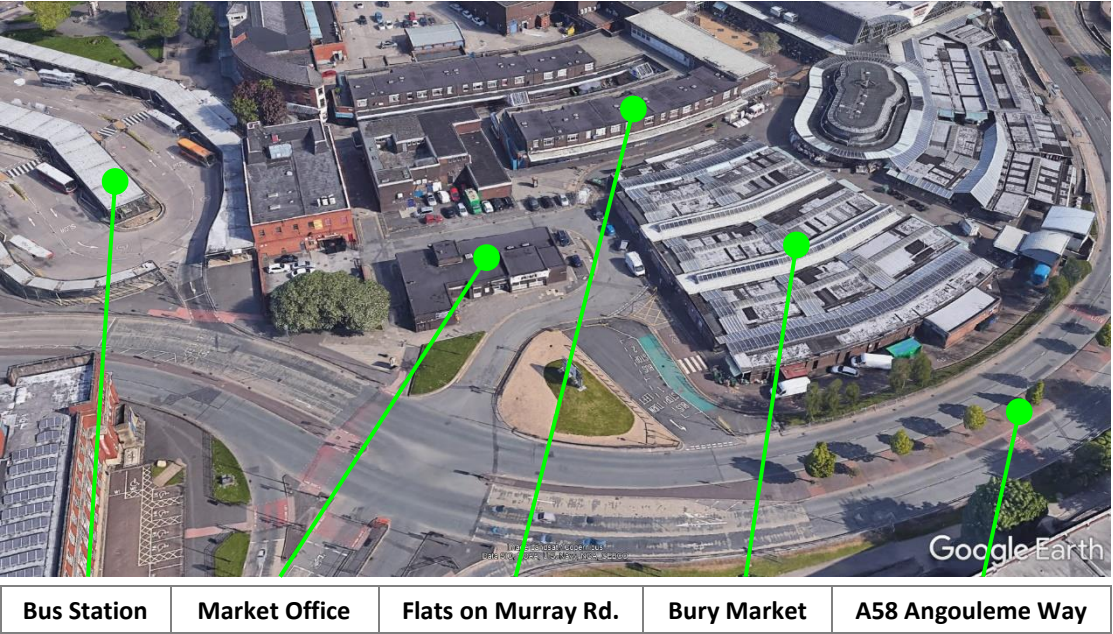


Figure 6.2 Meter location



- 6.9 The weather conditions during the survey have been sourced from www.wunderground.com for the weather station IBURY44 located at 53.566° N, 2.293° W. The data is presented on the survey history charts in Appendix A.
- 6.10 In summary, temperatures ranged between -2°C and 8°C during the daytime and between -2°C and 6°C during the night-time. Wind speeds were low and not considered to have significantly affected measurements. There was a very small amount of precipitation during the survey, and roads may have been damp during some periods, though this is in keeping with typical meteorological conditions at the site.
- 6.11 The dominant noise sources at the site was road traffic noise, predominantly from the A58 Angouleme Way, and from the market access roads close by. There were many pedestrians walking through the market which contributed noise from footfall and from talking/shouting.
- 6.12 A period of comparatively higher sound levels is notable during the night-time on Saturday 15th January, which could be due to the night-time economy and preparation for market day.
- 6.13 The results of the unattended survey are presented in the time history charts in Appendix A; detailed measured data are available on request.
- 6.14 A summary of the results is presented in Table 6.2 below. The time periods and data presented are consistent with the parameters considered within the criteria.

Table 6.2 Summary of noise survey results

Date	Period	Representative $L_{A90,T}$ (dB)
Thursday 13/01/2022	1900 – 2300 hours	49
	2300 – 0000 hours	42
Friday 14/01/2022	1900 – 2300 hours	52
	2300 – 0000 hours	49
Saturday 15/01/2022	1900 – 2300 hours	49
	2300 – 0000 hours	45
Sunday 16/01/2022	1900 – 2300 hours	47
	2300 – 0000 hours	43
Monday 16/01/2022	1900 – 2300 hours	49
	2300 – 0000 hours	42

7.0 Assessment

- 7.1 The sound levels given in Table 7.1 below are representative of a typical entertainment venue playing live music, which are adopted as a reasonable worst-case scenario.

Table 7.1 Entertainment sound levels

Description	Octave band equivalent sound pressure level, L_{eq} (dB)						
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Entertainment sound level	100	100	95	95	95	90	90

- 7.2 The route of noise egress considered is the glazed section of the north façade which is located opposite the noise-sensitive residences, and the roof. The sound reduction performance for these elements are shown in Table 7.2.

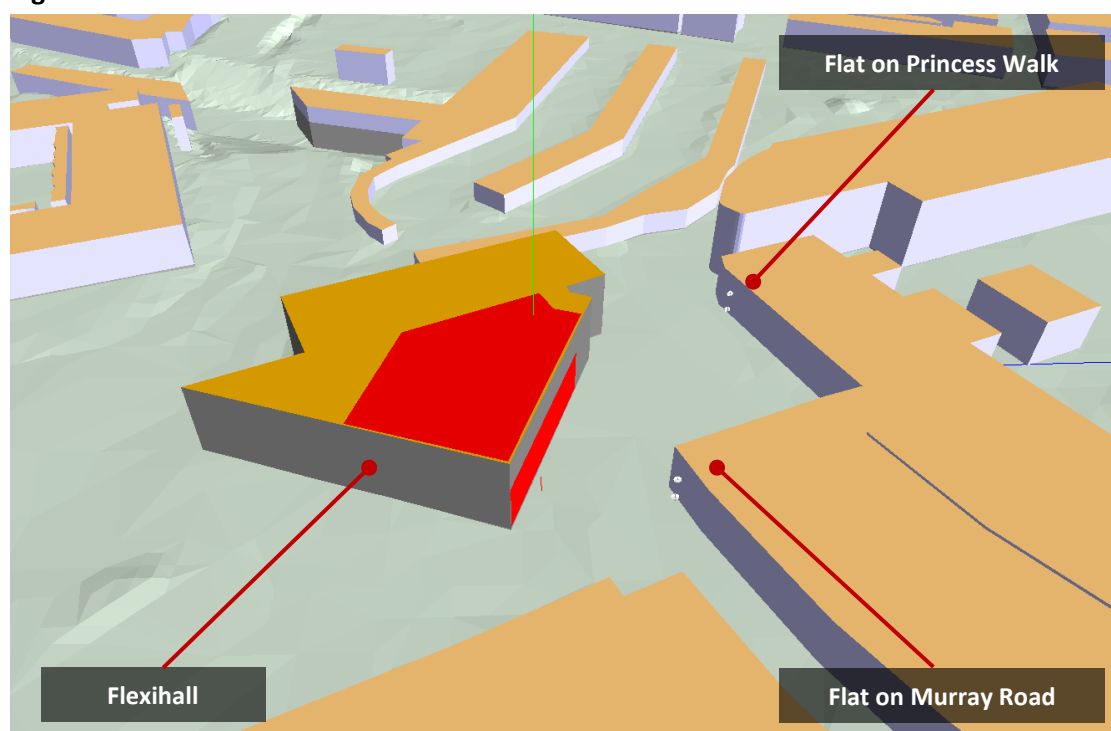
Table 7.2 Façade element sound insulation performance

Description	Octave band sound reduction index, SRI (dB)						
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Window <i>10.8 / 16 / 8.8 mm</i>	24*	35	41	48	53	55	65
Roof <i>Timber insulated roof panel</i>	24	27	25	45	48	56	66

* SRI value at 63 Hz is estimated.

- 7.3 Computer modelling software (SoundPLAN 8.2) has been used to calculate music noise egress and propagation across the proposed site. The model represents the current location including ground levels, existing buildings and highways, as well as the proposed ground levels and buildings. A 3D overview of the model is presented in Figure 7.1.

Figure 7.1 SoundPLAN model



- 7.4 The model calculates sound propagation according to the guidance and methodology of ISO 9613-2², and includes allowances for third order reflections, negligible ground absorption and downwind weather conditions. Noise propagation has been calculated in octave frequency bands.
- 7.5 Receiver positions were placed at first-floor façade locations for the nearest dwellings on Murray Way and Princess Walk.
- 7.6 Predicted free-field music noise levels one metre from the façade of dwellings are presented below.

Table 7.3 Predicted external music noise levels (MNL)

Description	Octave band sound pressure level, L_{eq} (dB)							MNL L_{Aeq} (dB)
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	
Murray Road	65	53	48	33	28	21	10	44
Princess Walk	60	49	44	28	23	15	4	39

- 7.7 Predicted music noise levels show that they are below 70 dB in the 63 Hz and 125 Hz octave bands, and that the MNL are below the measured background sound levels (L_{A90}) up to 2300 hours.
- 7.8 Between 2300 hours and midnight, MNL could exceed the measured background sound level on nights other than Friday or Saturday, or particularly quiet evenings. However, measured background sound levels are within 2 dB of predicted music noise levels, which is marginal and unlikely to be a noticeable difference.
- 7.9 Using the façade sound levels determined within the computer model, noise ingress calculations have been undertaken for the nearest dwellings.
- 7.10 Noise ingress calculations have been carried out in accordance with the methods and procedures described by BS 8233:2014 and BS 12354-3:2000³. Typical room dimensions have been assumed in the absence of available drawings.
- 7.11 Indoor ambient noise levels have been calculated on the basis of a partially open window for ventilation with an equivalent area of 100,000 mm² adopted for a habitable room (bedroom or living room).
- 7.12 The sound reduction performance for a partially open window is taken from NANR116⁴ with values as shown in Table 7.4.

Table 7.4 Sound reduction values for a partially open window

Description	Octave band normalised element level difference, $D_{n,e}$ (dB)						
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
100,000 mm ²	21	15	19	19	16	21	24

² ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.

³ BS 12354-3:2000 Building acoustics. Estimation of acoustic performance in buildings from the performance of elements - Airborne sound insulation against outdoor sound

⁴ NANR116: 'Open/Closed Window Research' - Sound Insulation Through Ventilated Domestic Windows, School of the Built Environment, Napier University, April 2007.

- 7.13 Predicted internal noise levels within dwellings due to entertainment/music from the Flexihall are presented in Table 7.5.

Table 7.5 Calculated internal music noise levels

Description	Octave band sound pressure level, L_{eq} (dB)							MNL L_{Aeq} (dB)
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	
Murray Road	46	40	32	16	15	3	-	28
Princess Walk	41	36	28	11	10	-	-	24

- 7.14 Results of noise ingress calculations demonstrate that the calculated values are consistent with the criteria for being 'inaudible' or 'virtually inaudible'.

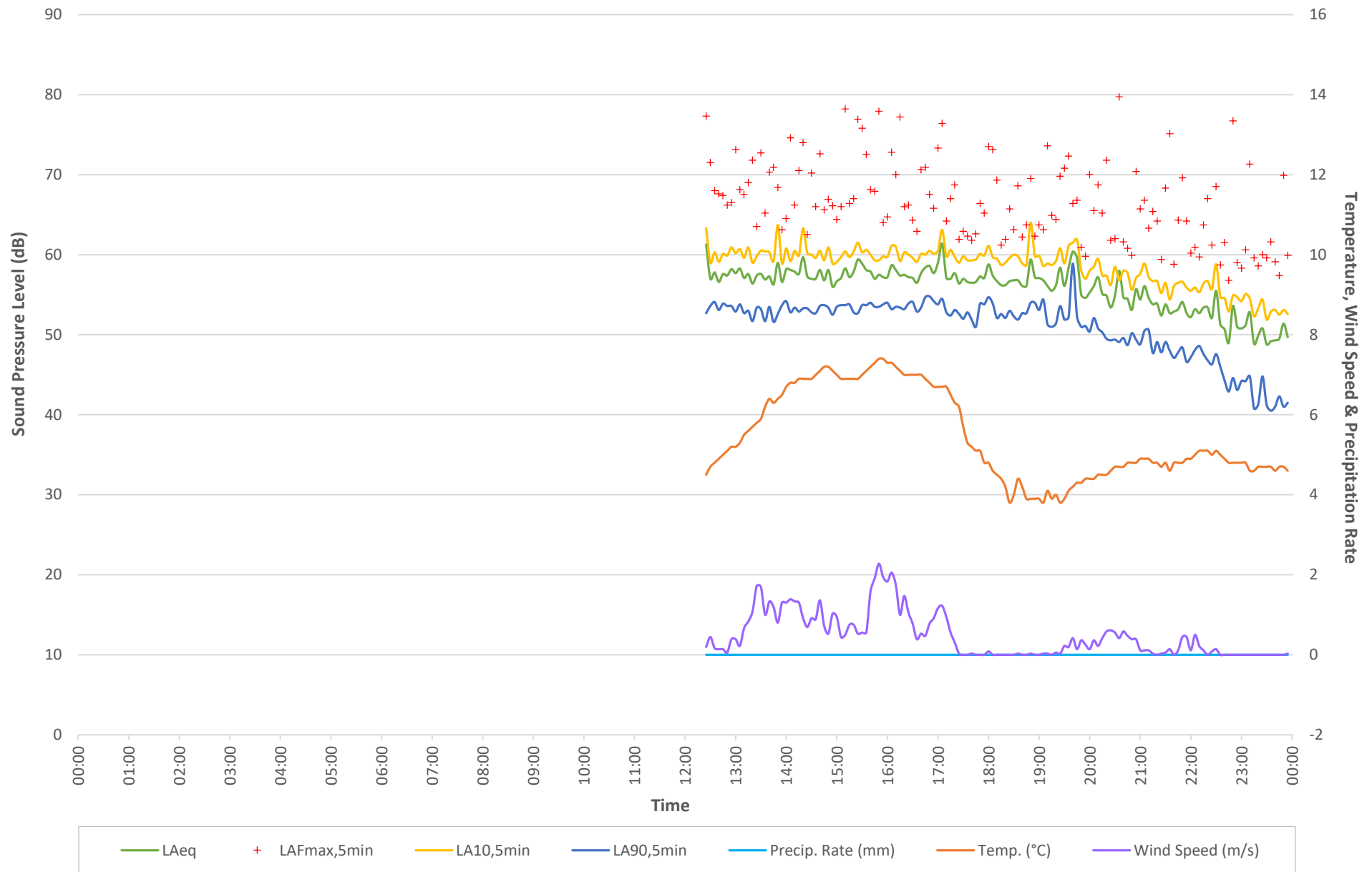
8.0 Conclusion

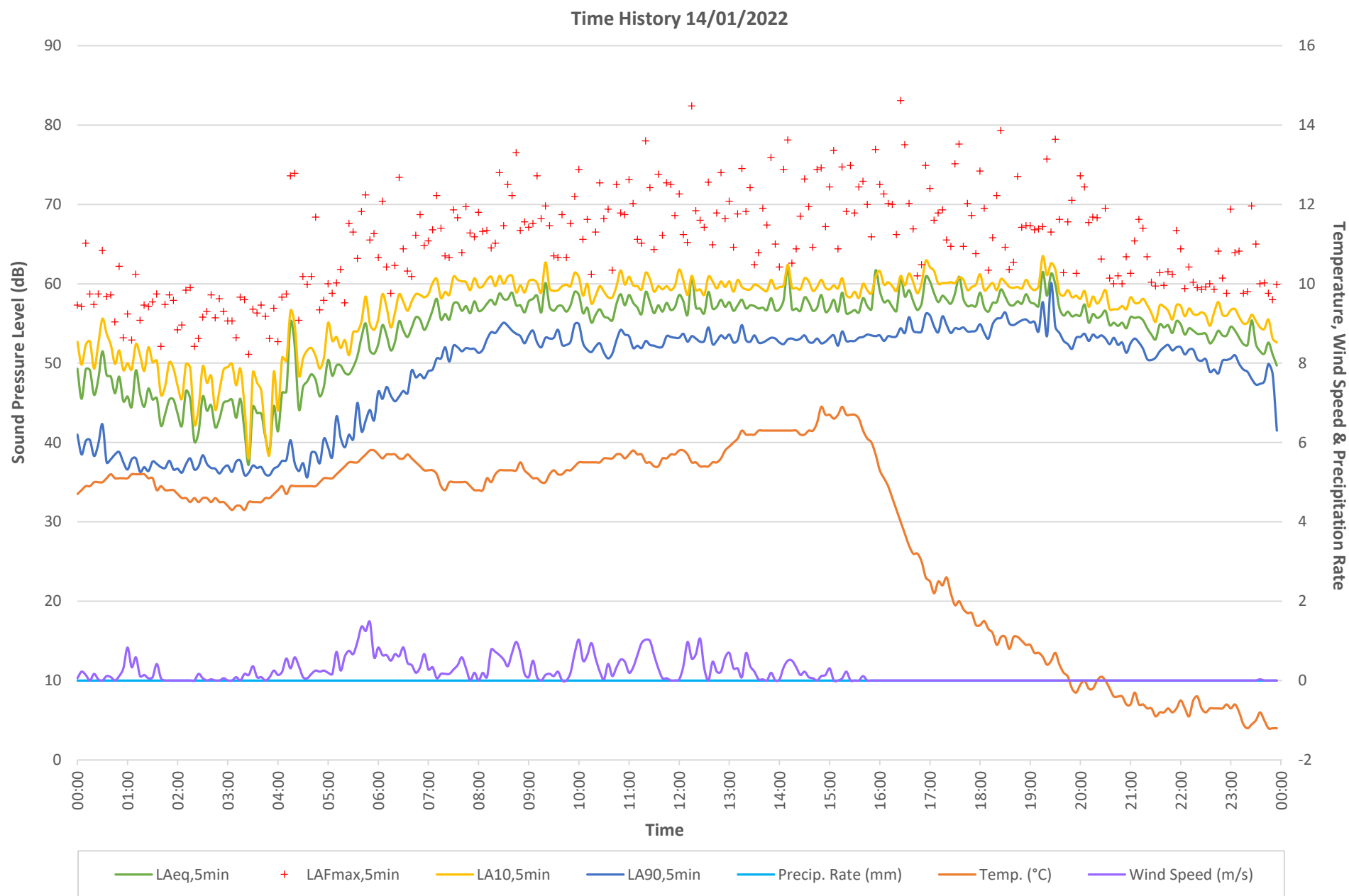
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- 8.6 Typical sound levels of 99 dBA L_{eq} for entertainment or amplified music within the Flexihall have been adopted, as shown in Table 7.1. These should be used as a reliable guide for appropriate internal sound limits, though the criteria proposed relate to receptors external to the development, and any compliance measurements should be taken at a position representative of these external locations. As such the internal sound limit spectrum may vary slightly depending on the acoustic performance of the completed building.
- 8.7 Calculations show, within the parameters adopted within this assessment, that entertainment noise/amplified music from the proposed Flexihall would:
- Achieve the proposed criteria within dwellings during all assessed periods (i.e. ≤ 47 dB $L_{Aeq,T}$ and 41 dB $L_{Aeq,T}$ in the 63 Hz and 125 Hz octave bands respectively);
 - Achieve the proposed criteria external to dwellings during all assessed periods (i.e. ≤ 70 dB $L_{Aeq,T}$ in the both the 63 Hz and 125 Hz octave bands);
 - Be no greater than 5 dB (in terms of L_{Aeq}) above the measured background sound level (L_{A90}) during the daytime until 2300 hours.
- 8.8 Between 2300 hours and midnight, MNL could marginally exceed the measured background sound level on nights other than Friday or Saturday, or particularly quiet periods. However, measured background sound levels are within 2 dB of predicted music noise levels, unlikely to be a noticeable difference. It is anticipated that events at the Flexihall extending into this period would be managed in sympathy with the proposed criteria. Importantly, the criteria within dwellings would still be achieved during this period.
- 8.9 Based on the findings of this assessment, noise due to amplified music within the Flexihall would not cause adverse impact in accordance with the policy aims of the NPPF.

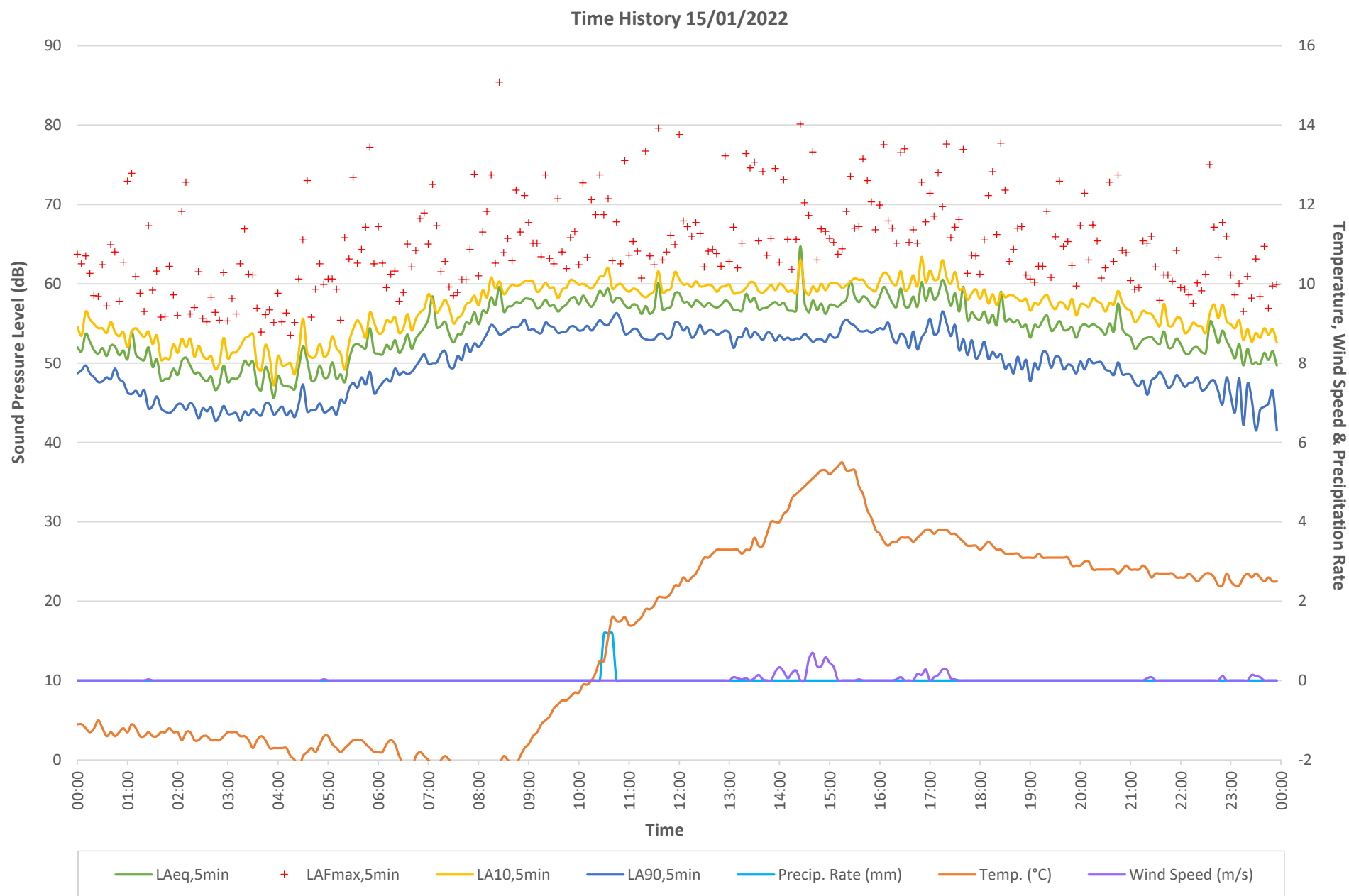
APPENDIX A

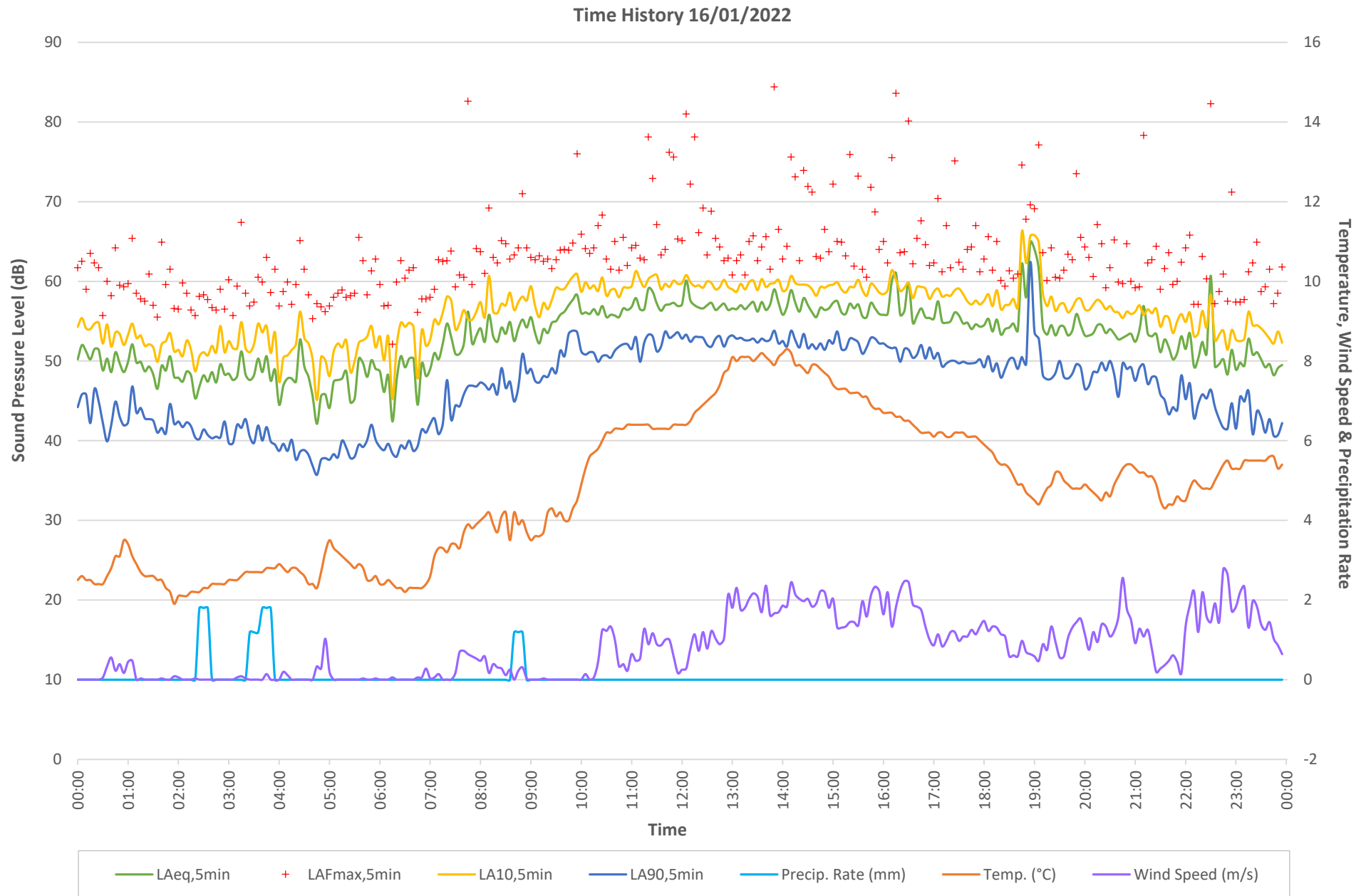
Survey Time History Charts

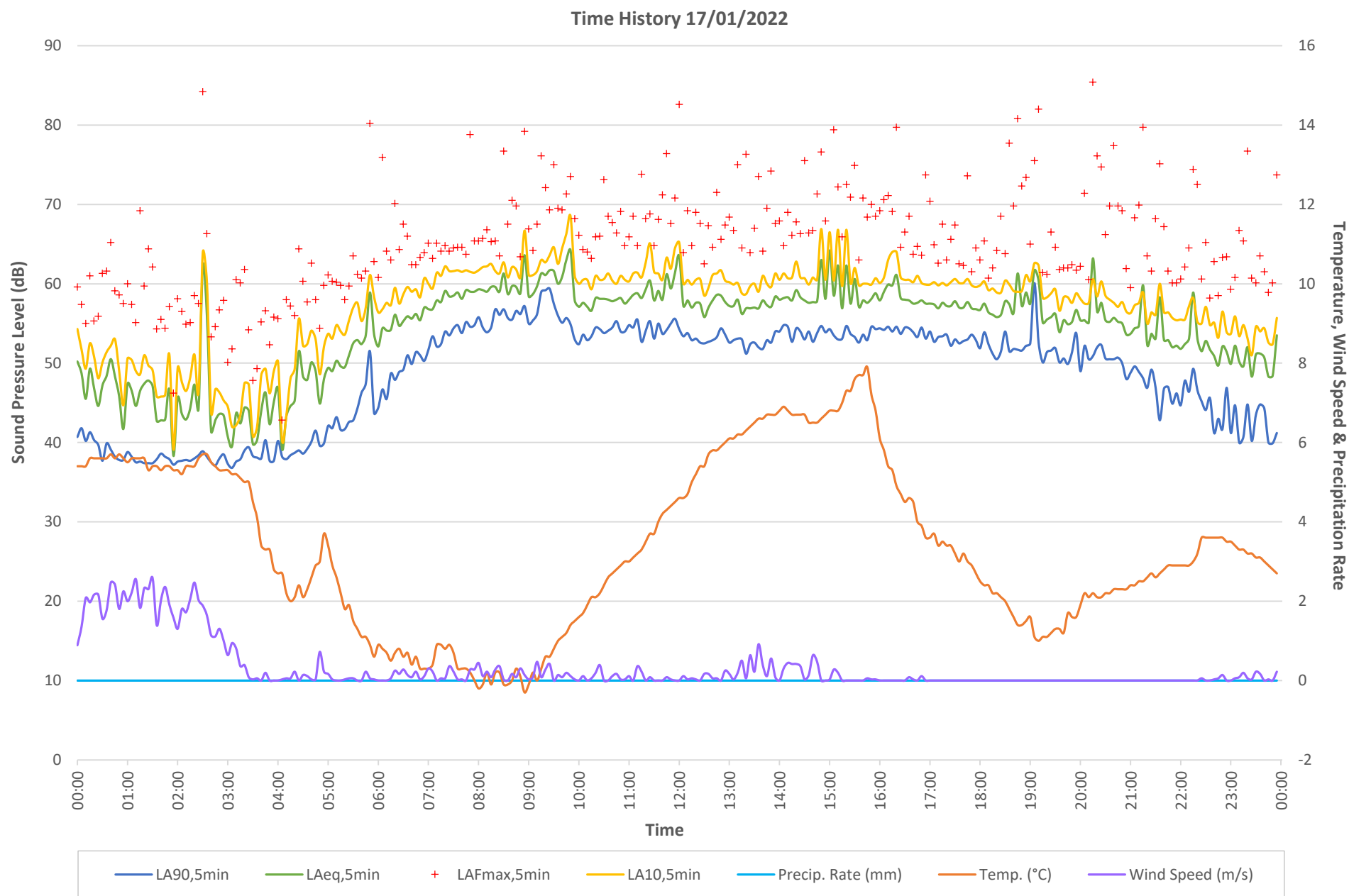
Time History 13/01/2022



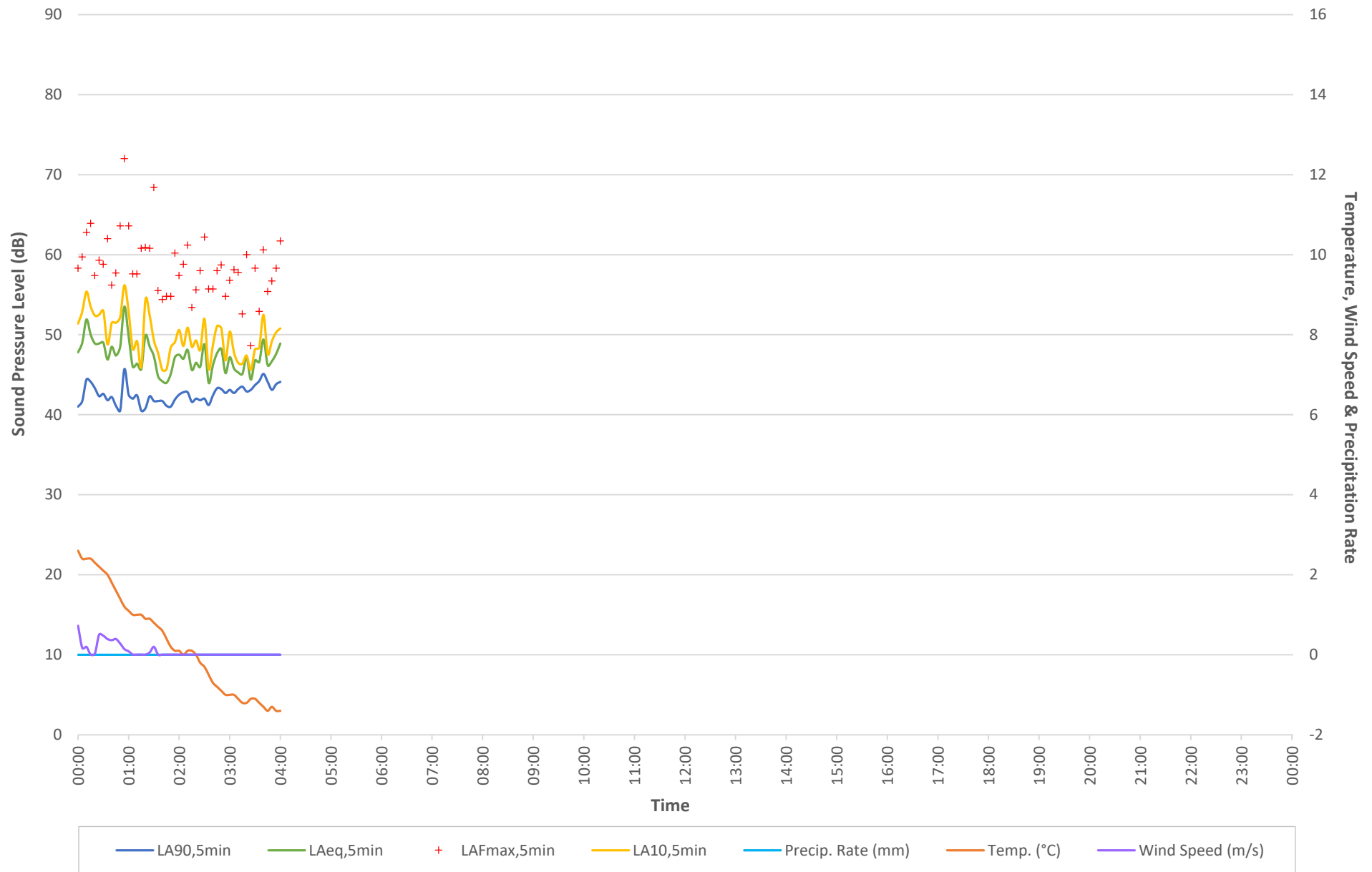








Time History 18/01/2022



APPENDIX B

Example Noise Management Plan

Noise Management Plan Advice

This document is intended to provide a simple, non-technical guide, to help manage noise and avoid complaints from neighbours.

Managing Noise from Events

There are three basic concepts to managing noise:

- Reduce noise at source,
- Prevent noise escaping,
- Noise Management.

Reduce Noise at Source

Volume Control

It sounds simple, but one of the best ways of controlling noise is keeping the volume level down. The basic form of this is simply turning the control on sound amplification systems down. More complex sound control systems may have sound compression or limiting facilities, and mixing desks with controls for bass or treble (low and high frequency sound). It is more important to reduce or control bass, as this travels through building structures more easily and causes the “thump-thump” beat which can cause disturbance. An agreement with the local authority of music noise levels together with low frequency levels at an easily monitored point is recommended.

Loudspeakers

Choose speakers that are right for the type of venue and entertainment that you wish to provide. There is no need to get an over-sized powerful speaker for smaller venues, and it is often better to have more, lower-power speakers positioned and directed to achieve the best result for the audience than one or two powerful speakers. Consider orientation away from residential receptors. Local screening/ baffles may be considered.

Position speakers away from windows, doors and other openings and don't mount directly on walls or other parts of the structure – use proper mounting-stands wherever possible.

Vocals / PA system

It is frequently the vocal element of music which can be most disturbing and so if you find this to be a problem you may need to use a compression system to provide more control over the volume and quality of the sound: specialist advice should be sought for this.

Prevent Noise Escaping

Loudspeakers are often able to direct sound at a target area, i.e. the audience. You should ensure that loudspeakers are focused on the area where the audience will be, in order to reduce the over-spill into the surrounding area. You need to consider the area where the audience will be located and ensure that your sound engineers set up the music system accordingly.

Type of Event

You should consider the type of performers that you are going to have. Some acts will result in higher sound levels than others, for example, solo singers or choirs are likely to be quieter than bands. Some acts may have higher levels of low frequency noise. Low frequency noise has more energy than high frequency noise and will travel further and penetrate buildings. Low frequency noise can result in increased disturbance to local residents and may require additional control measures.

Noise Management

Taking noise seriously is just another aspect of good management practice. Here are some simple suggestions to help manage noise effectively:

- Consider the impact on neighbours before booking or organising an event: letting neighbours know what you are planning and taking on board their views can be a good idea.
- There will be communication with all music suppliers in advance of the event to discuss noise management and the venue's responsibilities to maintain a reasonable sound level.
- Do a 'sound-check' before an event starts and set a volume level for the sound system that shouldn't be exceeded. You may need to set a quieter level if the event will go on after 11pm.
- Make sure the performer knows what volume level has been set and what time the performance needs to end.
- Manage access to volume controls on the amplifier, compression system or mixing deck.
- Monitor noise levels during the performance – the simple checklist at the end of this Guide may help. Remember, if you have come from a noisy environment this will affect your hearing, so the noise not may appear as loud to you as it will to neighbours.
- Take action to reduce noise if you think it's too loud and record what you have done.
- Put signs in prominent places asking patrons to be quiet when leaving the venue.
- Playing more gentle tracks at the end of the event can help calm the mood and mean patrons will be less noisy as they leave.
- Take any complaints from neighbours seriously and let them know what you have done to control noise.
- Provision of contact number for any noise issues arising.
- Completion of event monitoring form to be kept for LPA inspection if required.