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PREPARED: Thursday, 07 December 2023

# 13241 Flax Bourton, North Somerset

# Noise Impact Assessment

CONTENTS



LIST OF ATTACHMENTS



| | | | |
|---|---|---|---|
| **Project Ref:** | AS13241 | **Title:** | Flax Bourton, North Somerset |
| **Report Ref:** | AS13241.231207.NIA.docx | **Title:** | Noise Impact Assessment |
| **Client Name:** | Strongvox Homes | | |
| **Project Manager:** | Mike McLoughlin | | |
| **Report Author:** | Mike McLoughlin | | |

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# 1.0 EXECUTIVE SUMMARY

1.1 Clarke Saunders Associates has been commissioned by Strongvox Homes to undertake a noise impact assessment of the proposed residential development site at Flax Bourton, North Somerset.

1.2 The proposed development comprises eleven dwellings, access, car parking and associated landscaping.

1.3 Noise levels have been measured at key positions on site and an assessment has been undertaken based on the requirements of the North Somerset environmental protection team.

1.4 Mitigation measures including façade acoustic performance requirements have been recommended and considered, based on the site layout provided, to achieve suitable internal noise levels as detailed in BS 8233:2014.

1.5 Private amenity spaces are provided within the development, within which noise levels are commensurate with the targeted levels in World Health Organisation Guidelines.

# 2.0 INTRODUCTION

2.1 Clarke Saunders Associates has been commissioned by Strongvox Homes to undertake a noise assessment of a proposed development site at Flax Bourton, North Somerset for residential development of 11 dwellings, access, car parking and landscaping.

2.2 Noise will be assessed in accordance with the requirements of condition #12 of the planning permission for the development (23/P/0365/FUL), which requires levels in line with BS8233:2014 *Guidance on sound Insulation and noise reduction for buildings*, and the World Health Organisation *Guidelines for Community Noise*.

2.3 This report presents the results of the noise survey conducted on site and noise assessment based on the proposed layout of the site to demonstrate how noise can be controlled for future residents of the development.

## 2.4 SITE DESCRIPTION

2.4.1 The site is located in a semi-rural location to the east of Flax Bourton. The proposed development site is currently a discussed commercial garage and body shop facility, bounded to the east and west by existing residential receptors, Weston Road to the south and Farmland to the north. Long Ashton District Rifle Club[1] is located to the northwest of the proposed development site.

2.4.2 The local soundscape at the proposed development is predominantly determined by road traffic from local roads and Weston Road to the south, as well as a rail line located further to the south of the site. Noise from the Rifle Club is dependent on the clubs' shooting sessions. The club is located in a disused quarry and conducts shooting from internal and external firing positions. The enclosed nature of the quarry provides acoustic screening to the surrounding area.

[1] https://longashtonrifle.club

2.4.3 There is an electrical substation located to the south west of the site. During site visits no audible noise could be perceived from this source and its potential impact on the proposed development site is negligible.

2.4.4 The proposed development plan is shown in the attached Figure AS13241/SP1.

## 2.5 CONSULTATION

2.5.1 Planning permission has been granted for the development (23/P/0365/FUL), with a condition (#12) in relation to noise impacts on the development from external noise sources. as below;

> '*Prior to the occupation of the residential units a scheme for achieving the external and internal noise levels outlined in BS8233:2014 and World Health Organisation Guidelines shall have been submitted and approved in writing by the Local Planning Authority, and the approved scheme implemented.*
>
> *The approved scheme shall be fully implemented before the first occupation. Thereafter it shall be maintained in the approved state at all times with no alterations made to the approved structures including roof, doors, windows and external facades, layout of the units or noise barriers.*
>
> *Reason: In the interests of the living conditions of the occupants of the dwellings and in accordance with section 11 of the National Planning Policy Framework and policy CS3 of the North Somerset Core Strategy.*'

2.5.2 CSA has consulted with North Somerset Council Environmental Health team (Tracy Farrell via phone / E-mail) to discuss the proposed development and noise assessment, which has highlighted the potential impact from road and rail noise sources to the south of the site as well as noise from an adjacent rifle range to the northwest of the site.

2.5.3 In relation to the potential noise impact of the adjacent rifle range CSA have consulted with a representative from Long Ashton District Rifle Club (Anthony Willis via phone / E-mail) to discuss the proposed development and the operation of the rifle range and potential noise impacts on the development site.

2.5.4 Th Rifle Club confirmed that at the time of the proposed noise survey, any shooting noise from the Long Ashton District Rifle Club would be reduced, as firing positions would be restirced to within the building. To allow for noise measurements to be conducted of external firing positions, Long Ashton District Rifle Club suggested that they could undertake an external shooting session so that specific measurements could be conducted.

2.5.5 The club carried out an external shooting session on Saturday 21st October at 13:00 for a duration of 15 minutes. The ammunition used was high velocity ammo (1250 feet per second) without silencers, which is one of the highest calibre ammunition that the club is licensed to use. The club has a limit of 111 dB at the firing point and typically restricts operations to sub sonic ammunition.

# 3.0 NOISE CRITERIA

## 3.1 BS8233:2014 GUIDANCE

3.1.1 BS8233:2014 *Guidance on sound insulation and noise reduction for buildings*, provides guidance on suitable internal noise levels within dwellings. This guidance is summarised in the following table.

| ACTIVITY | LOCATION | 07:00 – 23:00 | 23:00 - 07:00 |
|---|---|---|---|
| Resting | Living Room | 35 dB $L_{Aeq, 16hr}$ | - |
| Dining | Dining room / area | 40 dB $L_{Aeq, 16hr}$ | - |
| Sleeping (daytime resting) | Bedroom* | 35 dB $L_{Aeq, 16hr}$ | 30 dB $L_{Aeq, 8hr}$ |

*Table 3.1 – Excerpt from BS8233:2014* [dB ref. 20µPa]

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

3.1.2 BS8233 states that, if noise has a specific character, for example it contains features such as a distinguishable, discrete, and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, lower noise limits might be appropriate.

## 3.2 WHO GUIDLINES

3.2.1 The World Health Organisation (WHO) Guidelines for Community Noise provide guidance to Environmental Health Authorities and those involved with protecting people from noise including annoyance, speech interference and sleep disturbance.

3.2.2 Noise limits are recommended for daytime (07:00 – 23:00) and night-time (23:00 – 07:00) periods.

3.2.3 The guidance provides values for internal locations, with levels for living areas of $L_{Aeq,16hours}$ 35 dB during the day, and within bedrooms of $L_{Aeq,8hours}$ 30 dB during night-time.

3.2.4 The WHO Guidelines states that indoor noise levels within bedrooms should not exceed 45 dB $L_{Amax}$ more than 10-15 times a night to ensure there are no negative health effects related to sleep disturbance.

3.2.5 During daytime (07:00 – 23:00) the guidelines recommend for external noise levels (e.g. private amenity spaces) not to exceed $L_{Aeq,16hour}$ 50 dB, with a limit of $L_{Aeq,16hour}$ 55 dB.

# 4.0 ENVIRONMENTAL SOUND SURVEY

4.1 A survey of the existing ambient and background sound levels was undertaken at the locations shown in the appended site plan, AS13241/SP1. This survey was carried out to determine representative ambient sound levels across the proposed development site and to confirm emissions and activity levels from the nearby shooting range.

4.2 Automated sound level monitoring equipment was installed at LT1, LT2and LT3 and set to record measurements of consecutive 5-minute $L_{Aeq}$, $L_{Amax}$, $L_{A10}$ and $L_{A90}$ sound pressure levels.

4.3 The sound level meters were located in free field positions with microphones 1.5m above local ground level.

4.4 Sound level meters were installed at positions LT1 and LT2 from the afternoon of Thursday 19th October 2023 until the morning of Wednesday 25th October 2023. Due to a power interruption the meter at LT2 stopped measuring noise levels at 20:00 on the evening of Sunday 23rd October 2023.

4.5 Noise measurements were also conducted at location LT3 from approximately 15:00 to 20:00 on Thursday 19th October 2023.

4.6 The following equipment was used during the survey:

- 1 no. Norsonic 118 level meter and GRAS microphone (LT1)
- 1 no. NTi XL2 sound level meter (LT2)
- 1 no. Svan 958 sound level meter (LT3)
- 1 no. Norsonic sound level calibrator type 1251.

4.7 The calibration of the sound level meters was verified before and after use, and no significant calibration drift was detected (<0.5 dB). Certificates of laboratory calibration of all equipment used in the survey are available on request.

4.8 Measurements were made following procedures in BS 7445:1991 (ISO1996-2:1987) Description and measurement of environmental noise Part 2-Acquisition of data pertinent to land use.

4.9 Historical weather data was checked to determine that the measurements were not adversely affected by high wind speeds or heavy rain. In general, windspeeds were low and no periods of prolonged rain were observed, making the conditions suitable for measurement of environmental sound.

4.10 Please see Appendix A for a glossary of acoustic terminology used in this report.

## 4.11 NOISE SURVEY RESULTS

4.11.1 Figures AS13241/TH1-TH6 show the $L_{Aeq}$, $L_{Amax}$, $L_{A10}$ and $L_{A90}$ sound pressure levels as time histories at measurement position LT1.

4.11.2 Figures AS13241/TH7-TH10 and TH11 show the $L_{Aeq}$, $L_{Amax}$, $L_{A10}$ and $L_{A90}$ sound pressure levels as time histories at measurement position LT2 and LT3.

4.11.3 The average sound levels measured during the survey during the '*Daytime*' and '*Night-time*' periods at monitoring positions are shown in the table below. Also shown are the typical highest $L_{AFmax}$, defined as the 90th percentile of the $L_{AFmax}$ dataset, and typical lowest $L_{A90}$, defined as the 10th percentile of the $L_{A90}$ dataset.

| LOCATION | PERIOD | NOISE LEVEL | | |
|---|---|---|---|---|
| | | $L_{Aeq,T}$ | TYPICAL $L_{Amax}$ (90th PERCENTILE) | TYPICAL $L_{A90}$ (10th PERCENTILE) |
| LT1 (free-field) | Daytime (07:00-23:00h) | 62 dB | -* | 40 dB |
| | Night-time (23:00-07:00h) | 51 dB | 75 dB | 30 dB |
| LT2 (free-field) | Daytime (07:00-23:00h) | 45 dB | -* | 33 dB |
| | Night-time (23:00-07:00h) | 39 dB | 53 dB | 28 dB |
| LT3 (free-field) | Daytime (15:00-20:00h) | 48 dB | -* | 41 dB |

*Table 4.1 – Results of environmental sound survey* [dB ref. 20µpa]
*There are no guidance levels or criteria for daytime maximum event levels.

4.11.4 The Long Ashton District Rifle Club carried out an external shooting session on Saturday 21st October at 13:00 for a duration of 15 minutes. The north west portion of the proposed development site is likely to have the greatest potential for exposure to noise from the rifle range operations, as represented by the monitoring location LT2.

4.11.5 Noise levels have been analysed during the period preceding 13:00 and post 13:15 to determine is there is a noticeable change in noise levels as a result of external shooting positions.

4.11.6 The analysis indicates that there is no significant change in ambient or maximum noise levels at the proposed development site due to shooting noise at the rifle range.

# 5.0 NOISE ASSESSMENT

## 5.1 INTERNAL NOISE LEVELS

5.1.1 Measured noise levels across the site indicate that ambient noise levels are low, except for the southern area of the site closer to Weston Road.

5.1.2 A review has been conducted of the proposed site layout and the measured noise levels on site. This review is based on the submitted site layouts available at the planning submission, targeting the internal noise levels set out in Table 3.1.

5.1.3 It has been assumed that non-glazed elements, i.e. traditional brick and block external walls, will provide the following minimum sound insulation performance, when tested in accordance with ISO 10140-2:2010.

| NON-GLAZED FACADE ELEMENT | SINGLE FIGURE WEIGHTED SOUND REDUCTION VALUE |
|---|---|
| Masonry | $R_w$ 51 dB |

*Table 5.1 – Proposed dwelling external wall acoustic performance*

5.1.4 Based on the measured noise levels across the site and the proposed building façade locations, the required minimum acoustic performance of glazing and ventilation units has been determined. This assessment has considered both the daytime and night-time average, and, for night-time periods, typical maximum noise levels in habitable rooms and bedrooms.

5.1.5 Suitable internal noise levels in noise-sensitive rooms can be achieved based on the minimum sound insulation specifications for glazed and ventilation façade elements as given in the table below.

5.1.6 Facades which are exposed to daytime noise levels in excess of 50dB $L_{Aeq,16hour}$ or night-time noise levels in excess of 45dB $L_{Aeq,8hour}$ should be considered for acoustic façade treatment.

| PLOT | ACOUSTIC OPTION | GLAZING SINGLE FIGURE WEIGHTED SOUND REDUCTION | VENTILATOR PERFORMANCE |
|---|---|---|---|
| Plots 1 – 4 on facades facing Weston Road | Type A | $R_w$ ≥31 dB | $D_{n,e,w}$ ≥32 dB |
| All other Plots and facades | Type B | Any standard double glazing | Any trickle ventilators / Ajar windows |

*Table 5.2 – Acoustic facade performances*

5.1.1 The options provided are the minimum acoustic requirement for each identified zone.

5.1.2 It is noted that the $R_w$ 31 dB specification is not overly onerous and can normally be achieved by standard proprietary thermal double glazing.

5.1.3 These specifications would allow dwellings across the proposed development to meet the aspirational targets both in terms of average daytime/night-time noise levels and typical $L_{AFmax}$ noise events set out in Table 3.1 with windows closed and vents open for background ventilation. There is no reason why windows could not be opened as a matter of personal preference or for purge ventilation, since no such internal noise criteria are applicable for these scenarios.

5.1.4 BS8233:2014 states that a building envelope, with windows open, will typically achieve a reduction in noise level from outside to inside of between 10 dB and 15 dB.

5.1.5 Assuming a loss of 15 dB for a partially open window, noise levels within dwellings with facades in proximity to, and directly facing Weston Road may exceed the aspirational design targets set out in Table 3.1.

5.1.6 Facades without this direct view are expected to meet the design targets with windows ajar, due to the increased distance and self-screening associated with the built form of the proposed development.

5.1.7 Where trickle vents or wall ventilators are used, the $D_{n,e,w}$ performance shown in Table 4.3 will be required. The figures stated are for a single vent per room. If multiple vents are required, then the $D_{n,e,w}$ performance requirement shown will increase by a value equal to +10log(N), with N being the total number of vents serving the room.

5.1.8 The above analysis is based on controlling internal noise levels to the criteria outlined in BS8233.

5.1.9 Across the majority of the site, internal ambient noise level targets can be achieved with windows fully or partially open for ventilation.

### 5.2 PRIVATE AMENITY SPACES

5.2.1 The WHO guidelines details that within private external amenity areas noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$. Based on measurements on site noise levels the majority on private amenity spaces are well below this range.

5.2.2 Noise levels are more elevated to the south of the site towards Weston Road. Based on the plot orientations in this area (P1-4) the private amenity spaces are located behind building masses relative to Weston Road which will provide acoustic screening from the road, and it is expected that noise levels within the private amenity spaces of these plots will be below $L_{Aeq,16hr}$ 55 dB.

## 6.0 UNCERTAINTY

6.1 Use of a calibrated type 1 sound level meters is considered to reduce measurement instrument error to insignificant levels as compared with environmental variations.

6.2 Whilst the noise levels shown in this report are considered to be representative of the site as a whole, on particular days the noise levels may be higher or lower. This variation is an inherent uncertainty in the environmental noise monitoring procedure, not an indication of error. Extended monitoring periods have been used to reduce this uncertainty.

## 7.0 CONCLUSION

7.1 Clarke Saunders Associates has been commissioned by Strongvox Homes to undertake a noise impact assessment of the proposed residential development site at Flax Bourton, North Somerset.

7.2 Noise measurements have been conducted across the proposed residential development site to quantify the noise levels at the site.

7.3 Appropriate measures to mitigate noise impacts has been prepared, based on the proposed layout to demonstrate the residential suitability of the design in relation to noise.

7.4 Mitigation measures including façade acoustic performance requirements have been recommended and considered, based on the site layout provided to achieve internal noise levels detailed in BS 8233:2014.

7.5 For the limited number of plots where windows on more exposed facades may need to remain closed to maintain internal noise levels, a required minimum acoustic performance of the external building fabric elements has been determined, with different specifications dependent on the façade location within the development.

7.6 Private amenity spaces are provided within the development that are commensurate with the targeted levels in World Health Organisation Guidelines.

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N
Shooting Range
LT2
LT3
Electrical Substation
LT1
WESTON RD
Access Road
Shared Surface
Google Earth

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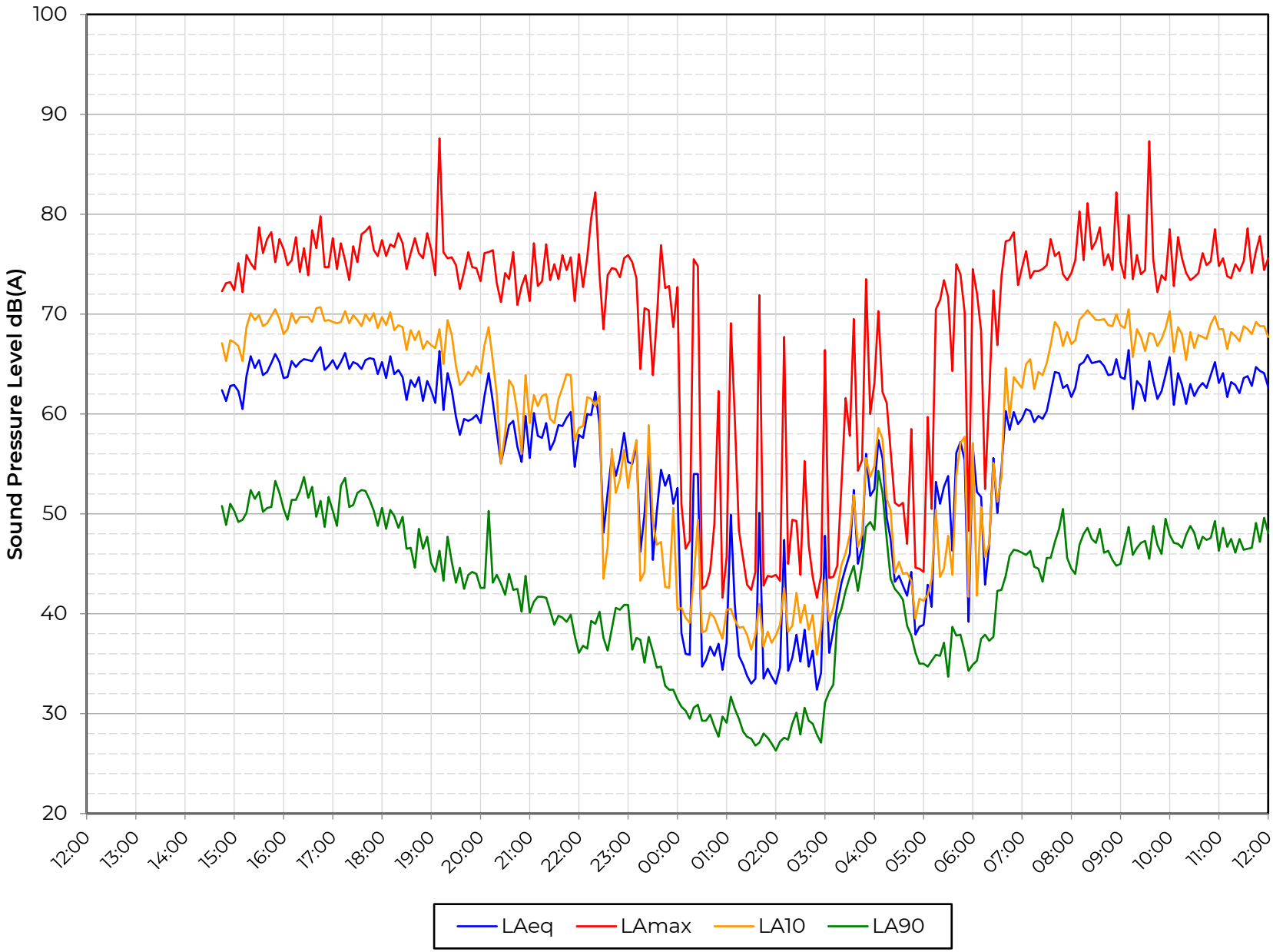
Flax Bourton, North Somerset

## Position LT1



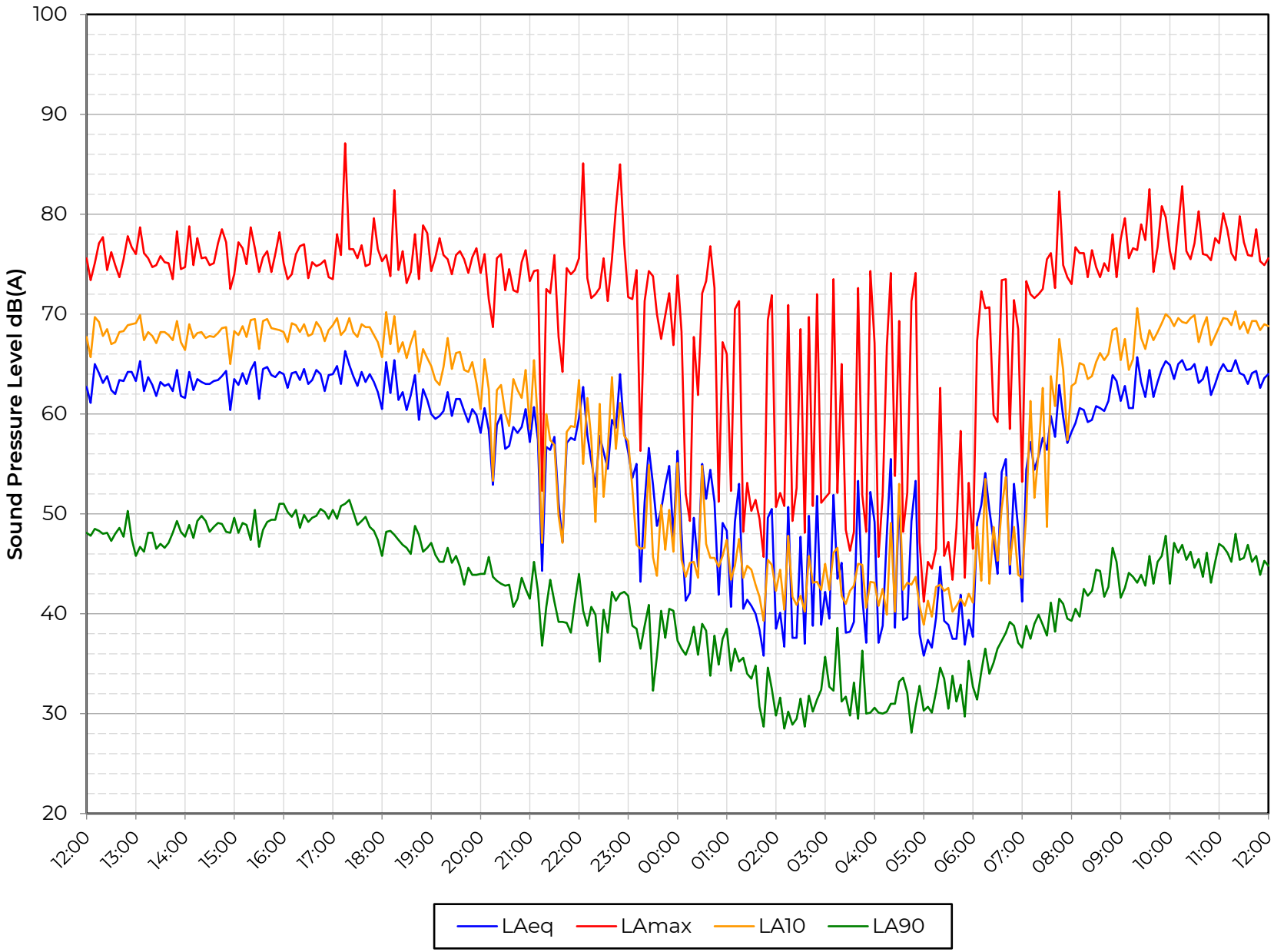

Thu 19 Oct to Fri 20 Oct

Figure AS13241/TH1

clarke saunders acoustics

Flax Bourton, North Somerset

**Position LT1**



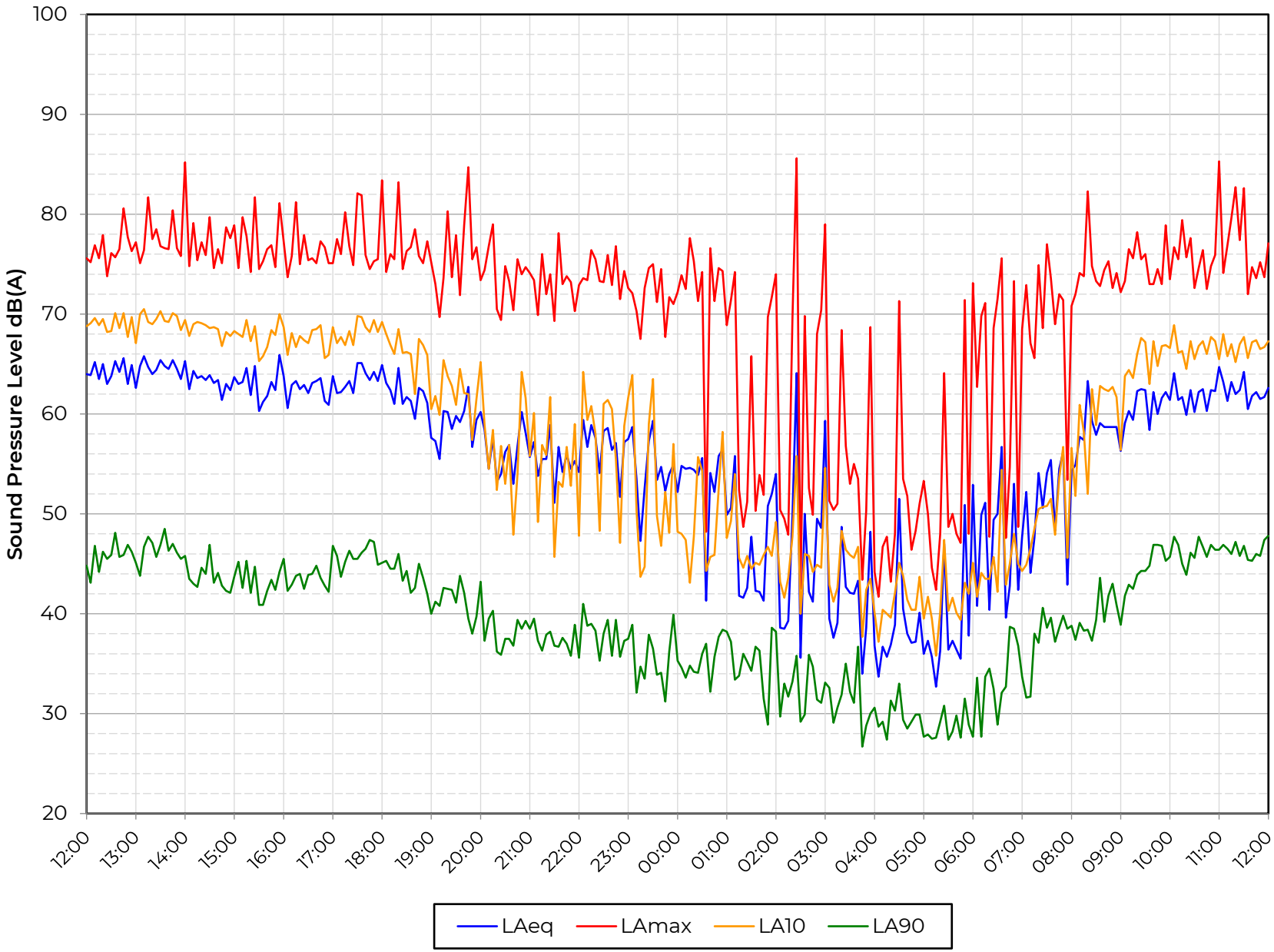

Fri 20 Oct to Sat 21 Oct

Figure AS13241/TH2

clarke saunders acoustics

Flax Bourton, North Somerset

**Position LT1**



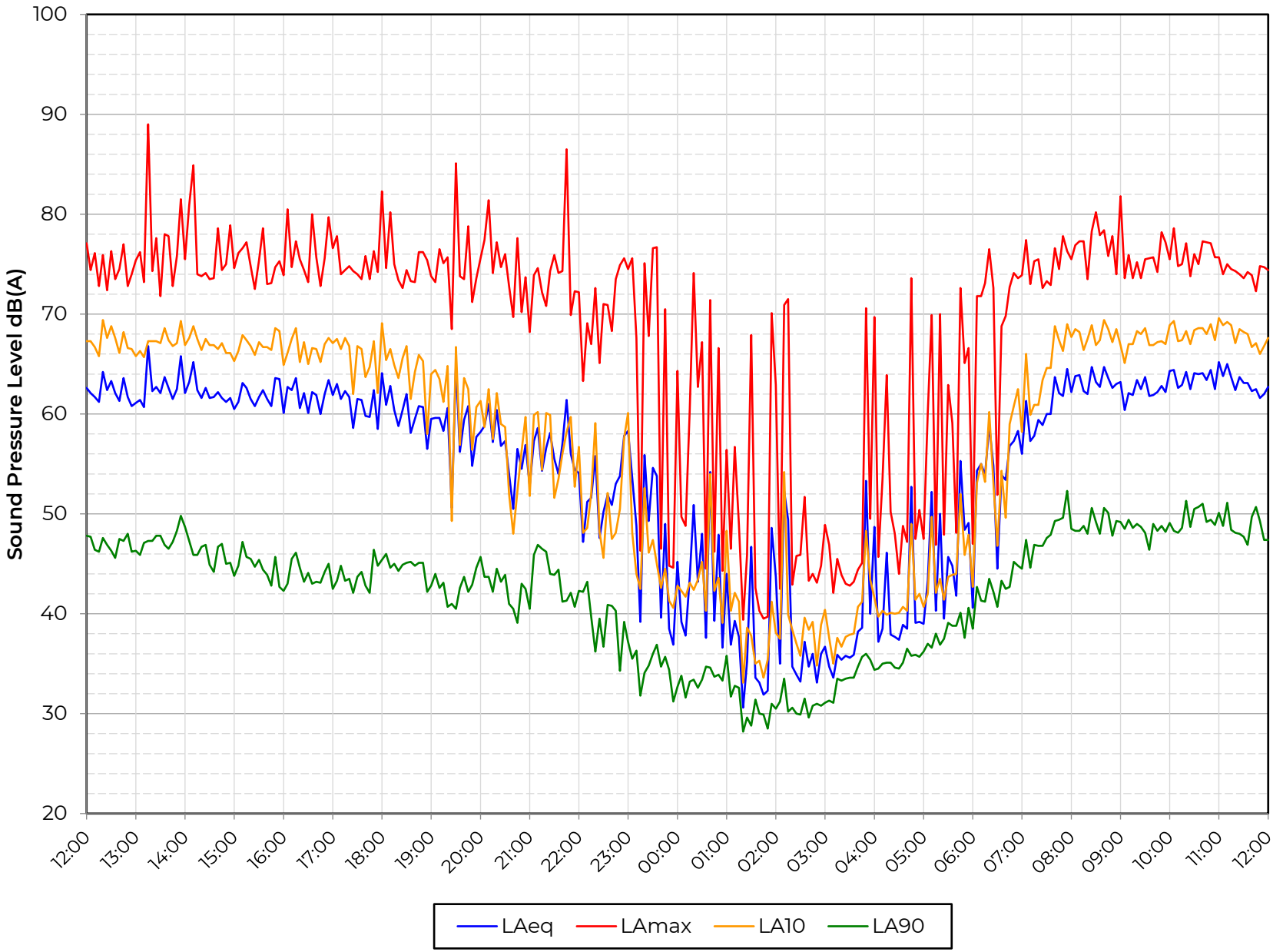

Sat 21 Oct to Sun 22 Oct

Figure AS13241/TH3

clarke saunders acoustics

Flax Bourton, North Somerset

**Position LT1**



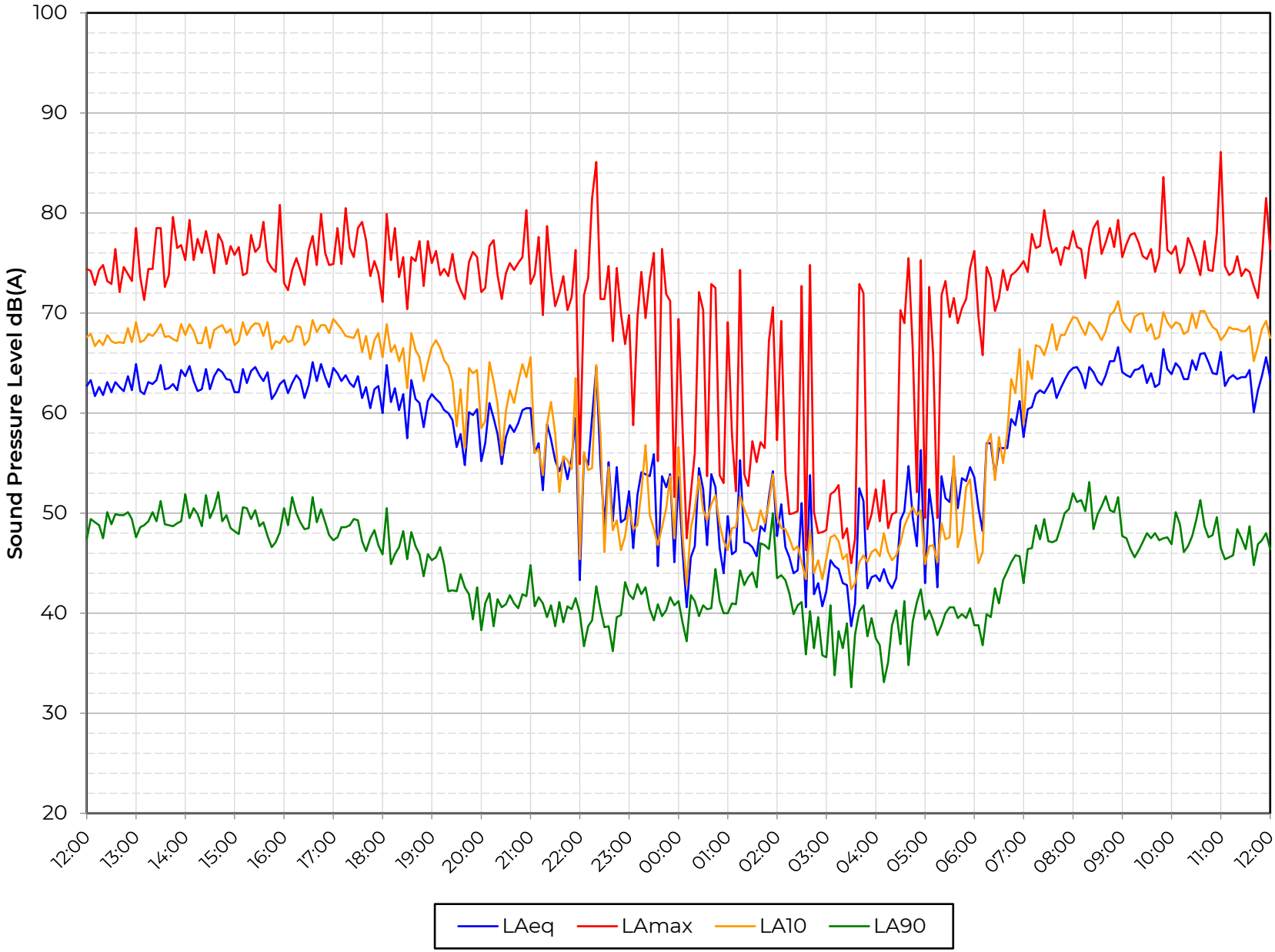

Sun 22 Oct to Mon 23 Oct

Figure AS13241/TH4

clarke saunders acoustics

Flax Bourton, North Somerset

**Position LT1**



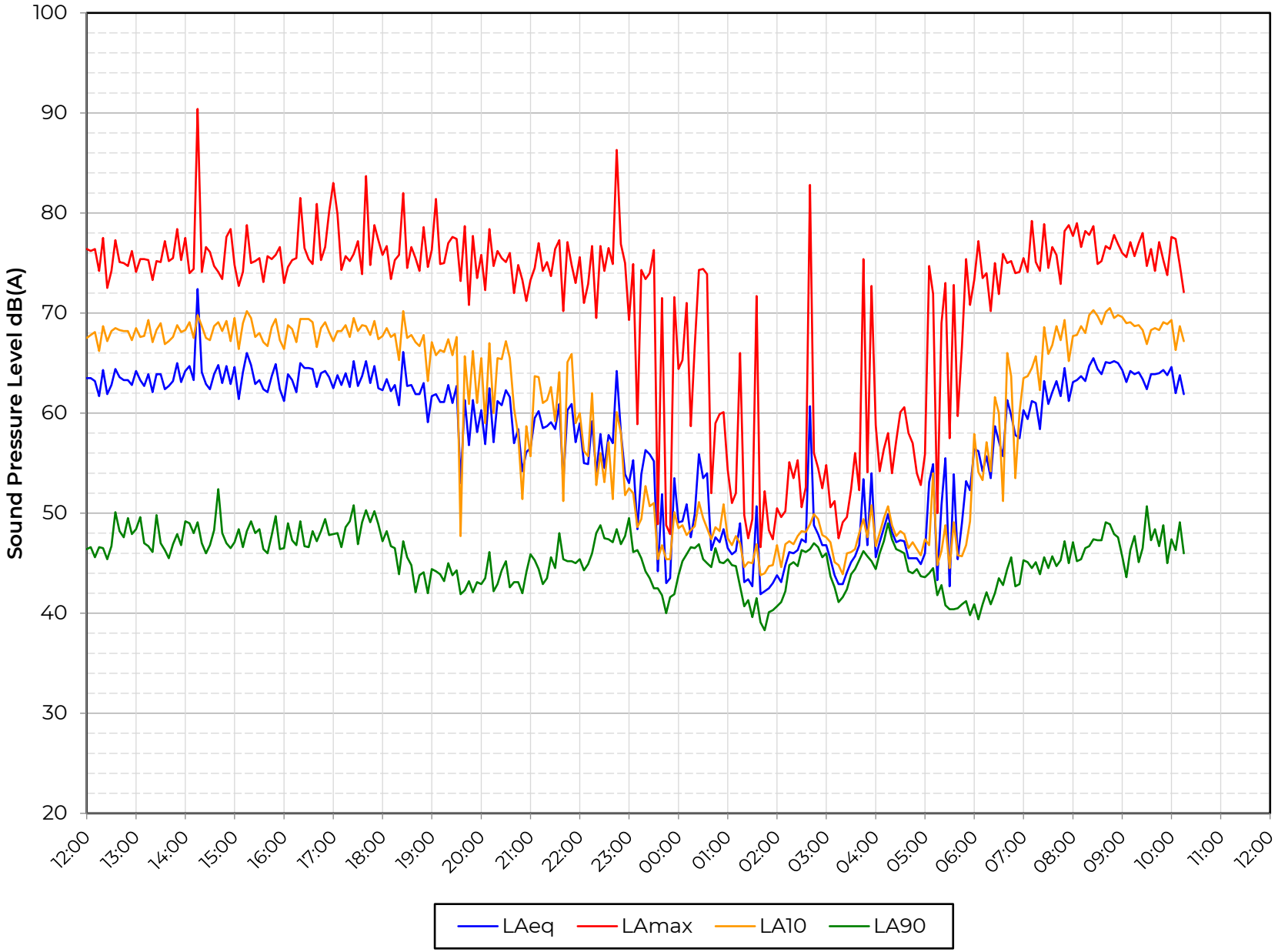

Mon 23 Oct to Tue 24 Oct

Figure AS13241/TH5

clarke saunders acoustics

Flax Bourton, North Somerset

**Position LT1**



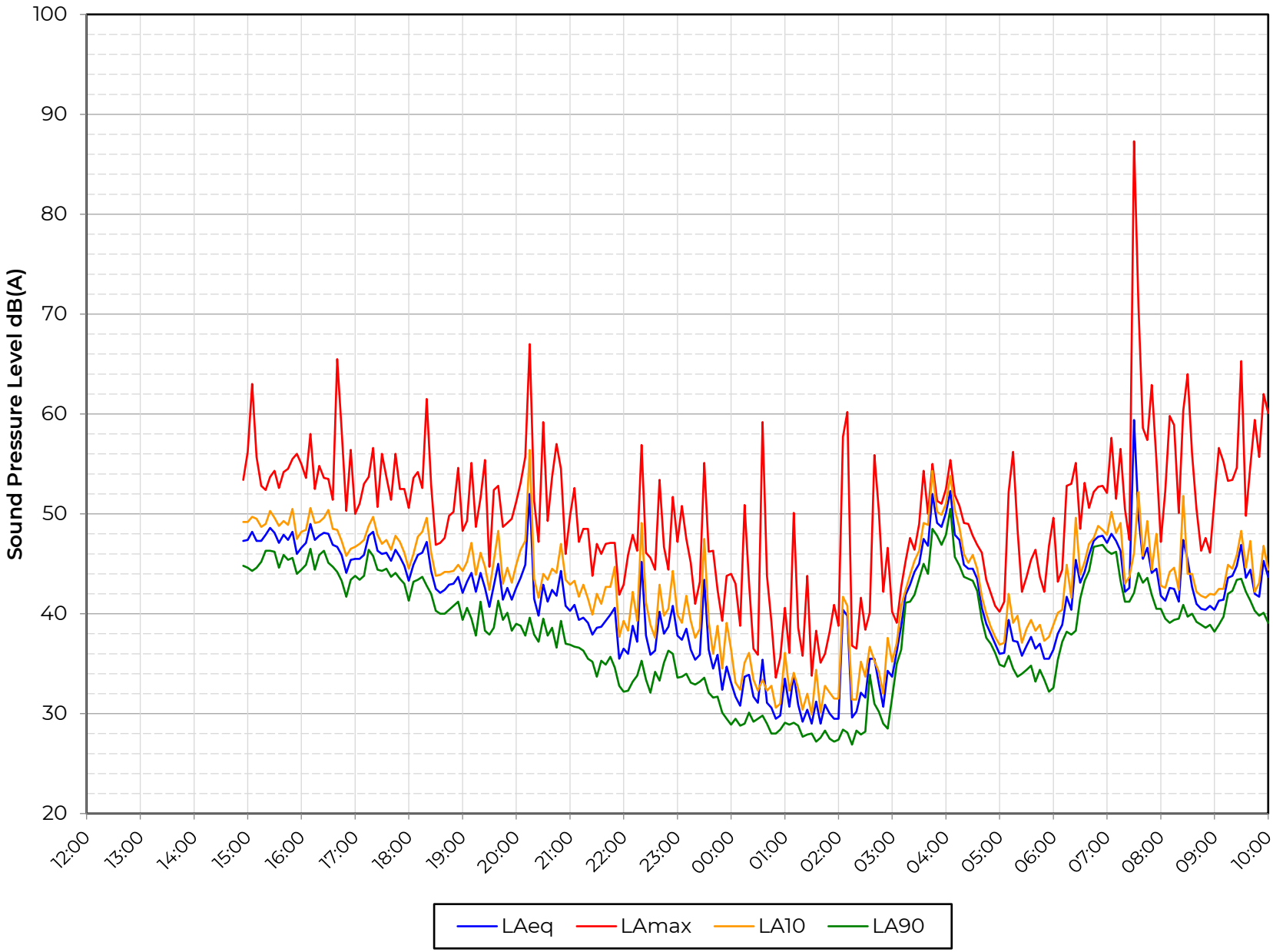

Tue 24 Oct to Wed 25 Oct

Figure AS13241/TH6

clarke saunders acoustics

Flax Bourton, North Somerset

## Position LT2



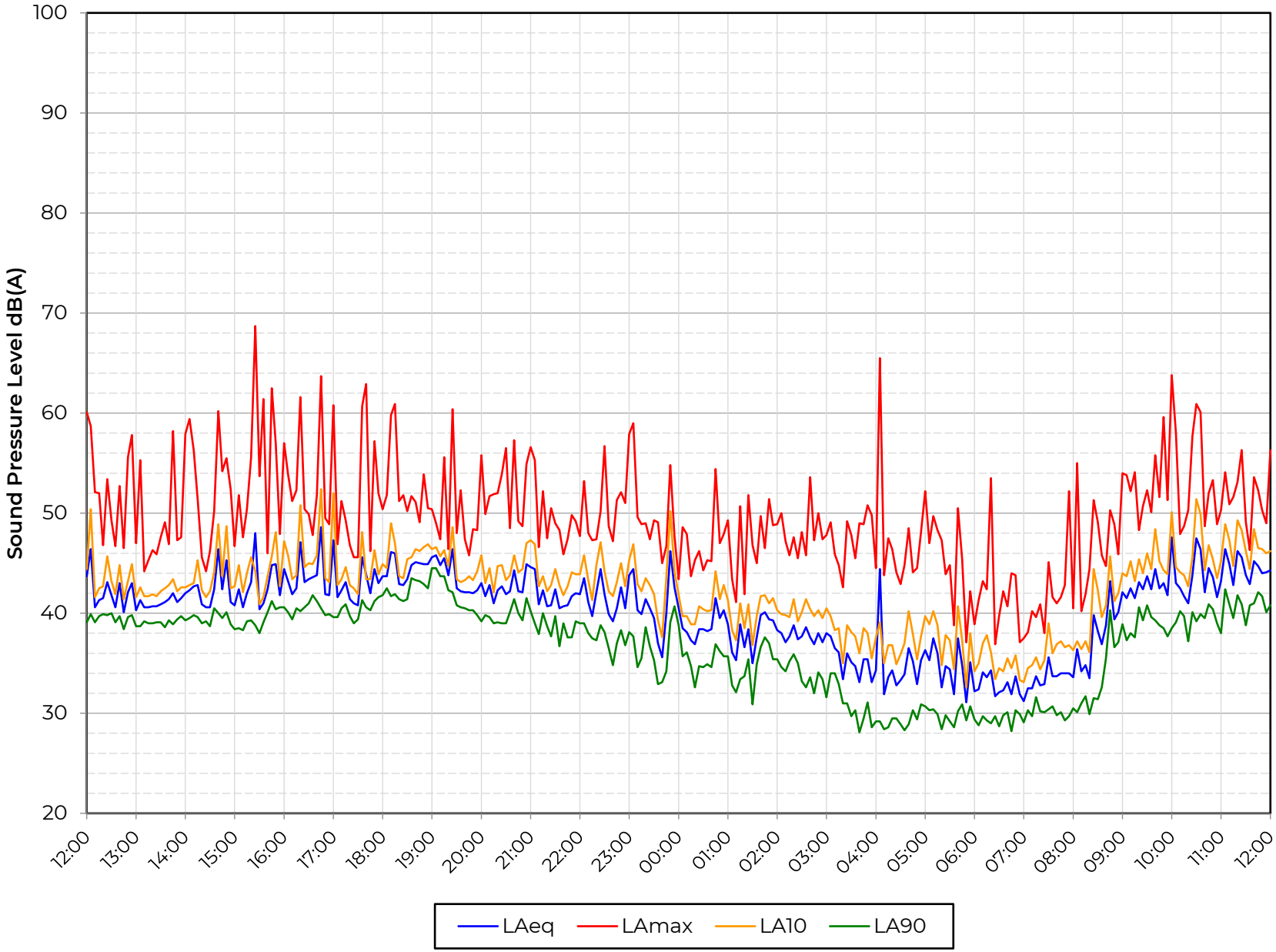

Thu 19 Oct to Fri 20 Oct

Figure AS13241/TH7

clarke saunders acoustics

Flax Bourton, North Somerset

**Position LT2**



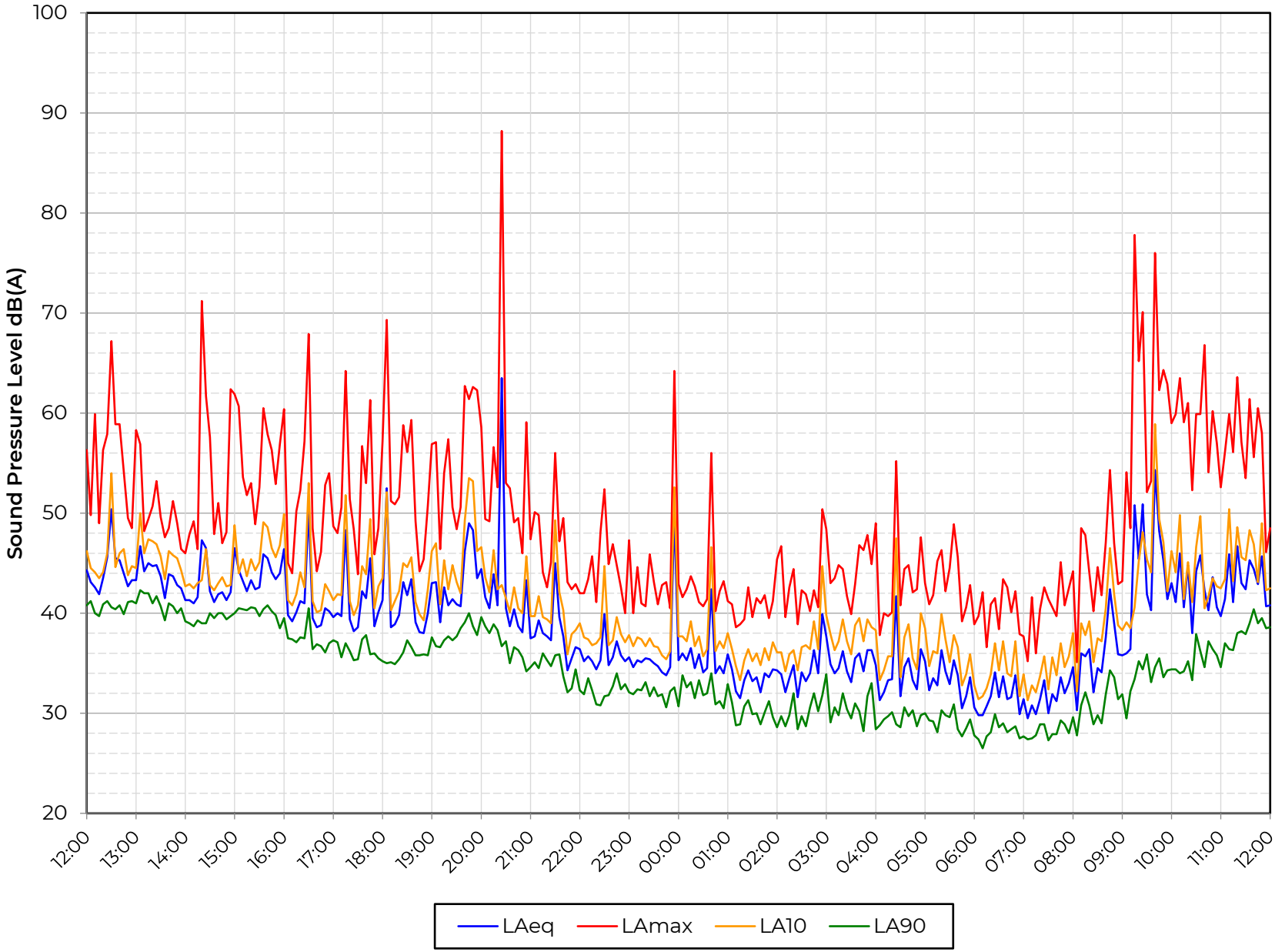

Fri 20 Oct to Sat 21 Oct

Figure AS13241/TH8

clarke saunders acoustics

Flax Bourton, North Somerset

## Position LT2



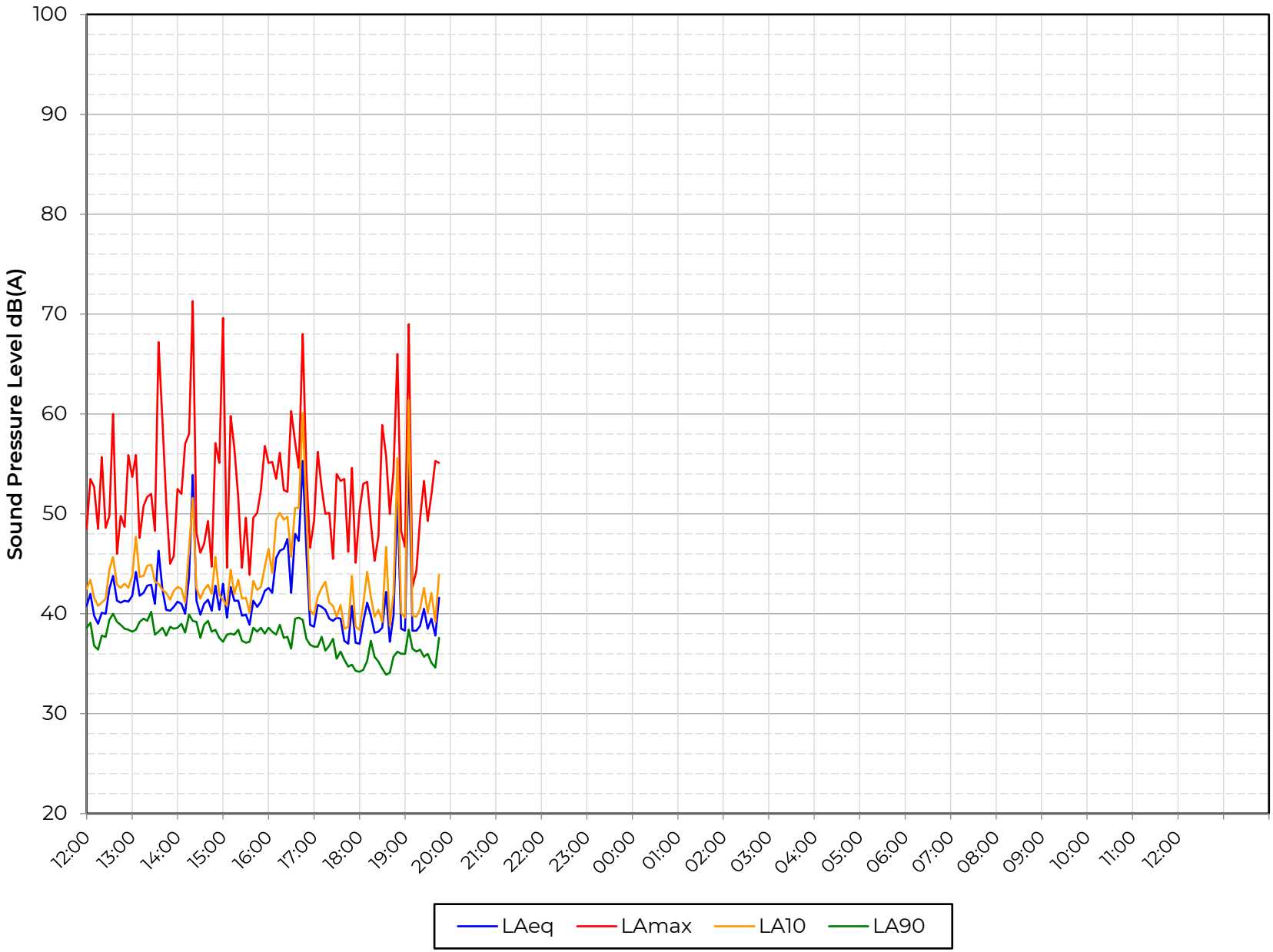

Sat 21 Oct to Sun 22 Oct

Figure AS13241/TH9

clarke saunders acoustics

Flax Bourton, North Somerset

## Position LT2



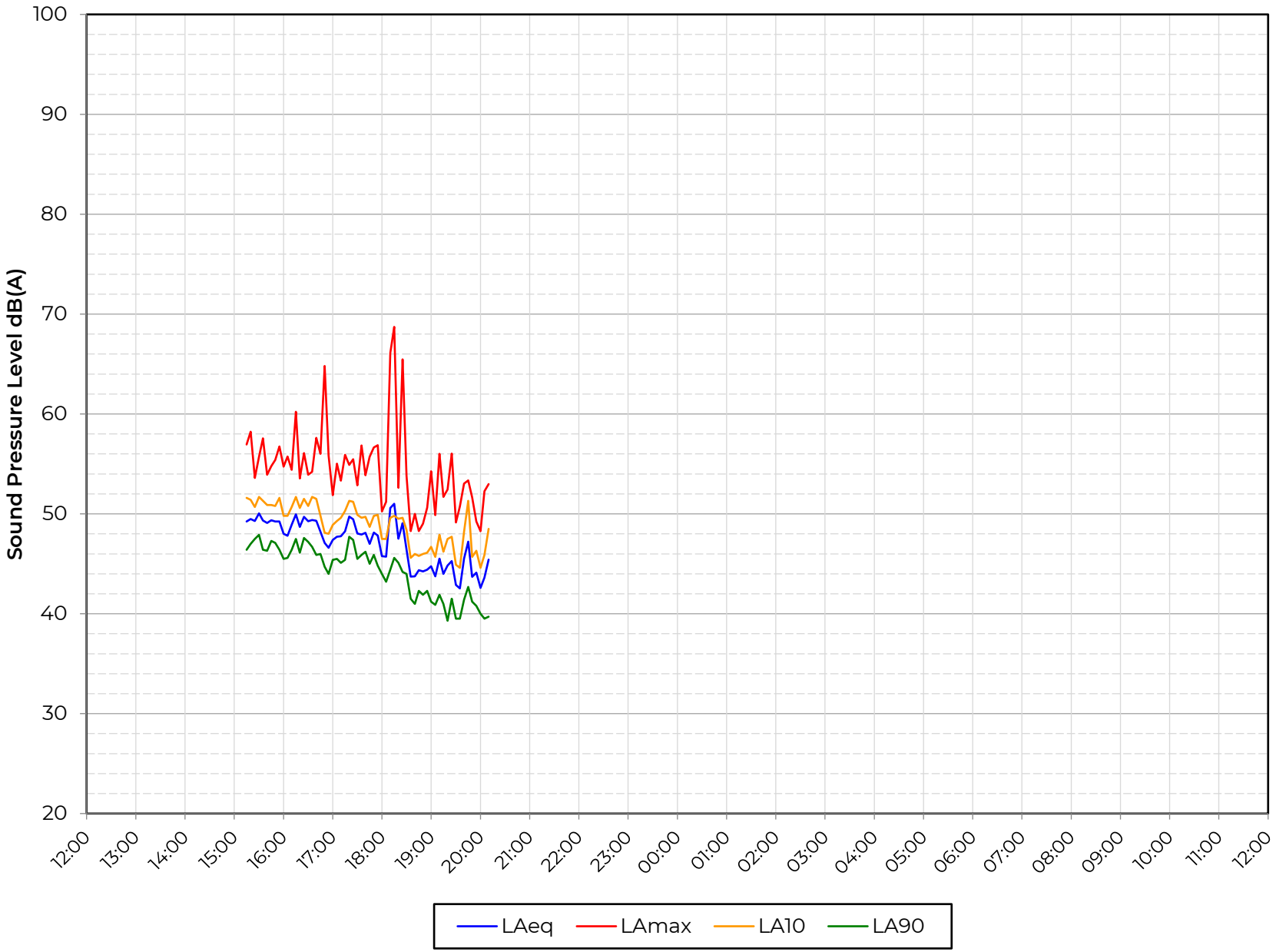

Sun 22 Oct to Mon 23 Oct

Figure AS13241/TH10

clarke saunders acoustics

Flax Bourton, North Somerset

## Position LT3




Thu 19 Oct to Fri 20 Oct

Figure AS13241/TH11

# APPENDIX A



## Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

**Sound** Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.

**Noise** Sound that is unwanted by or disturbing to the perceiver.

**Frequency** The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'.

**dB(A):** Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or $L_A$.

**$L_{eq}$:** A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc).

The concept of $L_{eq}$ (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction.

Because $L_{eq}$ is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.

**$L_{10}$ & $L_{90}$:** Statistical $L_n$ indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, $L_{10}$ is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, $L_{90}$ is the typical minimum level and is often used to describe background noise.

It is common practice to use the $L_{10}$ index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.

**$L_{max}$:** The maximum sound pressure level recorded over a given period. $L_{max}$ is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged $L_{eq}$ value.

## Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band.

In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

| Octave Band Centre Frequency Hz | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
|---|---|---|---|---|---|---|---|---|

## Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

INTERPRETATION

| Change in Sound Level dB | Subjective Impression | Human Response |
|---|---|---|
| 0 to 2 | Imperceptible change in loudness | Marginal |
| 3 to 5 | Perceptible change in loudness | Noticeable |
| 6 to 10 | Up to a doubling or halving of loudness | Significant |
| 11 to 15 | More than a doubling or halving of loudness | Substantial |
| 16 to 20 | Up to a quadrupling or quartering of loudness | Substantial |
| 21 or more | More than a quadrupling or quartering of loudness | Very Substantial |

## Earth Bunds and Barriers - Effective Screen Height

When considering the reduction in sound level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a tall barrier exists between a sound source and a listener, with the barrier close to the listener, the listener will perceive the sound as being louder if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the sound would seem quieter than if he were standing. This is explained by the fact that the "effective screen height" is changing with the three cases above. In general, the greater the effective screen height, the greater the perceived reduction in sound level.

Similarly, the attenuation provided by a barrier will be greater where it is aligned close to either the source or the listener than where the barrier is midway between the two.