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PREPARED: Wednesday, 07 December 2022

BURCOT AND CLIFTON HAMPDEN NDO

Acoustic Assessment

CONTENTS

LIST OF ATTACHMENTS

Project Ref:	AS12848	**Title:**	Burcot and Clifton Hampden NDO
Report Ref:	AS12848.221129.R1	**Title:**	Acoustic Assessment
Client Name:	Thomas Homes		
Project Manager:	Michael Symmonds		
Report Author:	Michael Symmonds		

Clarke Saunders Acoustics
Winchester SO22 5BE

1.0 EXECUTIVE SUMMARY

1.1 Clarke Saunders Acoustics has been commissioned by Thomas Homes to undertake a noise assessment of a proposed residential development at Clifton Hampden.

1.2 Noise levels have been measured at positions on site, resulting in a ProPG Stage 1 Noise Risk Assessment and Stage 2 Acoustic Design Statement.

1.3 The initial ProPG Stage 1 Noise Risk Assessment has demonstrated that noise levels indicate a low to medium noise risk, whilst the Acoustics Ventilation and Overheating Level 1 assessment indicates a medium to high risk in close proximity to the A415.

1.4 The proposed site and internal dwelling layouts, which have been developed following a good acoustic design process, have been reviewed in the Stage 2 Acoustic Design Statement.

1.5 Standard thermal double glazing and trickle ventilators should result in the desirable internal noise levels being achieved, whilst the overheating strategy can rely on openable windows, with reference to Approved Document O.

1.6 Private amenity spaces should experience noise levels within or below the aspirational design range of ProPG across the site, with a close boarded fence provided around the garden of plot 14.

2.0 INTRODUCTION

2.1 Clarke Saunders Acoustics has been commissioned by Thomas Homes to undertake a noise assessment of a site at Clifton Hampden for residential usage of 17 dwellings.

2.2 Noise will be assessed in accordance with the National Planning Policy Framework, *ProPG: Planning and Noise – New Residential Developments*, Acoustics Ventilation and Overheating: Residential Design Guide (AVO) and Approved Document O (ADO), with reference to the relevant sections of 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 ProPG Stage 1 and Stage 2 Acoustic Design Statement, based on the proposed layout of the site to demonstrate the feasibility of the development.

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

3.0 SITE DESCRIPTION

3.1 The application sites are on two parcels of land, referred to as the 'allotments site' and the 'paddocks site', which are situated to the north and south of the A415, respectively.

3.2 The A415 links Abingdon to various villages and towns, and has a 30mph speed limit passing the allotments site, which transfers to a 60mph limit as it passes the paddocks site. The surrounding area is mostly agricultural and residential, with Culham Science Centre to the west.

3.3 The proposals involve fourteen residential dwellings on the allotments site, along with a doctors' surgery and an extension to the existing village hall, whilst three houses will be located on the paddocks site.

4.0 PROPG STAGE 1 RISK ASSESSMENT

4.1 PROPG STAGE 1 REQUIREMENTS

4.1.1 The ProPG Stage 1 Risk Assessment compares measured daytime and night-time average L_{Aeq} noise levels against a sliding scale of increasing risk of adverse effect.

4.1.2 Sites with average daytime noise levels less than 50dB $L_{Aeq,16hour}$, night-time noise levels less than 40dB $L_{Aeq,8hour}$ and fewer than ten noise events of magnitude greater than 60dB L_{AFmax} during the night-time hours are considered to be of 'negligible' risk, with likely no adverse effect.

4.1.3 At 'low' noise levels, a site is likely to be acceptable for residential development from an acoustic perspective, provided that a good acoustic design process is followed and is demonstrated in an Acoustic Design Statement [ADS] which confirms how adverse noise impacts will be mitigated and minimised in the finished development.

4.1.4 As environmental noise levels increase, a site is likely to be less suitable from a noise perspective unless increasing levels of mitigation are adopted. The ADS should confirm how adverse noise impacts will be mitigated and minimised and should clearly demonstrate that significant adverse noise impact will be avoided in the finished development.

4.2 AVO LEVEL 1 GUIDANCE

4.2.1 The AVO has been written to complement the ProPG and provides additional guidance to address the issues of ventilation and overheating in the context of internal noise levels.

4.2.2 The AVO acknowledges that often, the simplest and most expedient way to achieve additional cooling is for occupants to open windows and, as such, (temporarily) higher levels of internal ambient noise may be considered reasonable at these times.

4.2.3 In order to assess the noise risk associated with this, the AVO suggests a two-level assessment procedure.

4.2.4 The Level 1 assessment adopts a screening approach, considering the issue simply in terms of external noise levels and indicating where a Level 2 Assessment should be conducted.

4.3 ENVIRONMENTAL SOUND SURVEY

4.3.1 A survey of the existing ambient and background sound levels was undertaken in free-field conditions, approximately 1.5m above local ground level at the locations shown in the appended site plan, AS12848/SP1.

4.3.2 The monitors were set to record measurements of consecutive 5-minute L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels between 10:25 hours on Thursday 24th November to 10:20 hours on Tuesday 29th November 2022.

4.3.3 The following equipment was used during the survey:

- 1 no. Rion sound level meters type NL52;
- 1 no. NTi sound level meter type XL2-TA;
- 1 no. Rion sound level calibrator type NC74.

4.3.4 The calibration of the sound level meters was verified before and after use, with no significant calibration drift detected. Certificates of laboratory calibration of all equipment used in the survey are available on request.

4.3.5 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*.

4.3.6 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 to moderate and there were no periods of prolonged heavy rain, making the conditions generally suitable for measurement of environmental sound.

4.4 NOISE SURVEY RESULTS

4.4.1 Figures AS12848/TH1-TH5 and TH6-TH10 show the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels as time histories at measurement positions LT1 and LT2, respectively.

4.4.2 The sound levels on the site are higher toward the A415, reducing with increased distance from the road.

4.4.3 The average sound levels measured during the survey during the daytime and night-time periods are shown in the table below. Also shown is the typical highest L_{AFmax}, defined as the 90th percentile of the L_{AFmax} dataset.

LOCATION	PERIOD	NOISE LEVEL	
		$L_{Aeq,T}$ dB	TYPICAL L_{AFmax} dB
LT1	Daytime	65	-*
	Night-time	58	78
LT2	Daytime	60	-*
	Night-time	53	69

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

4.5 RISK ASSESSMENT

4.5.1 With reference to the ProPG Stage 1 Risk Assessment, the daytime and night-time noise levels experienced across the site generally constitute 'low to medium risk'.

4.5.2 An Acoustic Design Statement [ADS], outlining appropriate measures to mitigate the noise impact on the site, will be carried out to establish how the site might be suitable for residential development based on the plot layouts.

4.5.3 ProPG states that an '*overheating*' scenario should be considered where, typically on a hot summer day / night, residents may require additional cooling, perhaps more so than might always be achievable through passive whole-dwelling ventilation systems.

4.5.4 With reference to the measured external daytime and night-time noise levels across the site and the guidance of Table 3-2 of the AVO, the Level 1 assessment indicates a medium to high risk in close proximity to the A415.

5.0 PROPG STAGE 2: ACOUSTIC DESIGN STATEMENT

5.1 ELEMENT ONE – ACOUSTIC DESIGN CONSIDERATIONS

5.1.1 The possibility of adverse noise impacts due to the surrounding roads has been identified and considered in the initial design of the scheme.

5.1.2 The measured noise levels on site generally constitute a low to medium risk depending on the distance from the A415. The site layout has, therefore, incorporated a stand-off buffer between the dwellings and A415, as shown in site plan AS12848/SP1.

5.1.3 The internal dwelling layouts have been designed such that many of the bedrooms do not have line of sight to the road, whilst many of the living rooms are double aspect, allowing the residents to open a window which does not have line of sight to the A415.

5.1.4 ProPG recognises that any development must balance acoustic design, as well as other common considerations such as aspect, light and management/utilities and access issues. The consideration of these factors and their weight in relation to the soundscape of the development constitutes a 'good design' process, and therefore 'good acoustic design' has been implemented in the context of these (sometimes competing) concerns and has been prioritised wherever possible.

5.2 ELEMENT TWO – INTERNAL NOISE LEVELS

5.2.1 The second element of the assessment is to seek to achieve recommended noise levels inside noise sensitive rooms in new residential development.

5.2.2 ProPG brings together relevant guidance from several sources including *British Standard BS 8233: 2014 Guidance on sound insulation and noise reduction for buildings* and internationally published guidance in the form of World Health Organisation *Guidelines for Community Noise (1999*). This is summarised in the table below.

ACTIVITY	LOCATION	07:00 - 23:00	23:00 - 07:00
Resting	Living Room	35 dB $L_{Aeq, 16\ hour}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16\ hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16\ hour}$	30 dB $L_{Aeq, 8\ hour}$ 45 dB L_{AFMax} (Note 4)

NOTE 1 The Table provides recommended internal L_{Aeq} target levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

NOTE 2 The internal L_{Aeq} target levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the internal L_{Aeq} target levels recommended in the Table.

NOTE 3 These internal L_{Aeq} target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.

NOTE 4 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. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A).

NOTE 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.

NOTE 6 Attention is drawn to the requirements of the Building Regulations.

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form (see Section 3.D).

Table 5.1 – *ProPG Guidance Levels*

5.3 EXTERNAL BUILDING FABRIC SPECIFICATION & INTERNAL NOISE LEVEL ASSESSMENT

5.3.1 This review is based on the submitted site and dwelling layouts available at the time of writing, targeting the internal noise levels set out in Table 5.2.

5.3.2 The calculated external noise levels at the future dwelling facades in closest proximity to the A415 are confirmed below, based on the measured survey data and site layouts.

LOCATION	PERIOD	NOISE LEVEL	
		$L_{Aeq,T}$ dB	TYPICAL L_{AFmax} dB
Paddocks North elevation	Daytime	59	-*
	Night-time	52	66
Allotments Plots 13 and 14	Daytime	60	-*
	Night-time	53	69
Allotments South elevation of remaining plots	Daytime	57	-*
	Night-time	50	63

Table 5.2 – *Results of environmental sound survey* [dB ref. 20µpa]

*There are no guidance levels or criteria for daytime maximum event levels.

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

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

Table 5.3 – *Proposed dwelling external wall acoustic performance*

5.3.1 On the basis of the measured noise levels at the proposed building facades, 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 typical maximum noise levels in habitable rooms.

5.3.2 Suitable internal noise levels in noise-sensitive rooms can be achieved based on the minimum sound insulation specifications for glazed and ventilation facade elements of the plots given in Table 5.4.

AREA	GLAZING SINGLE FIGURE WEIGHTED SOUND REDUCTION	VENTILATOR PERFORMANCE
Windows with line of sight to A415	$R_w \geq 28dB$	$D_{n,e,w} \geq 30dB$
Facades without line of sight to A415		Any trickle ventilators / Ajar windows

Table 5.4 – *Acoustic facade performances*

5.3.3 The options provided are the minimum acoustic requirement for each identified zone based on the site layout.

5.3.4 The R_w 28dB specification can be achieved by standard proprietary thermal double glazing.

5.3.5 This would allow houses across the proposed development to meet the aspirational targets both in terms of average daytime and night-time noise levels, and typical L_{AFmax} noise events set out in in Paragraph 5.2.2 with windows closed and vents open.

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

5.3.7 Assuming a loss of 15dB for a partially open window, noise levels within dwellings with facades with line of sight to the A415 are likely to exceed the aspirational design targets set out in Paragraph 5.2.2.

5.3.8 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.

5.3.9 Facades without direct line of sight to the A415 are expected to meet the design targets with windows open, due to the increased distance and self-screening associated with the built form of the proposed development.

5.3.10 Where trickle vents or wall ventilators are used, the performance shown in Table 5.4 will be required. The figures stated are for a single vent per room (2000mm^2). If multiple vents are required, then the performance requirement shown in Table 5.4 will increase by a value equal to +10log(N), with N being the total number of vents serving the room.

5.4 OVERHEATING

5.4.1 ProPG states that an overheating scenario should also be considered where, on a hot summer day, it may be desirable for residents to open windows to provide additional ventilation to mitigate overheating, more so than can be achieved through background ventilation provision.

5.4.2 Owing to the location of the plots on site, the initial site-wide risk indication of medium to high risk reduces to a low to medium risk. The recommendation of the AVO is that a Level 2 assessment is optional, but not required.

5.4.3 It should be noted, however, that Building Regulations Approved Document O – *Overheating* (ADO) came into effect in June 2022.

5.4.4 ADO will require the developer to comply with the requirements to mitigate overheating as follows:

> *"3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).*
>
> *3.3 Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.*
>
> *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).*
>
> *3.4 Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use."*

5.4.5 It is noted that the risk of overheating is greater in rooms with glazing elements on a southerly façade, which, on the allotments site, are the façades most exposed to road traffic noise from A415.

5.4.6 On the basis of the night-time noise levels stated in Table 4.2 and assuming a partially open window achieves an outside to inside noise level reduction of 15dB, the limits stated in 3.3a and 3.3b of ADO should be achieved. The overheating mitigation strategy can, therefore, assume that windows can be opened to control overheating on both the allotments and paddocks sites.

5.5 ELEMENT THREE – EXTERNAL AMENITY AREA NOISE LEVELS

5.5.1 ProPG makes it clear that consideration of noise in proposed external amenity areas is an important element in managing noise impact in new residential developments. The ProPG encourages a more holistic consideration of amenity rather than simply rating the level of noise outside.

5.5.2 ProPG states the following regarding the consideration and assessment of noise in external amenity spaces.

3(i) "If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended".

3(ii) "The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB LAeq,16hr."

3(iii) "These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces."

3(iv) Whether or not external amenity spaces are an intrinsic part of the overall design, consideration of the need to provide access to a quiet or relatively quiet external amenity space forms part of a good acoustic design process.

3(v) Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:

a relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or

a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different, protected, location); and/or

a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations.

5.6 EXTERNAL AMENITY SPACE PROPOSALS AND ASSESSMENT

5.6.1 Private external amenity spaces are proposed in the form of gardens to dwellings. A majority of the gardens are situated to the rear of the houses and, as such, will benefit from building mass screening afforded by the dwellings. This should result in the noise levels being within or below the desirable range of $L_{Aeq,16hr}$ 50-55dB.

5.6.2 To achieve appropriate noise levels in the gardens of plots 13 and 14, a 1.8m high close boarded timber fence will need to be constructed along the full southern and western lengths of the plot 14 garden, as indicated in AS12848/SP1.

5.7 ELEMENT 4 – ASSESSMENT OF OTHER RELEVANT ISSUES

5.8 COMPLIANCE WITH RELEVANT NATIONAL AND LOCAL POLICY

5.8.1 National planning policy for England, set out in the Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF) and the ProPG, aims to promote the building of high-quality sustainable homes in desirable areas while ensuring future and existing nearby residents and businesses are not adversely affected by the scheme (including by noise, amongst others).

5.8.2 The ProPG outlines a staged process by which to initially assess the risk posed by the existing noise climate followed by a more in-depth assessment of those risks and consideration of strategies by which they can be mitigated.

5.8.3 This assessment has been carried out following the ProPG process. The risk of potential impact of noise on future residents has been raised by the Local Authority, particularly with regard to noise impacting the site.

5.8.4 This assessment has demonstrated that, by the use of suitable mitigation measures and careful design of facades, layout of the site and internal layout of the dwellings, acceptable noise levels can be achieved both internally and externally.

5.9 MAGNITUDE OF EXTENT OF COMPLIANCE WITH PROPG

5.9.1 This assessment has demonstrated that, using careful acoustic design, both internal and external noise levels can be maintained in properties across the proposed scheme. The development is, therefore, generally compliant with the ProPG.

5.10 ACOUSTIC DESIGN VS UNINTENDED ADVERSE CONSEQUENCES

5.10.1 No significant adverse consequences resulting from the use of the proposed acoustic design have been identified.

5.11 ACOUSTIC DESIGN VS. WIDER PLANNING OBJECTIVES

5.11.1 The acoustic design outlined in the report generally supports the wider planning objectives of providing new homes in desirable areas, close to transport links and local amenities.

6.0 CONCLUSIONS

6.1 Clarke Saunders Acoustics has been commissioned by Thomas Homes to conduct a noise assessment of a proposed residential development at Clifton Hampden.

6.2 The assessment has been undertaken following requirements of national policy, the guidance of the published ProPG: *Planning and Noise: New Residential Developments* [ProPG).

6.3 The Stage 1 ProPG assessment has found that the daytime and night-time noise levels measured on site is considered low to medium risk, where the highest risk is found toward A415. In addition, an AVO Level 1 Assessment indicates a medium to high in close proximity to the A415.

6.4 An Acoustic Design Statement has been prepared on the basis of the proposed site and dwelling layouts, which outlines appropriate measures to mitigate noise impacts and demonstrates the acoustic suitability of the site for residential use.

6.5 Standard thermal double glazing and trickle ventilators should result in the desirable internal noise levels being achieved, whilst the overheating strategy can rely on openable windows, with reference to Approved Document O.

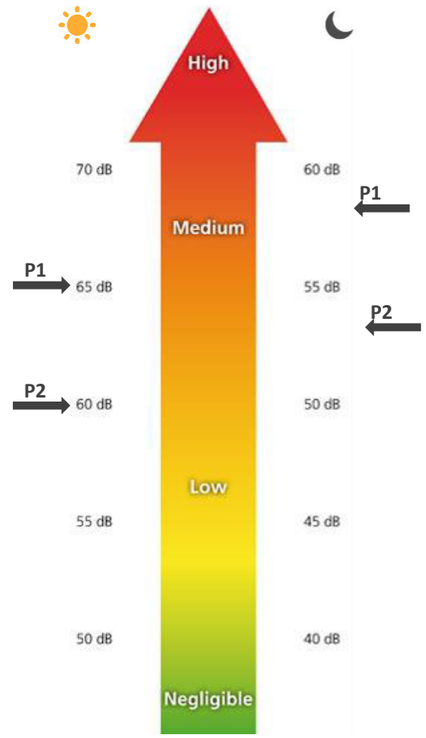
6.6 Private amenity spaces should experience noise levels within or below the aspirational design range of ProPG across the site, with a close boarded fence provided around the garden of plot 14.

Michael Symmonds MIOA
CLARKE SAUNDERS ACOUSTICS

ProPG: Planning & Noise – Stage 1 Risk Assessment Summary

Project:	Burcot and Clifton Hampden
Figure:	AS12848/PROPG

Daytime:	P1: 65 dB $L_{Aeq,16hour}$ P2: 60 dB $L_{Aeq,16hour}$
Night-time:	P1: 58 dB $L_{Aeq,8hour}$ P2: 53 dB $L_{Aeq,8hour}$

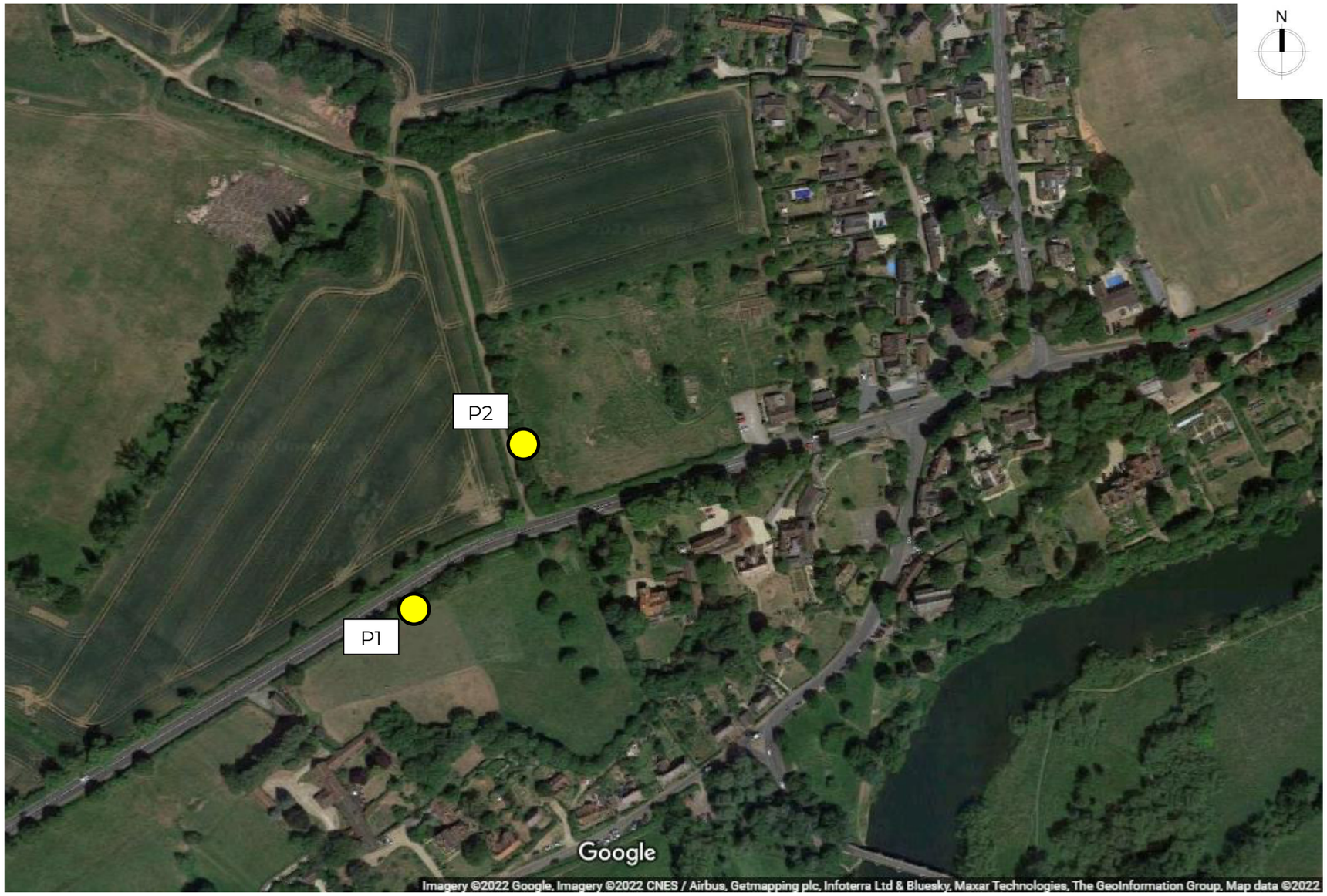


ProPG: Planning & Noise – Stage 1 Risk Assessment Summary

A survey of the existing noise climate was undertaken at the monitoring positions between Thursday 24th November and Tuesday 29th November 2022.

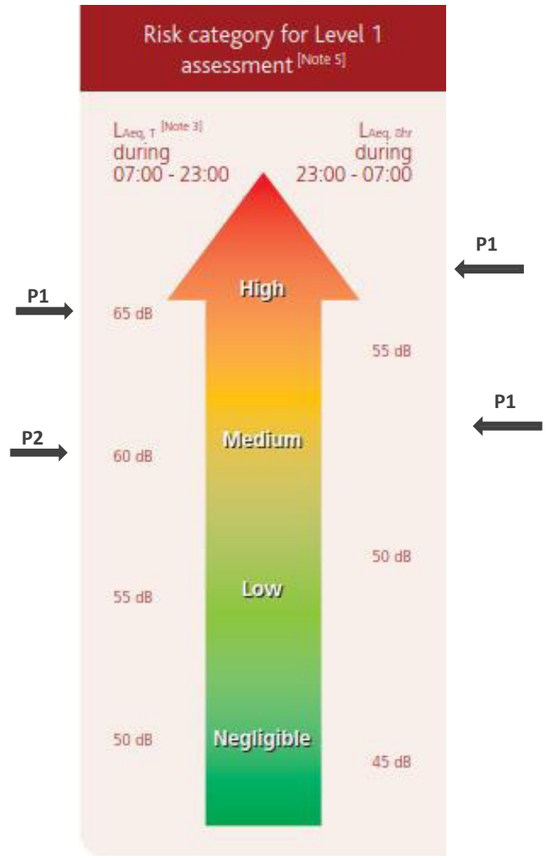
Noise levels generally represent a low to medium risk in terms of noise impact. A Stage 2 Acoustic Design Statement should be prepared.

AVOG – Level 1 Site Risk Assessment for Overheating Condition Summary



Project:	Burcot and Clifton Hampden
Figure:	AS12848/AVOG

Daytime:	P1: 65 dB $L_{Aeq,16hour}$ P2: 60 dB $L_{Aeq,16hour}$
Night-time:	P1: 58 dB $L_{Aeq,8hour}$ P2: 53 dB $L_{Aeq,8hour}$



AVOG: Level 1 Site Risk Assessment for Overheating Condition Summary

A survey of the existing noise climate was undertaken at the monitoring positions between Thursday 24th November and Tuesday 29th November 2022.

Noise levels represent a medium to high risk of adverse effect in respect of overheating without mitigation in close proximity to the A415, therefore an AVOG Level 2 Assessment may be required, dependent on the placement of the plots.

Allotments Site

Paddocks Site

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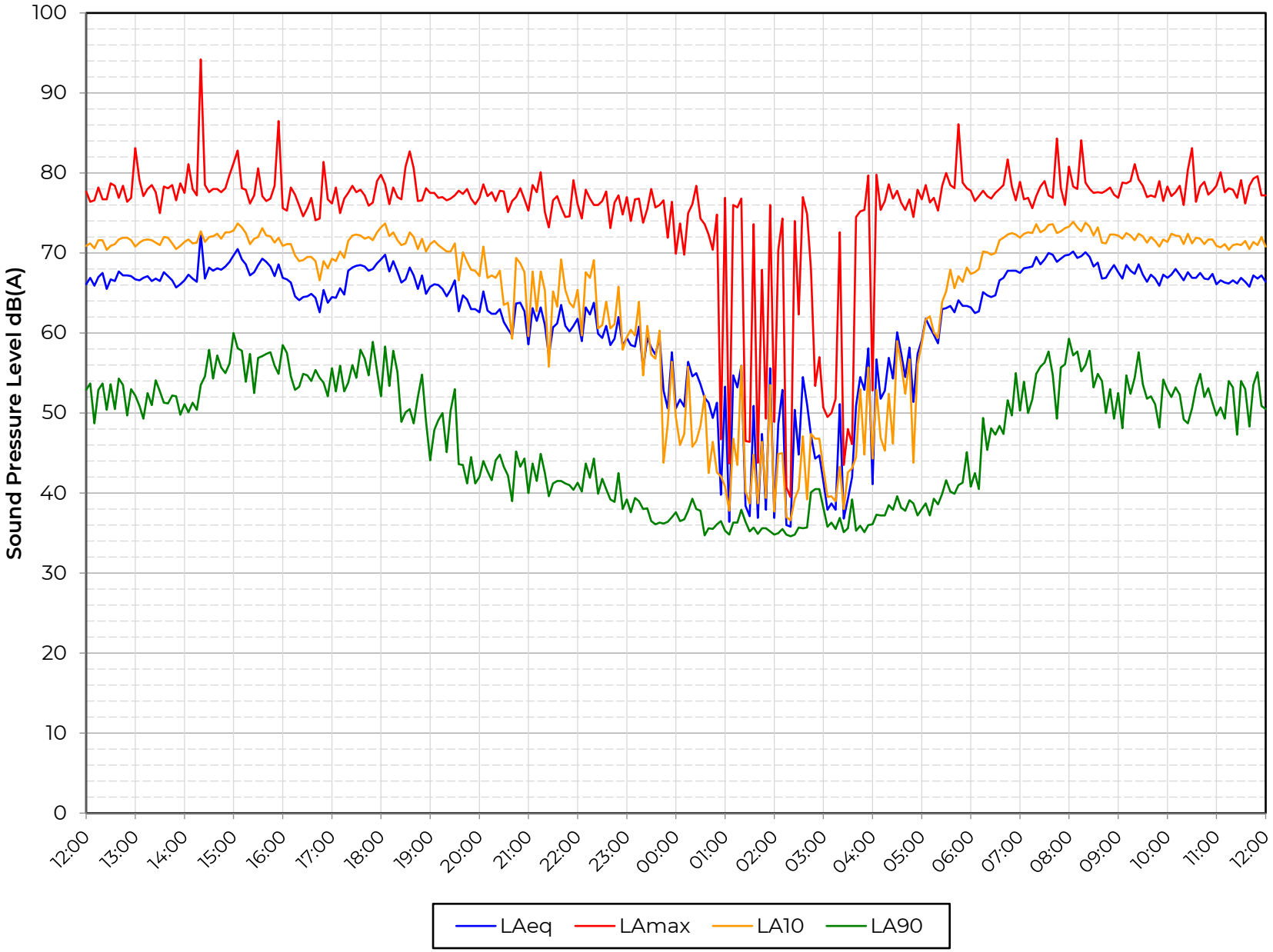
Clifton Hampden NDO

Position 1: Paddocks Site



Thu 24 Nov to Fri 25 Nov

Figure AS12848/TH1

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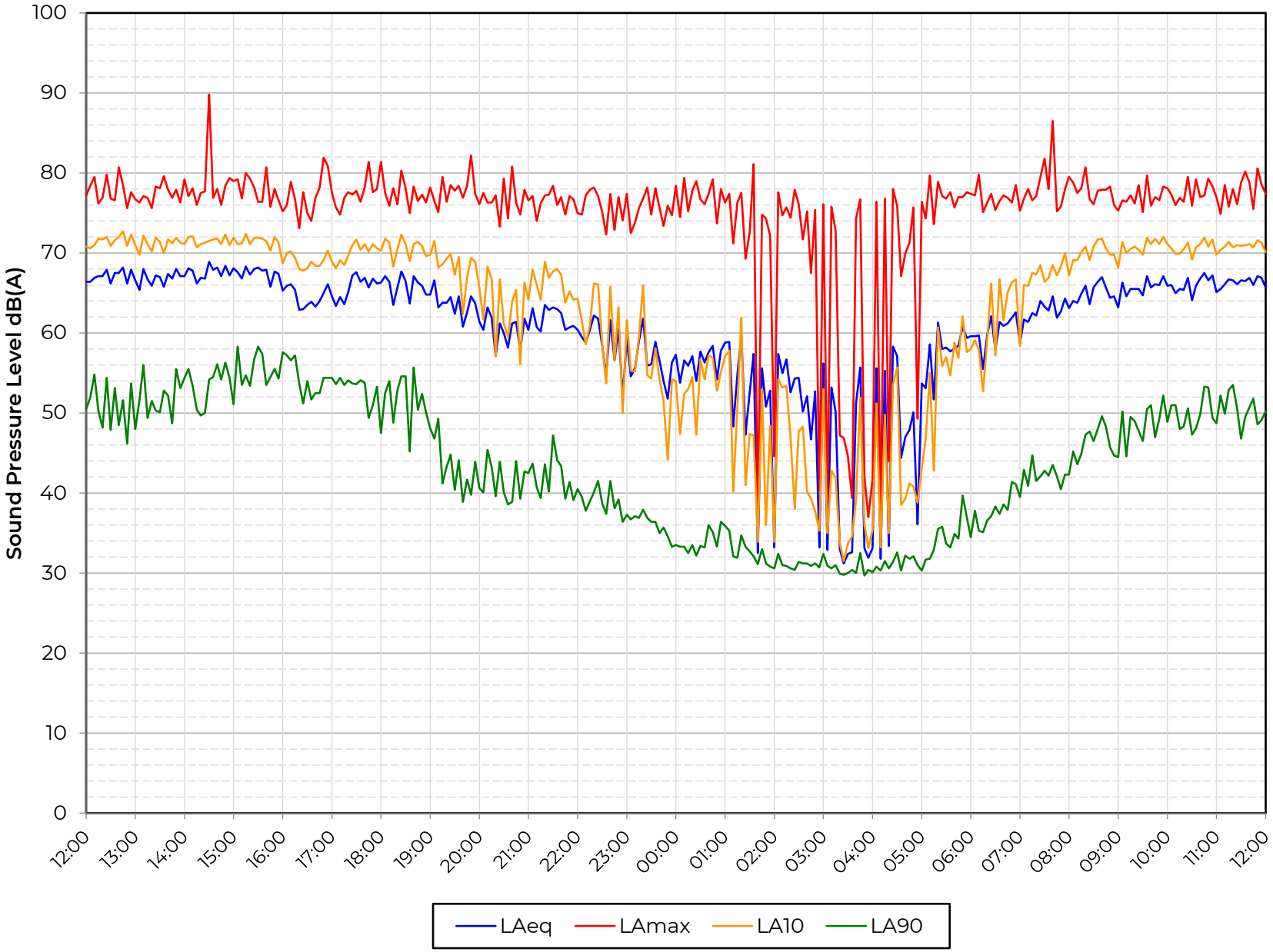
Clifton Hampden NDO

Position 1: Paddocks Site



Fri 25 Nov to Sat 26 Nov

Figure AS12848/TH2

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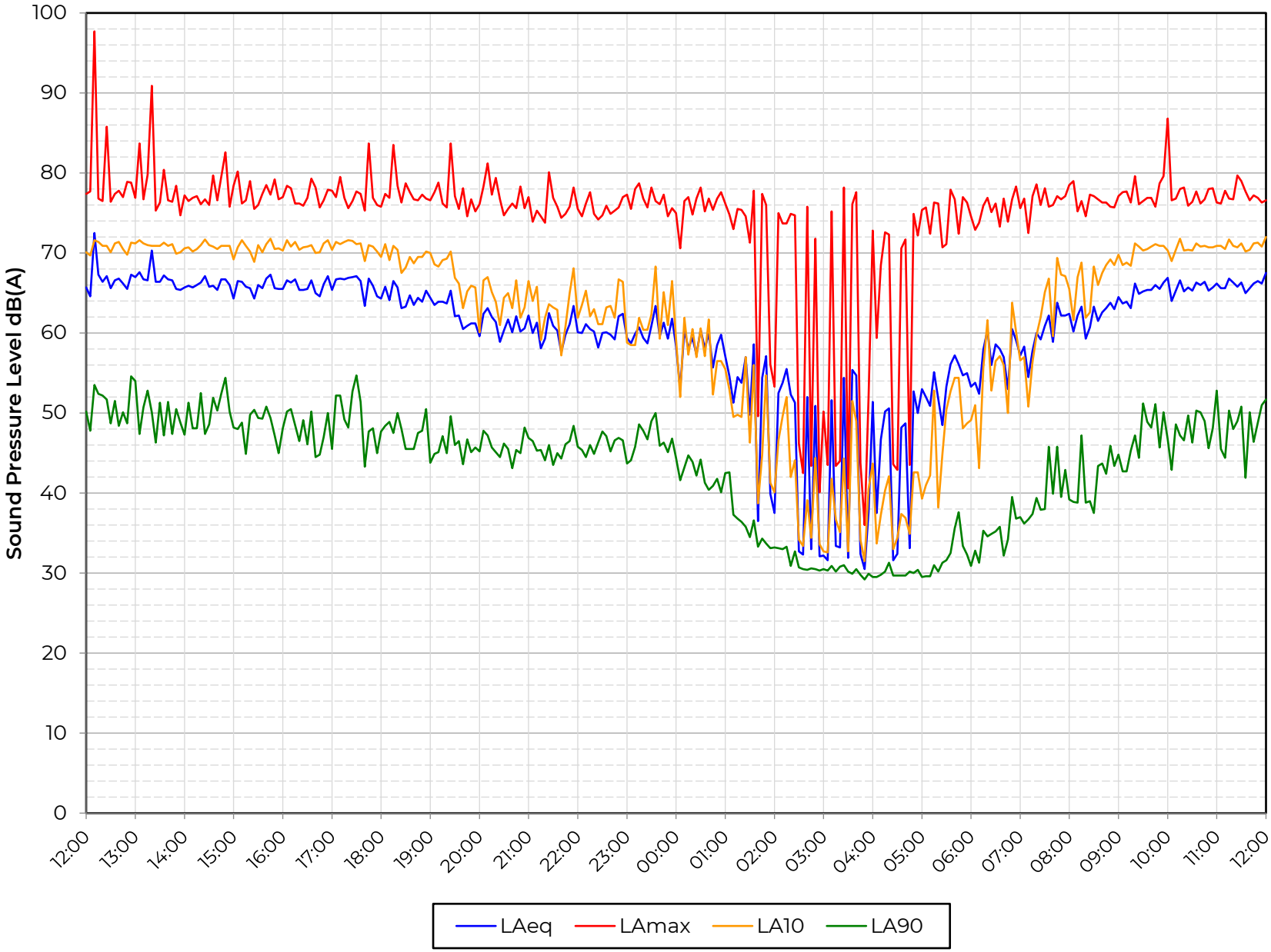
Clifton Hampden NDO

Position 1: Paddocks Site



Sat 26 Nov to Sun 27 Nov

Figure AS12848/TH3

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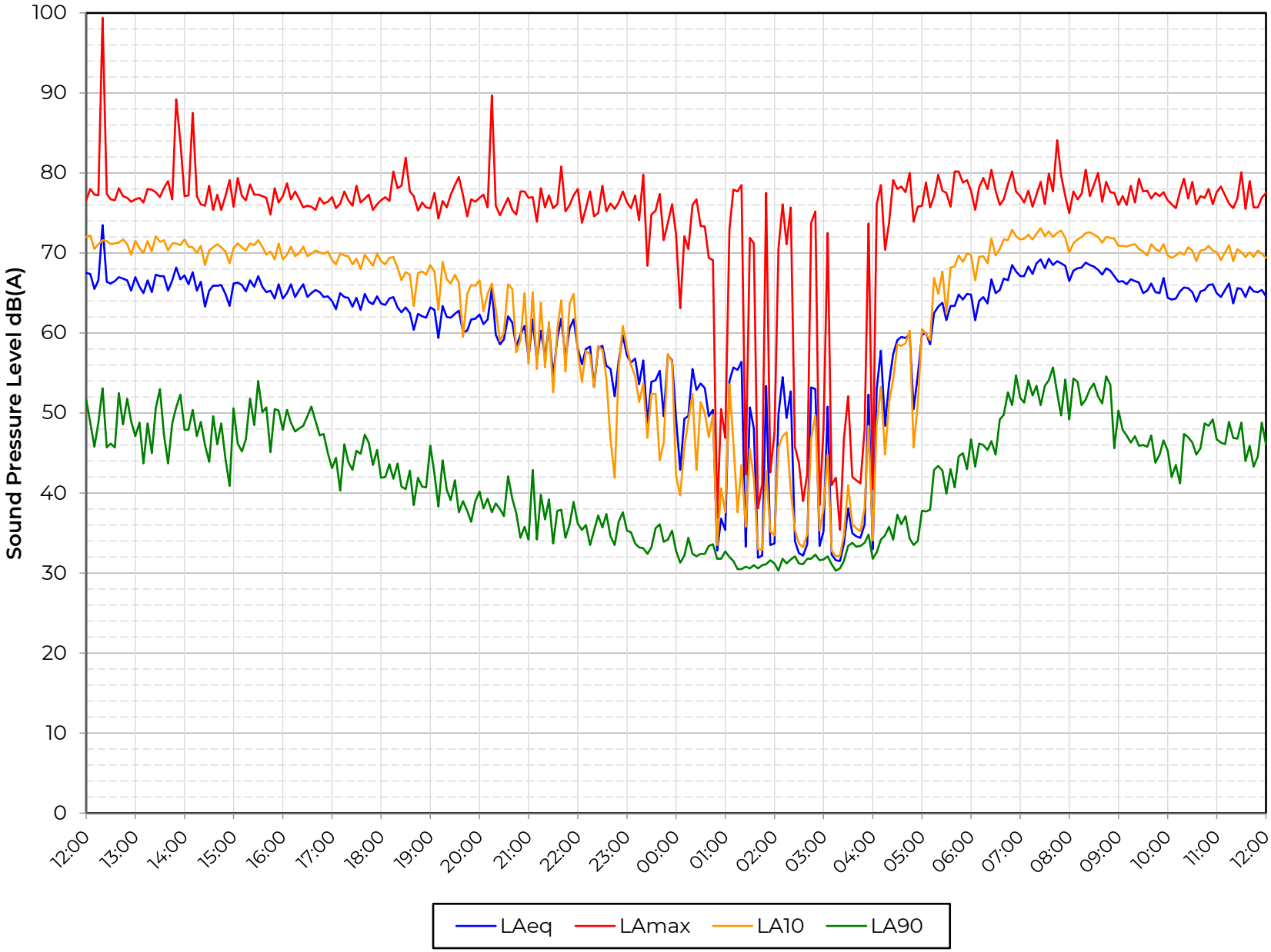
Clifton Hampden NDO

Position 1: Paddocks Site



Sun 27 Nov to Mon 28 Nov

Figure AS12848/TH4

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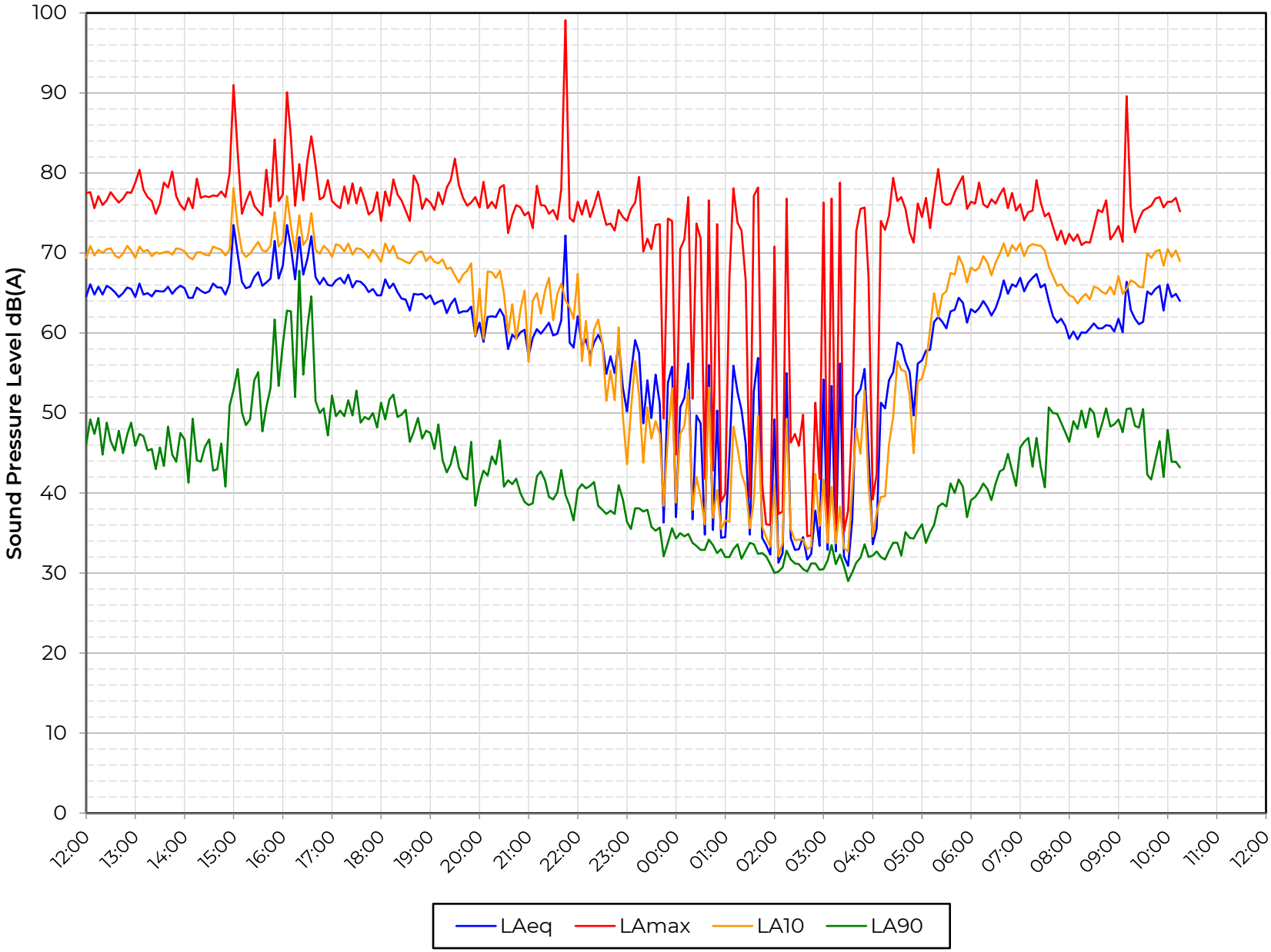
Clifton Hampden NDO

Position 1: Paddocks Site



Mon 28 Nov to Tue 29 Nov

Figure AS12848/TH5

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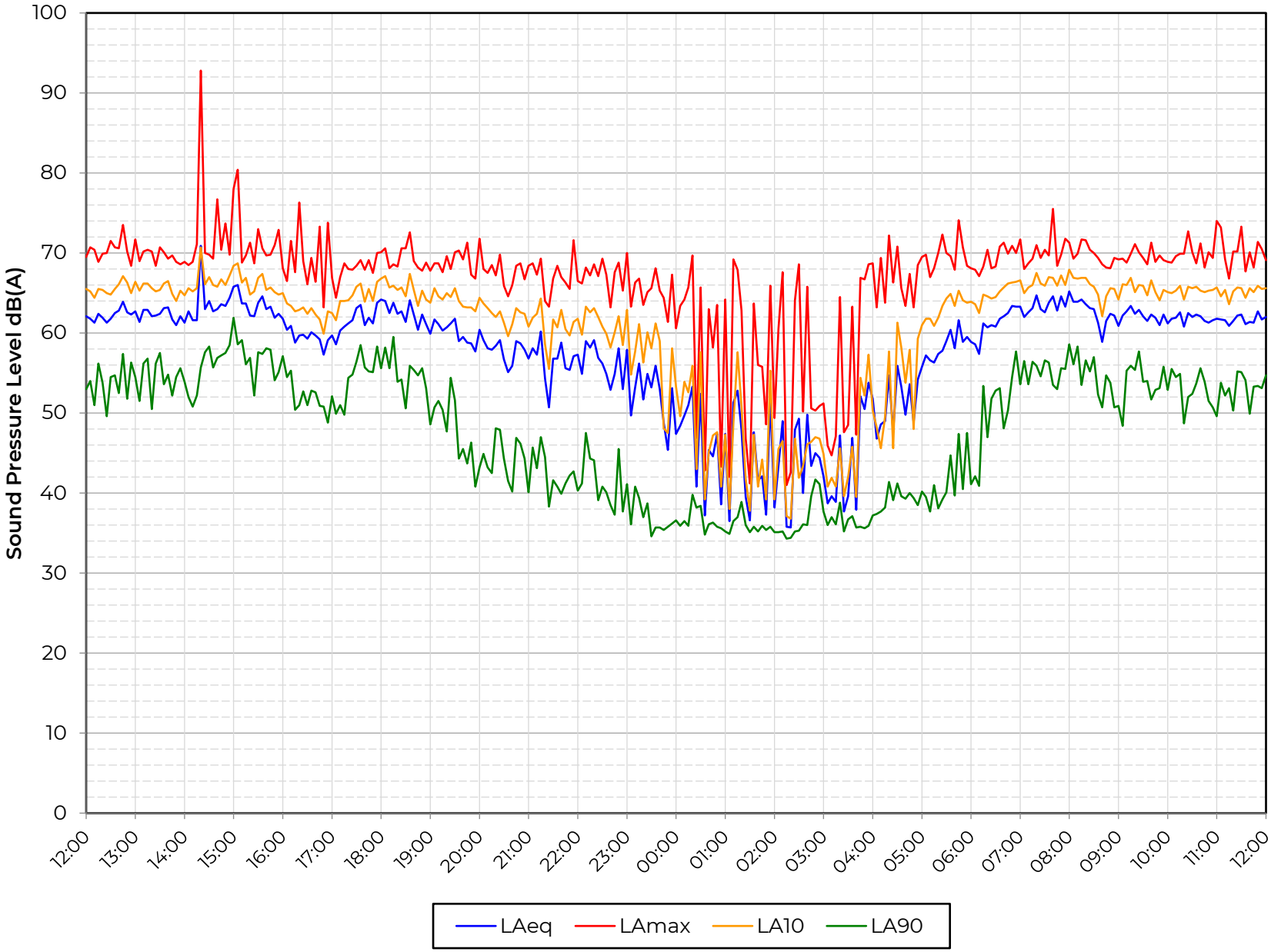
Clifton Hampden NDO

Position 2: Allotments Site



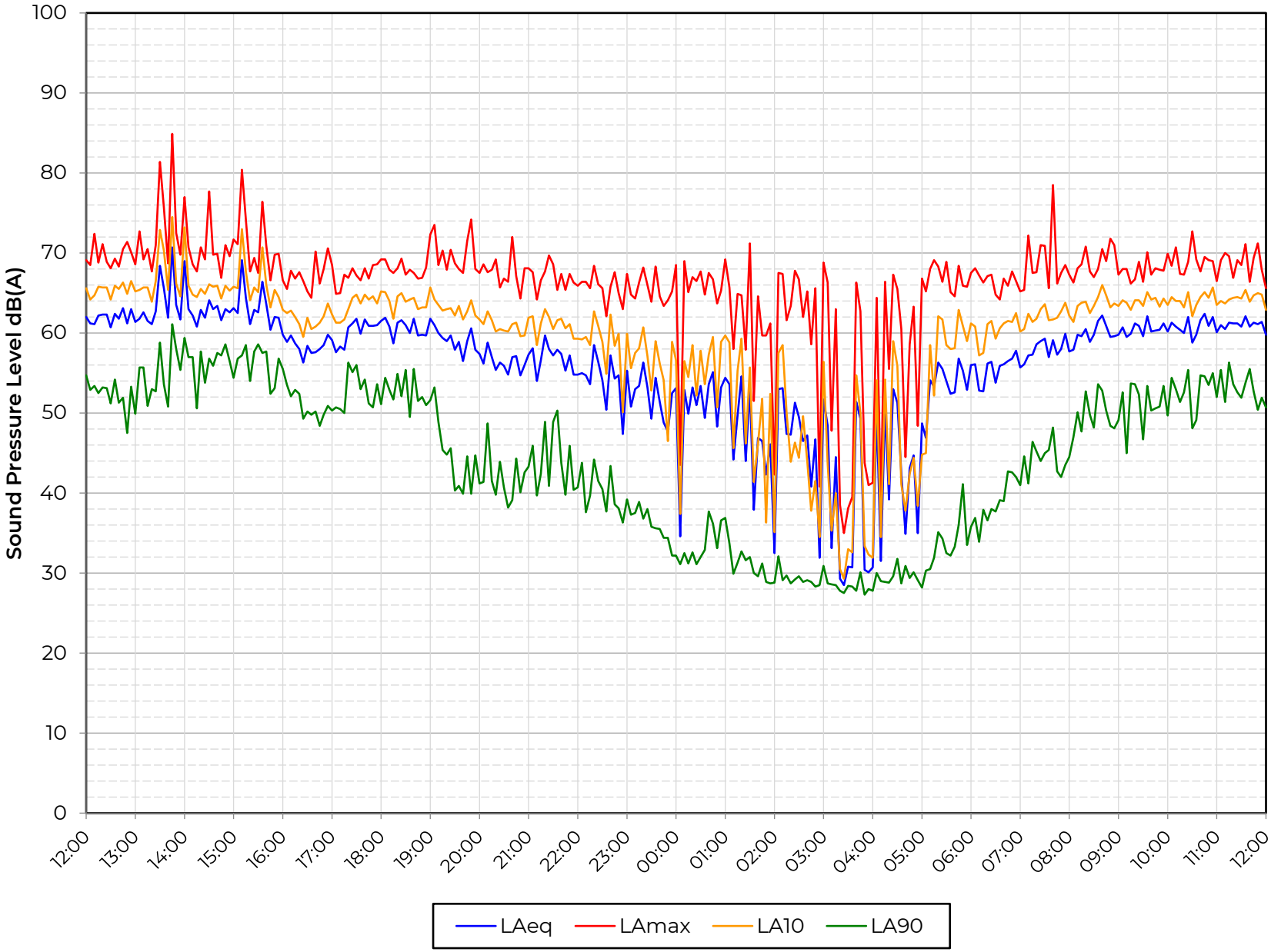
Thu 24 Nov to Fri 25 Nov

Figure AS12848/TH6

clarke saunders acoustics

Clifton Hampden NDO

Position 2: Allotments Site



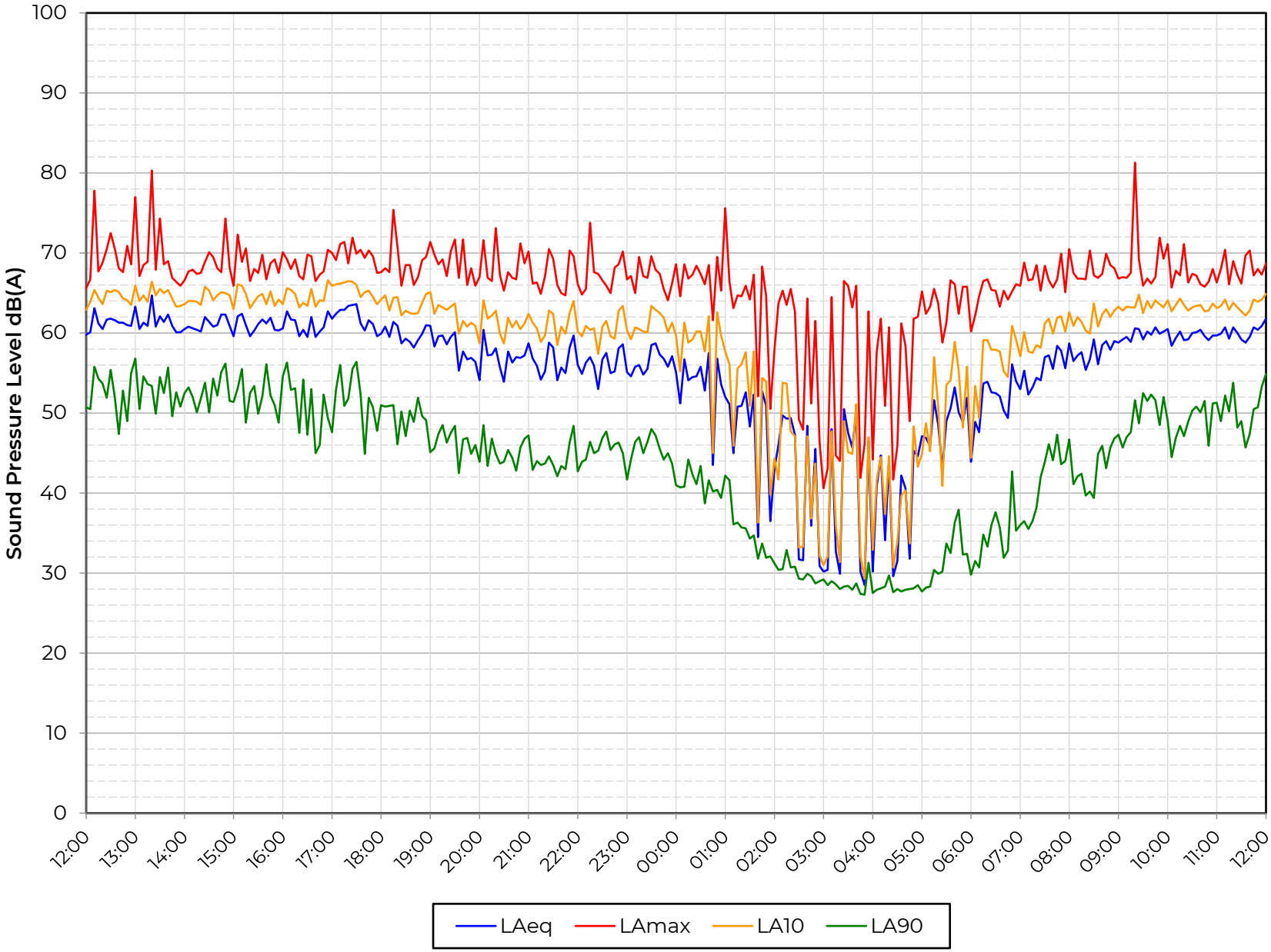
Fri 25 Nov to Sat 26 Nov

Figure AS12848/TH7

clarke saunders acoustics

Clifton Hampden NDO

Position 2: Allotments Site



Sat 26 Nov to Sun 27 Nov

Figure AS12848/TH8

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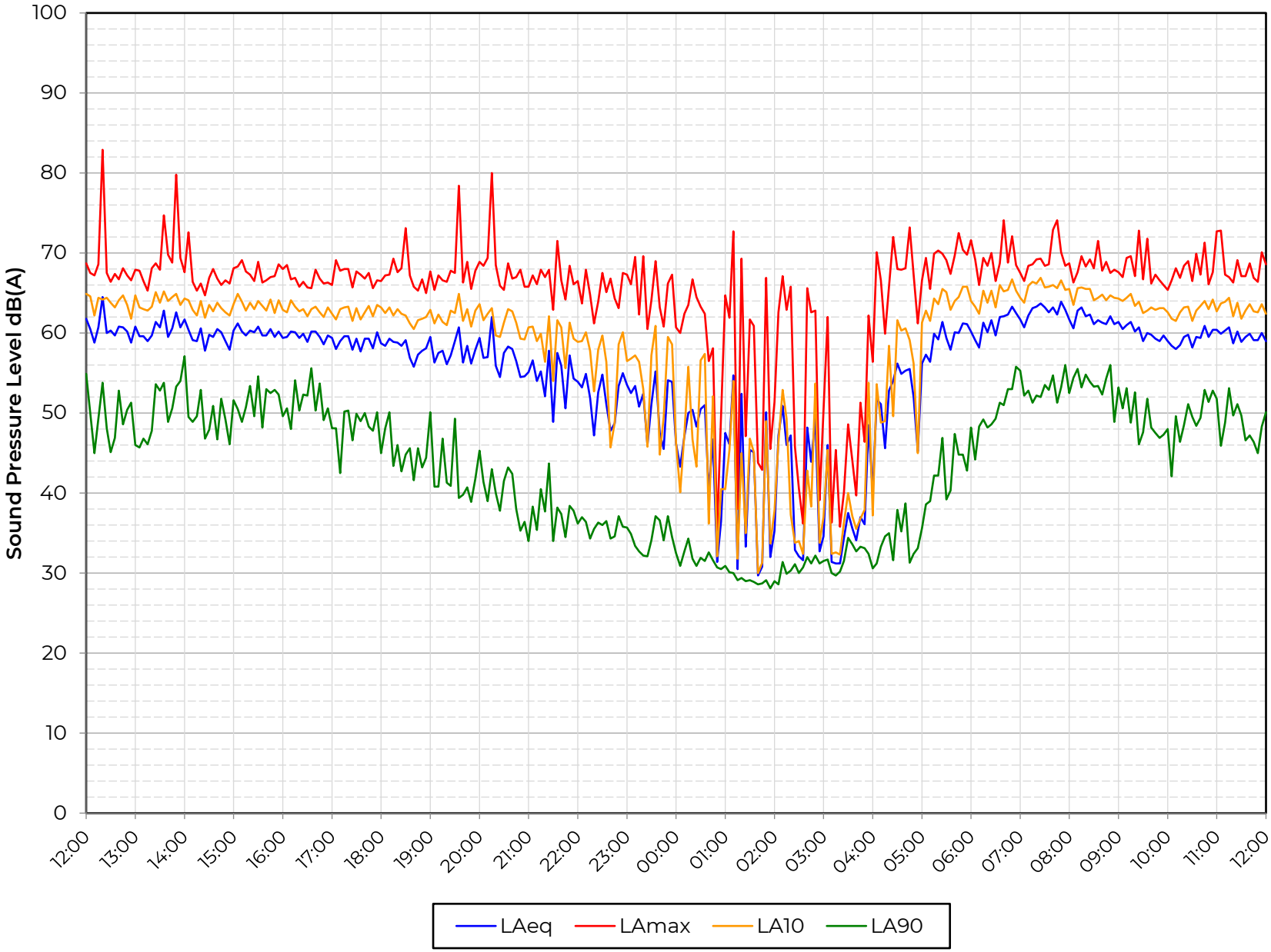
Clifton Hampden NDO

Position 2: Allotments Site



Sun 27 Nov to Mon 28 Nov

Figure AS12848/TH9

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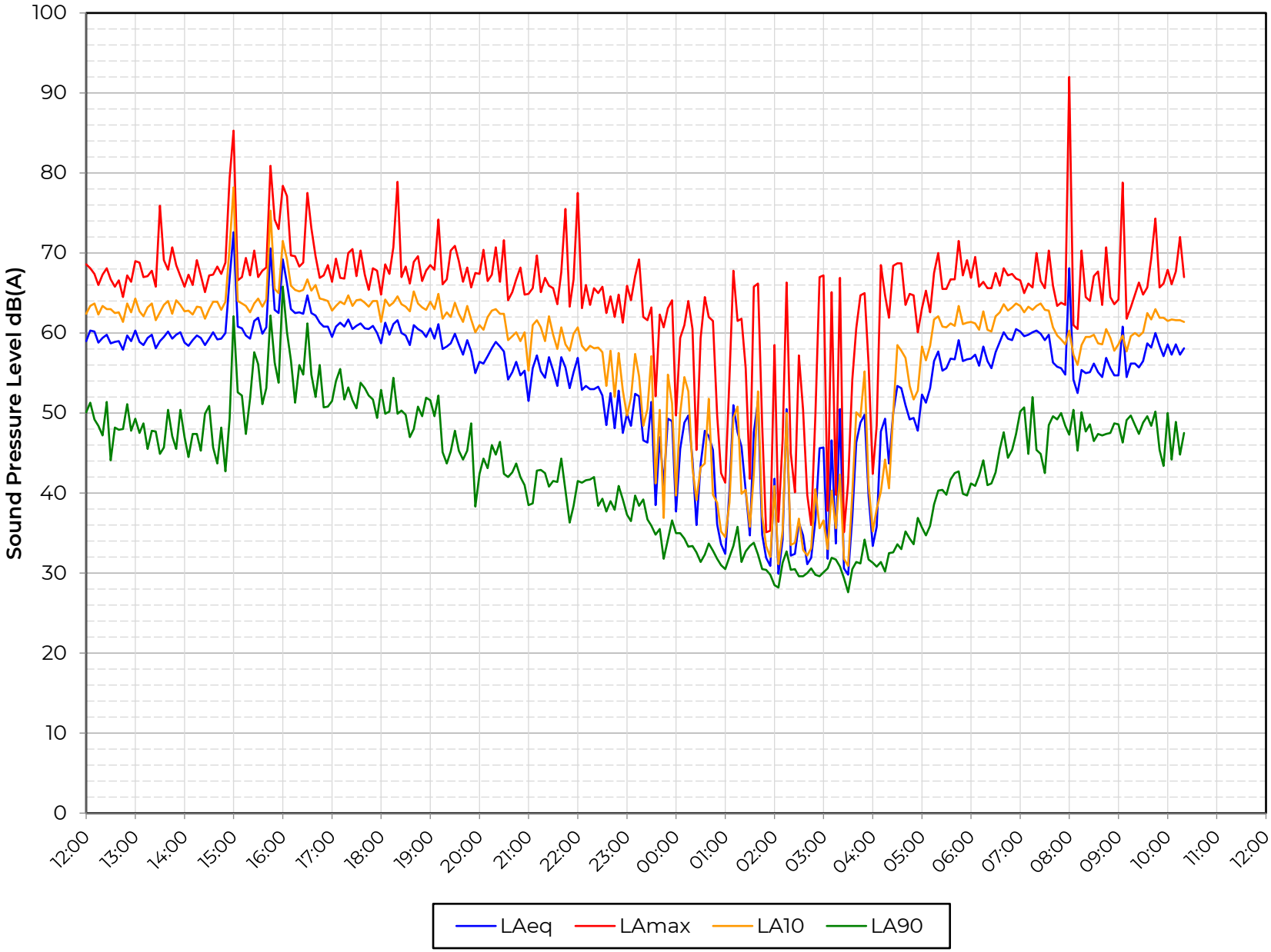
Position 2: Allotments Site



Mon 28 Nov to Tue 29 Nov

Figure AS12848/TH10

1.1 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.

1.2 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